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AComIn: Advanced Computing for Innovation

**FP7 Capacity Programme
Research Potential of Convergence Regions**

D5.2 Dissemination activities m. 36

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Galia Angelova, AComIn Coordinator**

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Version 1.1

EXECUTIVE SUMMARY

The deliverable D5.2 "Dissemination activities m. 36" contains the description of all dissemination activities carried out during Reporting period 2 of the AComIn project. The objectives of these activities were: 1) to inform regularly the EU ICT community about the AComIn results and the created new opportunities for cooperation with the IICT researchers and 2) to promote the leading IICT technologies at regional and national levels. During these activities the results, work and achievements of the incoming experienced researchers were presented. In this way the successful cooperation on European and world level as well as the opportunities for doing ICT research in Bulgaria were promoted.

All dissemination activities described in this document correspond to the AComIn Technical Annex "Description of Work".

During the reporting period AComIn has disseminated the project results to a broad scientific audience within 9 scientific events. Four of them belong to world-wide renowned series of International Forums: the International Conference on Numerical Methods and Applications (NMA), the International Conference "Artificial Intelligence: Methodology, Systems, and Applications" (AIMSA), the International Conference "Large Scale Scientific Computations" (LSSC) and the International Conference "Recent Advances in Natural Language Processing" (RANLP). Five events are workshops oriented mainly towards Bulgarian academic and industrial communities: the International Workshop "Advanced Control and Optimisation: Step Ahead' 2014", the First International Workshop on Biometrics (BIOMET'2014), the International Workshop "Control in Transportation Systems 2014", the International Workshop "Big Data in Natural Language Processing, Education and Digital Collections", and the International Workshop on Information Fusion (IWIF 2015).

In order to raise awareness about novel technologies enabled by AComIn and to promote the potential of the Smart Lab devices, 13 Technology Transfer seminars were organised intended for 5 different User Communities. Two seminars were intended for the User Community "Intelligent Management of Digital Content", three seminars - for the User Community "Advances in 3D Technologies", three seminars were organized for the User Community "Industrial Mathematics", three seminars – for the User Community "Advances in Material Analysis", and two seminars were organized for the user Community "Mechatronics and Industrial Applications". The results of all these technology transfer seminars can be evaluated as very successful since they have allowed strengthening the existing and creating new contacts of IICT researchers with Bulgarian industrial organisations, their regional branches as well as with individual professionals from various spheres. These contacts have served as a basis for carrying out some pilot projects in the area of Industrial mathematics, Non-destructive testing and 3D digitisation.

Promoting AComIn to society has been achieved by organising 3 events and by participating in 4 events. A meeting of the non-scientific Stakeholders' Committee was organised along with the meeting of the Science, Technologies and Innovation Expert Council to the Mayor of Sofia Municipality. Among the Meetings participants were two Vice-ministers of Education and Science, the Mayor of Sofia, Advisors of the President of the Republic of Bulgaria, Heads of NGOs related to Sofia Municipality and the Bulgarian government, leading figures in high educational institutions, directors and key scientists in academic institutions, as well as representatives of professional associations. Promoting AComIn to policy makers was also done at the regional meeting devoted for presentation of the "Innovation Strategy for smart specialisation 2014-2020". The event was attended by representa-

tives of the Ministry of Economy, Ministry of Regional Development and Public Works, the district governors in the South West region of Bulgaria, Mayors of the regional municipalities, Rectors of the universities in the region, NGOs representatives and others.

Presenting AComIn to more technical and business oriented audience was done at the Annual International Technical Fair in Plovdiv in September 2014, which is the biggest fair in Bulgaria.

The Second Doors Open Days were organised in April 2014 as a wide-scale dissemination event aiming at demonstrating the potential of the Smart Lab equipment and attracting young researchers from near-by countries to apply to post-docs positions in IICT-BAS. The event was attended by more than 150 representatives of the state administration, ministries and NGOs, as well as scientists from various institutes of the Academy of Sciences and universities, representatives of Bulgarian companies, and students. It was also announced and widely presented by several Bulgarian media (radio, TV, newspaper and information websites). The event can be assessed as very successful and has resulted in creating new contacts with scientific as well as industrial organisations from Bulgaria and abroad. Several ideas for new joint scientific and application-oriented projects exploring the Smart Lab devices have been proposed.

The AComIn project was also promoted at the First Children's Festival "iCreate: Children's Workshops for Science, High Tech and Art" organised by the Contemporary Art Foundation in the Vivacom Art Hall, Sofia on 24 May 2015. 3D figures and tactile matrices, elaborated in the project, were shown at the Exhibition "The Battle of Pavia in 1525" - an accompanying event of Expo 2015 that is held in June – November 2015 in Visconti Castle, Pavia, Italy. So AComIn was also promoted at this famous event that blends Art and Technology.

The project activities were also covered in 2 issues of the AComIn Newsletter published in English and Bulgarian.

The project achievements were appreciated by awarding the "Big Award Pitagor for successful leadership of international projects" to Prof. Galia Angelova, the Coordinator of AComIn, by the Minister of Education and Science on 18 June 2015.

The order of events in D5.2 "Table of Content" follows the enumeration accepted in the Deliverable D5.1 that presents AComIn dissemination activities in month 1-18. Scanned Lists of Participants in the AComIn events presented in D5.2 are uploaded in the AComIn Team Area, Reports, WP5 Dissemination Activities.

Document Information

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Work package	Number	5	Title	Dissemination

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Summary	Deliverable D5.2 "Dissemination activities m. 36" contains the description of all dissemination activities accomplished during the second Reporting period of AComIn project. The objectives of these activities were twofold: 1) to inform regularly EU ICT community about the AComIn results and the created new opportunities for cooperation with the IICT-BAS researchers and 2) to promote the leading IICT-BAS technologies at regional and national levels. During these activities the results, work and achievements of the incoming experienced researchers were presented. In such a way the successful cooperation on European and world level as well as the opportunities of doing ICT research in Bulgaria were promoted. All dissemination activities described in this document correspond to the planned tasks in AComIn Technical Annex "Description of Work".	
Keywords	Dissemination activities, Conferences, Workshops, Information days, Technology Transfer Seminars, User Communities, Door Open Days	
Version log/Date	Change	Author
v. 0.1, 20/07/2015	Table of Content presented to the AComIn Executive Board for approval	Gennady Agre
v. 0.2, 20/08/2015	Version 0.2 sent to AComIn Executive Board for comments and suggestions	Gennady Agre
v. 1.0, 30/09/2015	Final version 1.0 for delivery to the EC	Gennady Agre

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1. SECOND STAKEHOLDERS' MEETING

The Second Meeting of AComIn Stakeholders' Committee was held in IICT-BAS on 14 July 2015. It was organised along with the Meeting of the Science, Technologies and Innovation Expert Council to the Mayor of Sofia Municipality. The Meeting was opened by the Sofia Mayor Mrs Yordanka Fandakova in the presence of Prof. Nikolai Denkov and Prof. Kostadin Kostadinov, Vice-ministers of Education and Science.



More than 35 guests attended the meeting: Advisors of the President of the Republic of Bulgaria, Heads of NGOs related to Sofia Municipality and the Representatives of the Bulgarian government, leading figures in high educational institutions, directors and key scientists in academic institutions, as well as Heads and Representatives of professional associations.

Mrs Svetlana Lomeva, Executive Director of Sofia Development Association, presented a draft of the Innovation Strategy of Sofia.



Prof. Nikolai Denkov, a Vice-minister of Education and Science, presented the forthcoming Operational programme “Science and Education for Intelligent Growth” and focused more deeply on the instruments “Centres of Excellence” and “Centres of Competence”.



The Director of IICT Prof. Svetozar Margenov delivered a summary of the institute achievements and discussed their relevance to the National Research and Innovation Strategy for Smart Specialisation.



Prof. Galia Angelova, Co-ordinator of AComIn, presented the project and its relevance to the Bulgaria's Research and Innovation Strategy for Smart Specialisation. Prof. Dimitar Karastoyanov, Smart Lab manager, presented the innovation aspects of AComIn and the achievements in establishing links between the academia and industry.



Finally Prof. Dimitar Tcharaktchiev from Medical University Sofia presented a joint development between AComIn and the University Specialised Hospital for Active Treatment of Endocrinology for semi-automatic extraction of the Bulgarian diabetic register, using language technologies for analysis of Bulgarian text.

In the discussion that followed the presentations the guests noted the compliance of IICT research directions (in general) and AComIn results (in particular) to the topics of the Bulgarian Research and Innovation Strategy for Smart Specialisation and the forthcoming Innovation Strategy of Sofia. The guests appreciated the high quality of the research done in AComIn and its efforts for building User Communities.

The Meeting ended with demonstrations of the AComIn equipment (Smart Lab) and applications developed using several high tech devices.



The program of the Meeting can be found in http://www.iict.bas.bg/acomin/appreciation/14-July-2015/Programme_14_July_2015_Final_print.pdf.

2. USER COMMUNITY SEMINARS MONTHS 19-36

During the reporting period 12 technology transfer seminars were organised intended for 5 different User Communities. Two seminars (“New Trends in e-Learning “ and “New Trends in the Development of Cultural Heritage Digital Libraries”) were intended for the user community “Intelligent Management of Digital Content”. The seminars were attended by 47 participants from research institutions and companies.

Three seminars (“3D Visualization of Cultural Heritage”, “Digitisation and Creation of 3D Replicas of Cultural Heritage Objects” and “3D Digitisation and Virtual Reality”) were intended for the User Community “Advances in 3D Technologies”. The seminars were attended by 88 participants.

Three seminars (“Advanced Numerical Methods”, “Biomedical Simulation” and “Mathematics in Industry”) were organized for the User Community “Industrial Mathematics”. The seminars were attended by 93 participants.

Three Technology Transfer Seminars (“Microstructure Material Analysis”, “Advanced Techniques in Non-Destructive Testing” and “Advanced Material Characterisation, Modelling, and Numerical Simulations”) were organized for User Community “Advances in Material Analysis”. The seminars were attended by 92 participants from universities, academy and industry.

Two seminars (“Robotics and Innovations” and “Advanced Computing for Innovation - Industrial Applications”) were organized for the User Community “Mechatronics and Industrial Applications”. The seminars were attended by 85 participants from universities, academy and industry.

The results of all these technology transfer seminars can be evaluated as very successful since they have allowed strengthening the existing and creating new contacts of IICT-BAS researchers with Bulgarian industrial organisations, their regional branches as well as with individual professionals from various spheres. These contacts have served as a basis for carrying out some pilot projects in the area of Industrial mathematics, Non-destructive testing and 3D digitisation.

More details about the seminars are presented in Deliverable *D2.4 Building User Communities*.

3. THE SECOND INFORMATION DAY

The Second Information Day took place on 23 October 2014 in Panagyurishte, Bulgaria and was devoted to discussing the project achievements in year 2. The third meeting of AComIn's Steering Committee took place after the Information Day. The event contained nine presentations about various AComIn activities (see Program below). Two talks summarised the results of the incoming post-docs, recruited in the project (Dr. Jean Michel Sellier and Dr. Ivan Georgiev). The Progress report for year 2 was presented too, including a discussion of the project progress towards the objectives, explanation of deviations and the related contingency plan, as well as a financial analysis.

Information Day and 3rd Steering Committee Meeting Agenda 23 October 2014

Chair: Gennady Agre

8.45 – 9.00 Opening

9.00 – 9.30 Galia Angelova, Overview of AComIn Progress in year 2 (including more details about WP2 and WP3)

9.30 – 9.45 Svetozar Margenov, Appointments in WP1 "Strengthening the IICT Human Potential"

9.45-10.00 Dr Jean Michel Sellier, Post-doc achievements in AComIn

10.00-10.15 Dr Ivan Georgiev, Post-doc achievements in AComIn

10.15-10.35 Coffee break and questions on reported activities in WP1, WP2 and WP3

Chair: Galia Angelova

10.35-10.50 Kostadin Kostadinov, IICT Sustainability Strategy (presentation of D7.6, month 24)

10.50-11.05 Dimitar Karastoyanov, Innovation Activities in WP4 and User Communities

11.05-11.20 Gennady Agre, Dissemination activities in WP5 and User Communities in "Management of Digital Content" & "3D in Cultural Heritage"

11.20-11.35 Desislava Ivanova, AComIn at the International Technical Fair Plovdiv 2014: established contacts and lessons learnt

11.35-11.50 Dimo Dimov, Partnering with Pavia in successful event organisation

11.50-12.05 Todor Stoilov, Partnering with Crete in advanced transportation systems

12.05-12.15 Questions on reported activities in WP4 and WP5

12.15-14.00 Lunch Break

Chair: Dimitar Karastoyanov

14.00-14.40 Watching the movie "AComIn: the People" (part 1 of the 3 movies that will be developed within AComIn project)

14.40-15.00 Svetozar Margenov, Increasing the IICT Research Capacity: assessing research achievements of the employed incoming post-docs (WP1) and the added value of WP2-WP5

15.00–15.30 Galia Angelova, Wrapping up, Progress Management Report for year 2, Plans for year 3

15.30-16.30 Coffee break and informal discussions

16.30-17.30 Meeting of the Steering Committee members, discussing D7.5 ("Steering Committee conclusions regarding year 2")

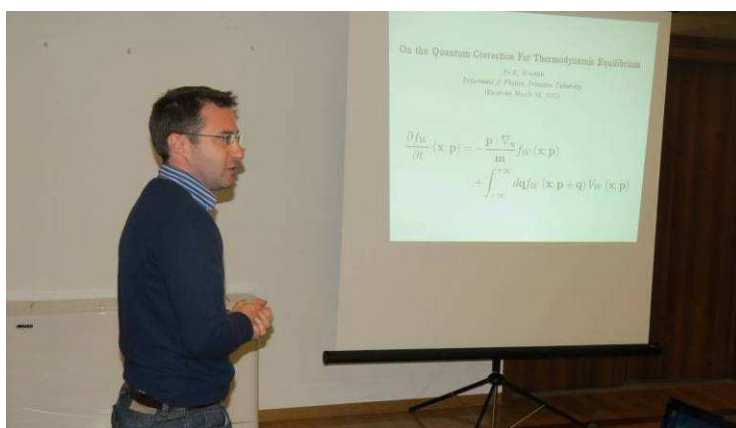
17.30 Feedback from the International Partners and suggestions for year 3

18.00 Closing

After the Information Day presentations, the Steering Committee members met at a special session to discuss findings, make suggestions and plan further tasks in year 3. They agreed that the general evaluation about the project progress in year 2 is positive. AComIn attracted excellent post-doctoral researchers, who came to Bulgaria from abroad, and continues keeping the high standards in the selection of further incoming experienced scientists. SmartLab runs since December 2013 and several growing User Communities are established. The Networking follows the plan, the implementation of secondments speeds up. Two AComIn-related patents are registered. The Dissemination is active, often targeted to the general audience (not only to the academic community).



A more detailed report on the Steering Committee decisions can be found in Deliverable D7.5 http://www.iict.bas.bg/acomin/docs/deliverables/D7_5.pdf.



4. THE SECOND DOORS OPEN DAYS

The Second AComIn Doors Open Days were held at IICT-BAS on 17-18 April 2015. The event programme included demonstration of Smart Lab devices and software purchased during the project as well as over 40 poster presentations (see <http://www.iict.bas.bg/acomin/events/17-18-April-2015/ProgrammePosters.pdf>).

AComIn (Advanced Computing for Innovation), FP7 grant 316087
Doors Open Days 17-18 April 2015, IICT-BAS, Acad. G. Bonchev str. Block 2 and Block 25A, Sofia 1113
Results and Demonstration of Applications (using the devices of Smart Lab)

Friday 17 April 2015 / sessions in English									
10:00	OPENING Hall 2, Block 25A								
11	3D Visual Wall and 3D Visualisation: Simulations in nano-electronics, material sciences, computational mechanics Hall 2 Block 25A			3D Printer 3D Scanner Halls 010 - 002 Block 2				AComIn Patent Applications Lobby 2 nd floor Block 2	Young Researchers' Posters Lobby 2 nd floor Block 25A
12	Acoustic camera Hall 218 Block 25A	Thermo - and high speed cameras, Hall 507 Block 2	Laser Particle Sizer and EDEM software Hall 110 Block 2	Tomography & Microstructures Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	AComIn movie 1 "The people" Hall 2 Block 25A
13	Lunch, Discussions								
14	3D Visual Wall and 3D Visualisation: Simulations in nano-electronics, material sciences, computational mechanics Hall 2 Block 25A			3D Printer 3D Scanner Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	Young Researchers' Posters Lobby 2 nd floor Block 25A
15	Acoustic camera Hall 218 Block 25A	Thermo - and high speed cameras, Hall 507 Block 2	Laser Particle Sizer and EDEM software Hall 110 Block 2	Tomography & Microstructures Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	AComIn movie 1 "The people" Hall 2 Block 25A
16	Discussions			3D Printer 3D Scanner Halls 010 - 002 Block 2	Discussions			Young Researchers' Posters Lobby 2 nd floor Block 25A	
17	Discussions			Tomography & Microstructures Halls 010 - 002 Block 2	Discussions				
18:00	Closing								

Saturday 18 April 2015 / sessions in Bulgarian									
10:00	OPENING Hall 2, Block 25A								
11	3D Visual Wall and 3D Visualisation: Simulations in nano-electronics, material sciences, computational mechanics Hall 2 Block 25A			3D Printer 3D Scanner Halls 010 - 002 Block 2				AComIn Patent Applications Lobby 2 nd floor Block 2	Young Researchers' Posters Lobby 2 nd floor Block 25A
12	Acoustic camera Hall 218 Block 25A	Thermo - and high speed cameras, Hall 507 Block 2	Laser Particle Sizer and EDEM software Hall 110 Block 2	Tomography & Microstructures Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	AComIn movie 1 "The people" Hall 2 Block 25A
13	Lunch, Discussions								
14	3D Visual Wall and 3D Visualisation: Simulations in nano-electronics, material sciences, computational mechanics Hall 2 Block 25A			3D Printer 3D Scanner Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	Young Researchers' Posters Lobby 2 nd floor Block 25A
15	Acoustic camera Hall 218 Block 25A	Thermo - and high speed cameras, Hall 507 Block 2	Laser Particle Sizer and EDEM software Hall 110 Block 2	Tomography & Microstructures Halls 010 - 002 Block 2	Speech Processing Lab Hall 322 Block 2	Language and Semantic Technologies Lobby 3 rd floor Block 2	ICT for Intelligent Transport Hall 204A Block 2	AComIn Patent Applications Lobby 2 nd floor Block 2	AComIn movie 1 "The people" Hall 2 Block 25A
16	Closing								

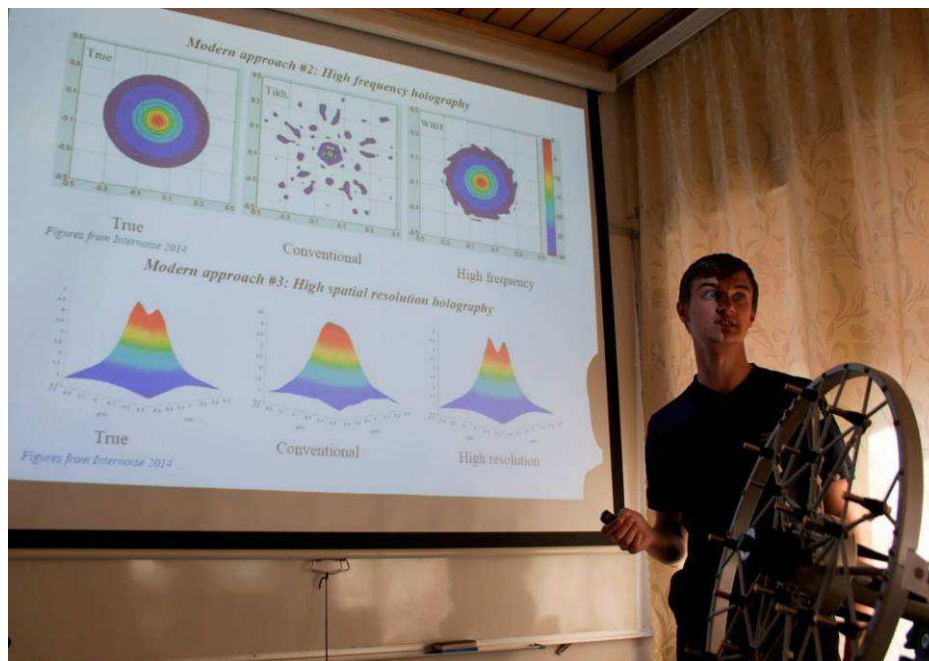
Capacity of halls:

Hall 2 basement Block 25A – 80 sitting places;
Hall 218, Block 25A – 20 sitting places;
Hall 507, Block 2 – 20 sitting places;
Hall 322, Block 2 – 5-7 people;
Lobby 2nd floor Block 2 – 15 people;
Lobby 2nd floor Block 25A – 15 people;
Lobby 3rd floor Block 2 – 15 people;
Hall 204A Block 2 – 5-7 people;
Hall 110, Block 2 – 15 people;
Halls 010-011, Block 2 – 15-20 people

Recommended registration:

Desislava Ivanova <divanovaacomin@gmail.com>

The presentations described new results achieved in the developing of core technologies for simulations and data processing as well as innovative applications of the Smart Lab equipment for solving some practical problems. Scientific program of the event also included presentations of 11 AComIn postdocs and of several young scientists from ICT-BAS who carried out research projects and actively used the Smart Lab devices.



The event was attended by more than 150 representatives of the state administration, ministries and NGOs, as well as scientists from various institutes of the Academy of Sciences and universities, representatives of Bulgarian companies, students and citizens.



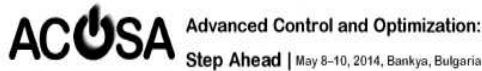
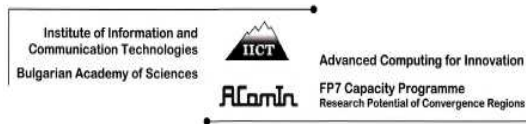
The Doors Open Days were announced and widely presented by several Bulgarian media (radio, TV, newspapers and information websites).



More photos about the 2nd AComIn Doors Open Days can be found in the project site at <http://www.iict.bas.bg/acomin/events/17-18-April-2015/index.html>.

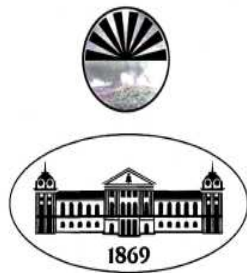
5. ACOMIN-SUPPORTED SCIENTIFIC EVENTS IN MONTHS 19-36

5.1 THE INTERNATIONAL WORKSHOP “ADVANCED CONTROL AND OPTIMIZATION: STEP AHEAD’ 2014”



INTERNATIONAL WORKSHOP ON
ADVANCED CONTROL AND OPTIMIZATION:
STEP AHEAD '2014

PROCEEDINGS



Prof. Marin Drinov Academic Publishing House

The International workshop “ADVANCED CONTROL AND OPTIMISATION: STEP AHEAD” (ACOSA 2014) was held on 8-10 May 2014 in Bankya. The workshop aimed at gathering specialists interested in the areas of control and optimisation, decision making techniques, process control systems, intelligent agents and systems, and other related topics, as well as at providing a forum for presenting the latest achievements and fruitful discussions. The event was structured in five topic sessions (see <http://www.iict.bas.bg/acomin/events/8-10%20May-2014/ACOSA-report.pdf>). Three of them were devoted to presentation of new research results (15 presentations) and others two – to discussions. The workshop was opened by Acad. Vassil Sgurev and a presentation about the progress of AComIn project given by Prof. Galia Angelova. Prof. Iulian Dutu from the Hydraulics and Pneumatics Research Institute (INOE 2000-IHP), Bukarest, Romania gave a presentation about the research activities currently conducted in the Institute. The foreign Co-Chair of the Programme Committee, Acad. Janusz Kacprzyk, chaired one of the workshop sessions and opened it with a short talk on the recent achievements obtained in the Institute of System Research at the Polish Academy of

Sciences. He also promoted several forthcoming events in the areas of AComIn project that will be held by the end of 2014 and in 2015.

The Workshop was attended by 28 participants (19 – from IICT-BAS, 5 – from Bulgarian institutions and 4 – from abroad). The support provided by AComIn to ACOSA 2014 enabled the organisers to cover the travel expenses and accommodation of the speakers who presented their novel results in the area of advanced control and optimisation.

List of AComIn-related papers of IICT-BAS scientists published in the ACOSA 2014 Proceedings

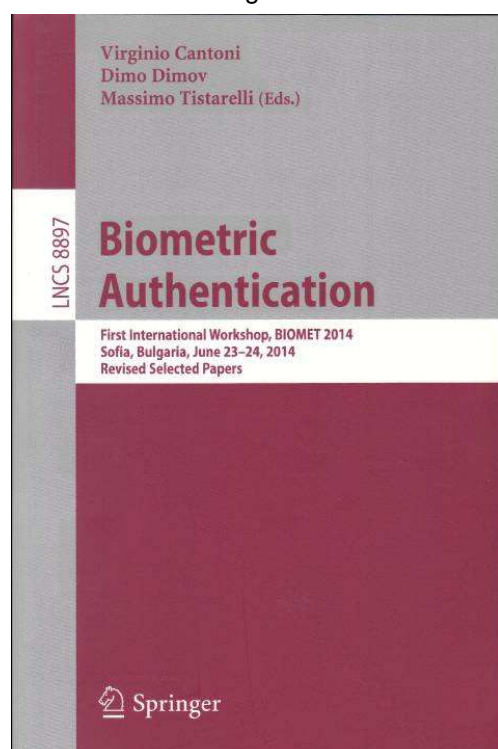
1. Kolchakov K., V. Monov. Examination of an algorithm for non-conflict schedule with diagonal activation of joint sub matrices in a large scale switching matrix, *International Workshop on „Advanced Control and Optimisation: Step Ahead’2014 – ACOSA*, 8-10 May 2014, Bankya Palace Hotel, Bankya, Bulgaria, 46-50, ISSN 1314-4634
2. Tashev, T., V. Monov, R. Tasheva. Load optimization in a grid structure for parallel computer simulations of the throughput of a crossbar switch node. *Proc. of International Workshop “Advanced Control and Optimisation: Step Ahead’2014 - ACOSA*”, May 8-10, 2014, Bankya, Bulgaria. 51-56. ISSN: 1314-4634

3. Atanasova, T., J. Atanasov, Integrated information system for enterprise management, *International Workshop "Advanced Control and Optimisation: Step Ahead - ACOSA"*, May 8-10, 2014, 40-45, Bankya Palace Hotel, Bankya, Bulgaria, ISSN 1314-4634.
4. Dzambov V. Finding the roots of non-linear equations with high definition using the .NET Framework C# and X-MPIR, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014,11-17, ISSN 1314-4634.
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6. Korsemov, Ch. and H. Toshev, Main Types, Comparisons and Working of Wind Generators, In: *Proceedings of the International Workshop on Advanced Control and Optimization: Step Ahead ACOSA 2014*, Sofia, Bulgaria, 2014, 83-87, ISSN 1314-4634.
7. Nikov V., L. Doukovska. Significance of the Advanced Control and Optimisation for SMEs, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 63-66, ISSN 1314-4634.
8. Popchev I., V. Angelova. Improved residual bound of the matrix equation $X + \sigma A_2^H X^{-1} A_2 = A_1$, $\sigma = \pm 1$, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 1-3, ISSN 1314-4634.
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11. Shahpazov V., L. Doukovska. Forecasting financial markets with artificial intelligence, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 67-74, ISSN 1314-4634.
12. Savov S., I. Popchev. Solution Estimation for the Discrete-Time Parameter-Dependent Lyapunov Equation, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 29-33, ISSN 1314-4634.
13. Sgurev V., St. Drangajov. A Probabilistic approach to optimizing the path of monitoring the nodes of a network, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 34-39, ISSN 1314-4634.
14. Terziyska M., L. Doukovska. Semi fuzzy neural networks, Part 1: Nonlinear system identification, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 18-23, ISSN 1314-4634.
15. Terziyska M., L. Doukovska. Semi fuzzy neural networks, Part 2: Predictive control, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 24-28, ISSN 1314-4634.

5.2. THE FIRST INTERNATIONAL WORKSHOP ON BIOMETRICS (BIOMET'2014)

[The First International Workshop on Biometrics](#) (BIOMET 2014) was held on 23-24 June 2014 in Sofia. The workshop was intended to provide a forum to present current work and new ideas in the challenging field of biometrics – the science discipline working on identification of humans by their characteristics or traits. Biometrics is used in computer science as a form of identification and access control and to identify individuals in groups that are under surveillance. BIOMET 2014 was primarily

connected with the goals of the AComIn project to disseminate recent advances in Biometrics among the research groups and companies in Bulgaria and Balkan countries as well.



The scientific program of the workshop included four invited lectures and 17 regular lectures selected by the workshop Programme Committee. The invited lectures were:

- Mark Nixon (Univ. of Southampton, UK). *Gait and soft biometrics*
- Andrzej Drygajlo (Lausanne Fed. Inst. of Tech., Switzerland). *From speaker recognition to forensic speaker recognition*
- Massimo Tistarelli (Univ. of Sassari, Italy). *Biometrics in Forensics science: challenges, lessons and new technologies.*
- Chang-Tsun Li (Univ. of Warwick, UK). *People identification and tracking through fusion of face and gait features*

The best student paper was awarded to Atanas Nikolov - a PhD student from IICT-BAS. The revised selected papers from the workshop were published as a Special Volume in

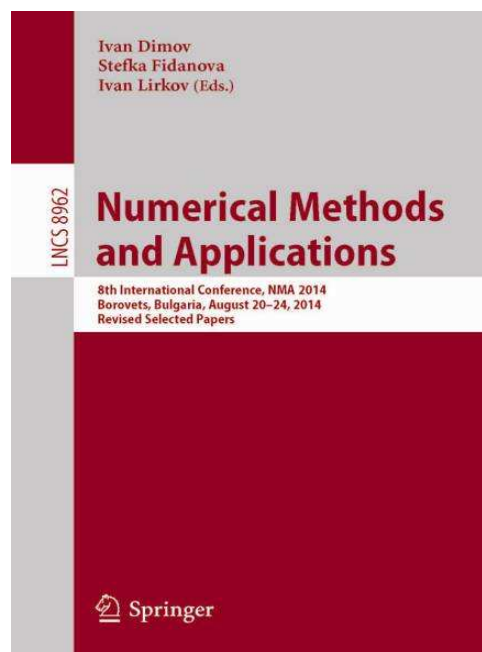
Springer's series Lecture Notes in Computer Science (LNCS 8897).

The workshop was attended by 30 participants – 15 from Bulgaria and 15 foreigners - from Italy, United Kingdom, Cyprus, Finland, Saudi Arabia, etc.

List of AComIn-related Papers of IICT-BAS Scientists Published in BIOMET 2014 Proceedings

1. Boyadjieva, D., G. Gluhchev. On-line signature verification using Neural network and KNN classifiers. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 198-206, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_16
2. Cantoni, V., D. T. Dimov, and A. Nikolov: 3D Ear Analysis by an EGI Representation. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 136-150, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_11
3. Dimov, D.T., V. Cantoni: Appearance-Based 3D Object Approach to Human Ears Recognition. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 121-135, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_10
4. Ouzounov, A.: Noisy Speech Endpoint Detection using Robust Feature. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 105-117, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_9

5.3. THE 8-TH INTERNATIONAL CONFERENCE ON NUMERICAL METHODS AND APPLICATIONS (NMA'14)



[The 8-th International Conference on Numerical Methods and Applications](#) (NMA'2014) was held on 20-24 August 2014 in Borovets. It was planned and carried out within the AComIn project focusing on the advanced computing topic. The topics of the conference not only represented the main pillar of the project, but were related to the presentation of efficient methods and algorithms for advanced computing, the modelling and therefore understanding the behaviour of materials and the underlying phenomena and how those materials could be applied for the advancement of ICT. Furthermore, the topics of the conference were related to advanced computing applied in the development of large-scale environmental models, novel results in CMOS modelling and application of results, new methods and models for computing small sensitivity indices, etc.

The Scientific Programme of the event includes 8 Invited talks, 6 Special Sessions and Sessions of Contributed Talks. All of the Special Sessions are related to the AComIn project activities. There were several contributed talks and plenary sessions by worldwide known scientists, as well as discussion on "Ultimate numerical algorithms for solving advanced problems in physics". The invited lecturers gave the following talks:

- Bl. Sendov, *Extreme problems in the geometry of polynomials*
- Vidar Thomée, *On Positivity Preservation in some Finite Element Methods for the Heat Equation*
- Stefan Heinrich, *Multilevel Monte Carlo methods for parametric problems*
- Asen Asenov, *Kinetic Monte Carlo Simulation of Statistical Reliability in Nanoscale CMOS*
- Sylvain Maire, *Walk on equations and sequential Monte Carlo to solve linear systems*
- J.L. Guermond and P.D. Minev, *High-order Artificial Compressibility for the Navier-Stokes Equations*
- Wil Schilders *Model order reduction in the electronics industry*
- Bangti Jin, Raytcho Lazarov, Joseph Pasciak, and Zhi Zhou, *Finite element method for fractional order partial differential equations*

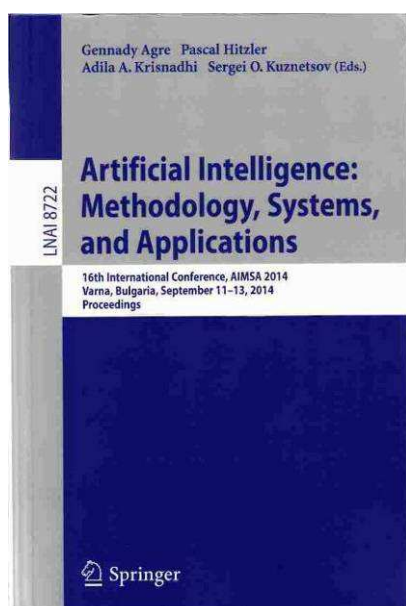
Besides the invited talks, additional 69 papers were presented at the Conference in 6 Special sessions in 11 scientific topics of interest. The participants were coming from 21 countries, namely, Bulgaria, Germany, Austria, UK, China, USA, Belgium, Spain, Czech Republic, Switzerland, Norway, Greece, Turkey, Slovakia, Poland, Russia, Sweden, The Nederland, Denmark, France, and Canada. The conference proceedings were published as a Special Volume in Springer's Lecture Notes in Computer Science (LNCS 9374).

The conference was attended by 75 participants: 43 of them were foreign participants, 22 – from IICT-BAS and 10 participants came from academic institutions outside IICT-BAS. The support provided by AComIn to NMA 2014 enabled to cover the travel expenses and accommodation of the invited speakers, who gave plenary and keynote talks, to cover the expenses of 21 participants from IICT-BAS and to print a Book of Abstracts with summaries of all the accepted talks, index of participants and the conference program.

List of AComIn-related Papers of ICT-BAS Scientists Published in NMA 2014 Proceedings

1. J.M. Sellier, Rayna Georgieva, and Ivan Dimov. Sensitivity Analysis of Design Parameters for Silicon Diodes. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 34-43.
2. Todor Balabanov, Iliyan Zankinski, and Bozhidar Shumanov. Slot Machines RTP Optimization with Genetic Algorithms. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 55-61.
3. Petia Koprinkova-Hristova. Hebbian Versus Gradient Training of ESN Actors in Closed-Loop ACD. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 95-102.
4. Clemens Hofreither and Walter Zulehner. Spectral analysis of geometric multigrid methods for isogeometric analysis. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 123-130.
5. Ivan Georgiev, Evgeni Ivanov, Svetozar Margenov, and Y. Vutov. Numerical Homogenization of Epoxy-Clay Composite Materials. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 130-137.
6. Stanislav Stoykov, Clemens Hofreither, and Svetozar Margenov. Isogeometric Analysis for Nonlinear Dynamics of Timoshenko Beams. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 138-148.
7. Angelos Liolios, Anaxagoras Elenas, Asterios Liolios, Stefan Radev, Krassimir Georgiev, and Ivan Georgiev. Tall RC Buildings Environmentally Degradated and Strengthened by Cables under Multiple Earthquakes: A Numerical Approach. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 187-195.
8. Tasho Tashev and Vladimir Monov. A Numerical Study of the Upper Bound of the Throughput of a Crossbar Switch Utilizing MiMa-Algorithm. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 285-303.

5.4. THE 16TH INTERNATIONAL CONFERENCE ARTIFICIAL INTELLIGENCE: METHODOLOGY, SYSTEMS, AND APPLICATIONS (AIMSA 2014)



[The 16th International Conference AIMSA 2014: Artificial Intelligence: Methodology, Systems, and Application](#) was held on 11-13 September 2014 in Varna. AIMSA is a biennial series of AI conferences that have been held in Bulgaria since 1984. The conference covered a wide range of topics in Artificial Intelligence and related disciplines. The event provided a forum for exchanging ideas between scientists developing and studying methods and algorithms for Artificial Intelligence as well as researchers, who apply them for solving real life problems. The following major scientific topics, all related to the AComIn project activities, were included: Machine learning, Data mining, Natural language processing and Formal concept analysis, Neural networks, Decision support, Planning and Agents, Knowledge representation and reasoning, Social Networks. The Scientific Programme of the conference included 3 Invited talks and 8 Sessions of Contributed Talks. All these sessions are related to the AComIn project activities. The invited lecturers supported by AComIn gave the following talks:

- Bernhard Ganter (Technical University of Dresden, Germany). *Formal Concepts for Learning and Education*.
- Diego Calvanese (Free University of Bozen-Bolzano, Italy). *Scalable End-User Access to Big Data*.



The AIMSA 2014 Best Paper Award was awarded to the paper: Ivelina Nikolova, Dimitar Tcharaktchiev, Svetla Boytcheva, Zhivko Angelov, and Galia Angelova. Applying Language Technologies on Healthcare patient Records for Better Treatment of Bulgarian Diabetic Patients, that was reflected research carried out in the frame of AComIn Project.

The AIMSA'2014 Proceedings was printed as a special volume (8722) of the Springer Lecture Notes in Artificial Intelligence (LNAI) series. The conference was attended by 61 participants – 16 of them form IICT-BAS, 10 – from other

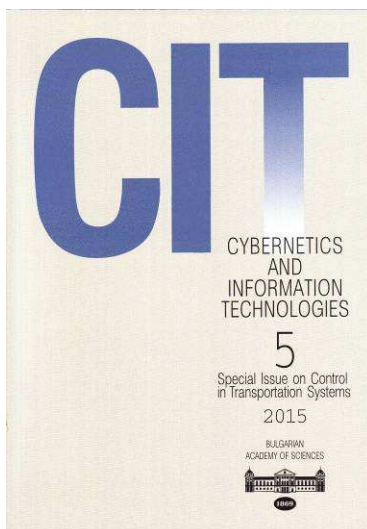
Bulgarian institutions and 35 – from abroad.

The support, provided by AComIn to AIMSA 2014, enabled to cover the travel and local expenses of two worldwide known scientists giving invited talks, as well as to support partly of the participants from IICT-BAS.

List of AComIn-related Papers of IICT-BAS Scientists Published in the AIMSA 2014 Proceedings

1. Ivelina Nikolova, Dimitar Tcharaktchiev, Svetla Boytcheva, Zhivko Angelov, and Galia Angelova. Applying Language Technologies on Healthcare patient Records for Better Treatment of Bulgarian Diabetic Patients, Artificial Intelligence: Methodology, Systems, and Applications, LNAI 8722, 2014, Springer, ISBN: 978-3-318-10553-6, 92-104.
2. Petia Koprinkova-Hristova and Kiril Alexiev. Dynamic Sounds Fields Clusterization Using Neuro-Fuzzy Approach. Artificial Intelligence: Methodology, Systems, and Applications, LNAI 8722, 2014, Springer, ISBN: 978-3-318-10553-6, 194-205.

5.5. THE INTERNATIONAL WORKSHOP "CONTROL IN TRANSPORTATION SYSTEMS 2014"



[The International Workshop on Control in Transportation Systems](#)

was held on 10-11 October 2014 in Sofia. The workshop was organized as a co-event of the COST TU1102 Training School held at the same place during the period September 9-12, 2014. The scientific program of the workshop contained 2 invited talks and 12 regular talks selected by the Workshop Programme Committee.

The invited lecturers supported by AComIn, gave the following presentations:

- H. Haj Salem (IFSTTAR, France). *Motorway traffic control: how to optimise traffic and safety indices? Application for coordinated ramp metering strategy: development. Preliminary results.*
- H. Abouaïssa (Université Lille Nord France): Macroscopic traffic flow control via state estimation

The workshop was attended by 22 participants – 13 from IICT-BAS,

7 – from Bulgarian universities and 2 – from France.

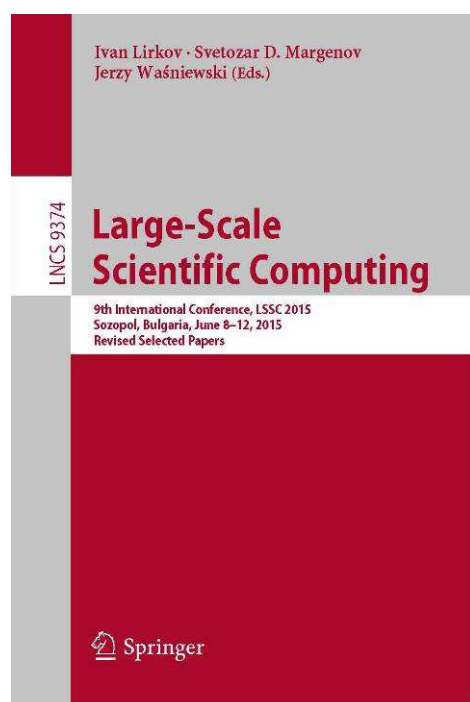
The support provided by AComIn to Control in Transportation Systems'14 enabled to cover the travel expenses and accommodation of the both renowned keynote speakers, who presented innovative aspects of their researches in Computer and Transportation Systems.

Extended versions of selected workshop papers were published in a special issue of journal *Cybernetics and Information Technologies* (Volume 15, No 5 Sofia, 2015).

List of AComIn-related papers of ICT-BAS scientists published in the special issue on Control in Transportation Systems

1. Todor Stoilov, Krasimira Stoilova, Markos Papageorgiou, Ioannis Papamichail. Bi-Level Optimization in a Transport Network. *Cybernetics and Information Technologies*, Volume 15, No 5, Sofia, 2015, Special Issue on Control in Transportation Systems, ISSN: 1311-9702, 37-59.
2. Vladimir N. Ivanov. Using a PicoBlaze Processor to Traffic Light Control. *Cybernetics and Information Technologies*, Volume 15, No 5, Sofia, 2015, Special Issue on Control in Transportation Systems, ISSN: 1311-9702, 131-139.

5.6. THE 10TH INTERNATIONAL CONFERENCE “LARGE-SCALE SCIENTIFIC COMPUTATIONS” (LSSC’15)



[The 10th International Conference “Large-Scale Scientific Computations” \(LSSC 2015\)](#) was held on June 8-12 June 2015 in Sozopol. It is a biannual event organised in Bulgaria since 1997. The conference provided a forum for exchange of ideas between scientists, who develop and study numerical methods and algorithms, and researchers, who apply them for solving real life problems. The major scientific topics included: Hierarchical, adaptive, domain decomposition and local refinement methods; Robust preconditioning algorithms; Monte Carlo methods and algorithms; Numerical linear algebra; Control systems; Large-scale computations of environmental biomedical and engineering problems; High-performance algorithms for engineering problems; Parallel algorithms and performance analysis.

The Scientific Programme of the conference included 5 Plenary Invited talks, 10 Special Sessions and Sessions of Contributed Talks. Seven of the Special Sessions were directly related to the AComIn project activities.

The Plenary Invited lecturers gave the following talks:

- Thierry Coupez, *Implicit Boundary in Multiphase Flows and Anisotropic Adaptive Meshing*
- David Keyes, *Algorithmic Adaptations to Extreme Scale*
- Johannes Kraus, *Combined Strategies in Algebraic Multilevel Preconditioning*
- Siegfried Selberherr, *Spin-Based CMOS-Compatible Devices*
- Ludmil Zikatanov, *Subspace Correction Methods: Theory, Practice, and Robustness*

The proceeding of the conference was published as a Special Issue of Springer’s Lecture Notes in Computer Science (LNCS 9374).

The conference were attended by 130 participants – 23 of the form IICT-BAS, 15 – from other Bulgarian institutions and 82 – from abroad.

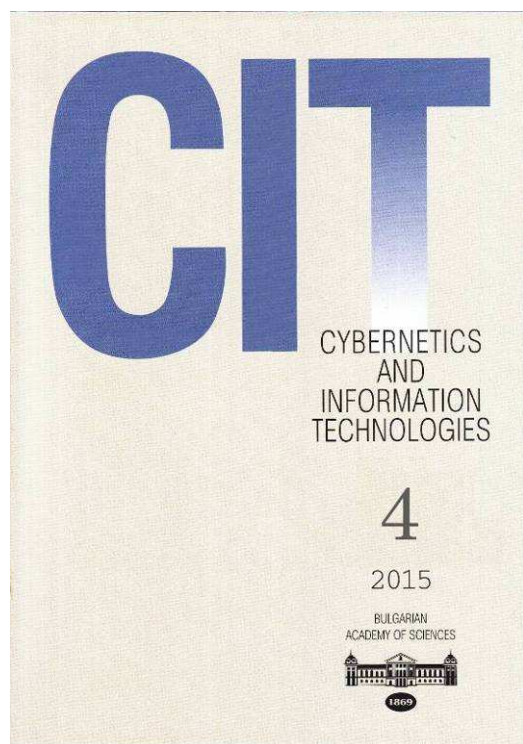
The support, provided by AComIn to LSSC'15, enabled to cover the local expenses of several worldwide known scientists giving top level plenary and key note invited talks and to partly the participants from IICT-BAS.



List of AComIn-related papers of IICT-BAS Scientists Published in the LSSC 2015 Proceedings

1. Georgiev, I., S. Harizanov and Y. Vutov. Supervised 2-Phase Segmentation of Porous Media with Known Porosity. Large-Scale Scientific Computing (LSSC 2015), LNCS 9374, Springer International Publishing Switzerland, 2015, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_38, 343 - 351.
2. Harizanov, S., S. Margenov and L. Zikatanov. Fast Constrained Image Segmentation Using Optimal Spanning Trees. Large-Scale Scientific Computing (LSSC 2015), LNCS 9374, Springer International Publishing Switzerland, 2015, ISBN: 978-3-319-26519-3, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_2, 15 - 29.
3. Koprinkova-Hristova, P. and K. Alexiev. ACD with ESN for Tuning of MEMS Kalman Filter. Lecture Notes in Computer Science, 9374, Springer, 2015, ISSN:0302-9743, DOI:10.1007/978-3-319-26520-9_24, 226 - 233.
4. Kosturski N., I. Lirkov, S. Margenov and Y. Vutov. Thermoelectrical Tick Removal Process Modeling. Large-Scale Scientific Computing, 9374, Springer, 2015, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_41, 369 – 376
5. Kosturski, N., S. Margenov, P. Popov, N. Simeonov, and Y. Vutov. Performance Analysis of Block AMG Preconditioning of Poroelasticity Equations. Large-Scale Scientific Computing, 9374, Springer, 2015, ISBN: 978-3-319-26519-3, ISSN:0302-9743, DOI:10.1007/978-3-319-26520-9_42, 377 - 384. SJR:0.339

5.7. THE INTERNATIONAL WORKSHOP “BIG DATA IN NATURAL LANGUAGE PROCESSING, EDUCATION AND DIGITAL COLLECTIONS”



Bulgarian language

[The International Workshop “Big Data in Natural Language Processing, Education and Digital Collections”](#) was held on 29 June 2015 in Sofia. It aimed at gathering experts who investigate hot research issues or implement novel applications in: Cloud computing, Natural language processing, Information retrieval, Knowledge discovery, Data visualization, Educational analytics, Data analytics for social media, Content development and metadata management, Business intelligence etc. The Workshop provided a framework for presentation of AComIn results in intelligent management of digital content, grouped in the following topics:

- Development of large-scale linguistic resources for Bulgarian language
- Educational analytics for increasing user involvement in eLearning
- Sentiment analysis of annotated images based on image tags
- Information extraction of patient-related entities from large repositories of medical texts in

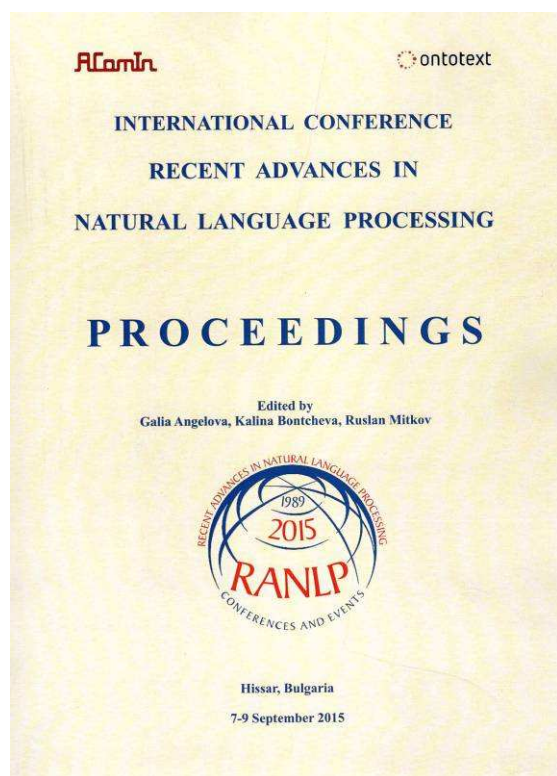
The whole [scientific program](#) of the event was dedicated to topics relevant to AComIn. Six presentations concerned directly dissemination of project results. The workshop was attended by 27 participants: 13 of them were from IICT-BAS, 10 researchers, students and industrial representatives, including 4 representatives from software companies and a eLearning portal and participants from USA, Malta, Qatar and Germany. Extended versions of selected presentations of the workshop were published in the journal “Cybernetics and Information Technologies”.

The Workshop was a very useful meeting where comments and suggestions helped to shape or improve AComIn results. This concerns at first the ideas about image sentiment analysis, and partly the intermediate results concerning the educational analytics task performed for UCHA.SE. At the same time the event offered an open forum for public presentation of mature project results.

List of AComIn-related papers of IICT-BAS Scientists Presented at the Workshop and Published in the Journal “Cybernetics and Information Technologies”

1. Christo Dichev, Darina Dicheva, Gennady Agre, Galia Angelova – Trends and Opportunities in Computer Science OER Development. Cybernetics and Information Technologies, Volume 15, No 3. Sofia, 2015, ISSN: 1311-9702, 114-126.
2. Milena Dobreva, Galia Angelova, Gennady Agre – Bridging the Gap between Digital Libraries and e-Learning. Cybernetics and Information Technologies, Volume 15, No 4. Sofia, 2015, ISSN: 1311-9702, 92-110
3. Svetla Boytcheva, Galia Angelova, Zhivko Angelov, Dimitar Tcharaktchiev – Text Mining and Big Data Analytics for Retrospective Analysis of Clinical Texts from Outpatient Care. Cybernetics and Information Technologies, Volume 15, No 4. Sofia, 2015, ISSN: 1311-9702, 58-77.

5.8. THE 10TH INTERNATIONAL CONFERENCE “RECENT ADVANCES IN NATURAL LANGUAGE PROCESSING” (RANLP-2015)



[The 10th International Conference “Recent Advances in Natural Language Processing” \(RANLP-2015\)](#) was held on September 5-11, 2015 in Hissar. RANLP-2015 consisted of 4 tutorials given in 2 days (5-6 September 2015), main conference (7-9 September 2015) with 6 invited talks, 56 oral presentations, 39 poster presentations, and a parallel Student Research Workshop with 3 oral presentations and 2 poster presentations as well as 5 Workshops held on 10-11 September 2015, where 5 invited talks and 46 papers were presented.

The invited lecturers, supported by AComIn, gave the following presentations:

- Paolo Rosso (Polytechnic University of Valencia): *Author profiling in social media* - a tutorial held on 5 September 2015, 10:00-13:40;
- Leon Derczynski (University of Sheffield): *NLP for social media* - a tutorial held on 5 September 2015, 15:00-18:40;
- Horacio Saggion (University Pompeu Fabra, Barcelona): *An Introduction to Automatic Text Simplification* - a tutorial held on 6 September 2015, 9:30-13:10;
- Bonnie Webber (University of Edinburgh, Scotland): *Towards improving the discourse coherence of SMT output* - an invited talk held on 7 September 2015, 14:30-15:30;
- Marcello Federico (Fondazione Bruno Kessler, Trento): *When machine translation meets human translators* - an invited talk held on 9 September 2015, 9:00-10:00;
- Idan Szpektor (Yahoo Research, Haifa): *Natural Language Processing for Community Question Answering* - an invited talk held on 9 September 2015, 14:30-15:30;
- Piek Vossen (VU University Amsterdam): *From mentions in text to instances in RDF: crosslingual interpretation of unstructured news in the NewsReader project* - an invited talk held on 8 September 2015, 9:30-10:30.

The above listed tutorials and invited talks concerned core AcomIn topics: big data in natural language processing as well as large-scale approaches to text analysis using large linguistic resources.

The event was attended by 164 participants – 11 of them from IICT-BAS, 18 Bulgarian participants outside IICT-BAS including students and industrial representatives, and 135 foreign participants. The support, provided by AComIn to RANLP-2015, enabled:

- To invite world renowned keynote speakers and tutorial lecturers who presented the achievements in the hottest “large-scale” trends in Natural Language Processing. The IICT postdoctoral researchers listened to state-of-the-art presentations and established fruitful connections with younger experienced scientists from abroad;
- To introduce “reduced fees” for conference participants from countries with lower standard, including lower fees for Bulgarian participants. This concerned especially representatives of Bulgarian software industry and Bulgarian students who attended esp. in the tutorials without any restrictions. In this way the industrial training component of RANLP was particularly

strengthened because many companies benefited directly from the practical aspects of the tutorials.



The RANLP-2015 proceedings is uploaded at the ACL Anthology (USA) (<http://aclweb.org/anthology/>)

List of AComIn-related papers of IICT-BAS scientists published in the RANLP 2015 Proceedings

1. Kanishcheva, O. and G. Angelova. About Emotion Identification in Visual Sentiment Analysis, Proceedings of RANLP-2015, ISSN:1313-8502, 258–265
2. Simov, K., A. Popov and P. Osenova. Improving Word Sense Disambiguation with Linguistic Knowledge from a Sense Annotated Treebank. Proceedings of RANLP-2015, ISSN:1313-8502, 596–603
3. Osenova, P. and K. Simov. Universalizing BulTreeBank: a Linguistic Tale about Glocalization. In Proceedings of the 5th Workshop on Balto-Slavic Natural Language Processing, pp. 81–89, ISBN 978-954-452-033-5, 2015

5.9. THE INTERNATIONAL WORKSHOP ON INFORMATION FUSION (IWIF 2015)

[The International Workshop on Information Fusion \(IWIF 2015\)](#) was held on 25 September 2015 in Sofia. The workshop was aimed at addressing new challenges, sharing solutions, and discussing future research directions in Information Fusion, relating mainly signal processing applications. It was also organized to spread out the AComIn project results and to present the IICT-BAS excellence at regional, national and international levels by bringing together researchers from academia and industry as well as to report on the latest scientific and technical advances in the field.

The scientific program of the workshop consisted of a plenary invited talk, 3 invited lecturers and 9 research papers presented by researchers from IICT-BAS and from the universities in Bulgaria.

The invited lectures gave talks as follows:

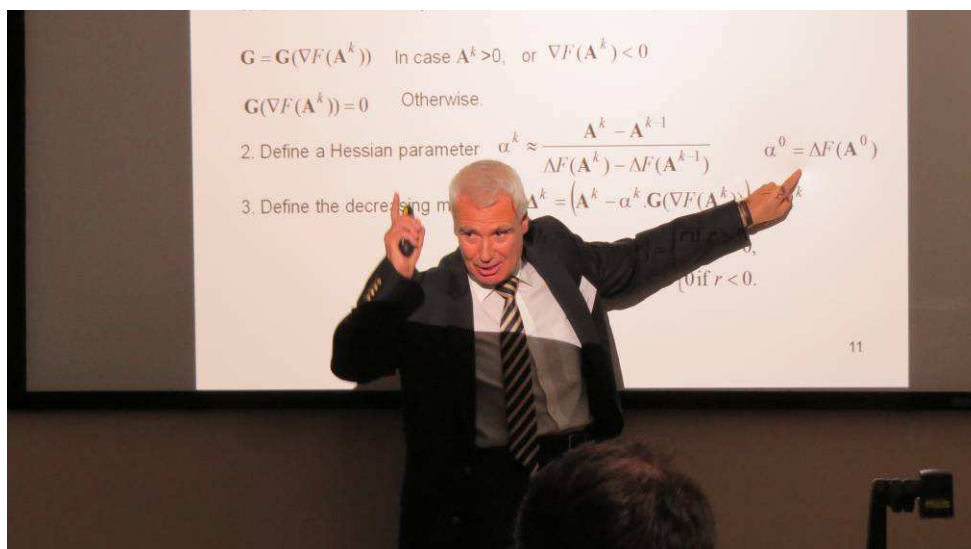
- Jean Dezert (ONERA, France, President elect IF). *Information Fusion with Belief Functions: A DSMT Perspective*
- Dimiter Prodanov (IMEC, Belgium). *Scale Spaces in Microscopic Image Analysis*
- G. Prokopenko (National Aviation University, Ukraine). *Statistical Synthesis of the Robust Signal Detection Algorithms in the Conditions of Aprioristic Uncertainty*
- K. Lukin (IRE, NAS of Ukraine). *Microwave 2D and 3D Imaging Technique using MIMO Active and Passive Noise Radar*



The workshop was attended by 24 participants: 13 – from IICT-BAS, 5 researchers from Bulgarian universities and 6 foreign participants.

The extended versions of workshop presentations will be published in a special issue on Information Fusion in the journal “Cybernetics and Information Technologies” (Volume 15, No 7, 2015).

The support, provided by AComIn to IWIF 2015 enabled to cover travel and accommodation expenses of several worldwide known scientists giving top level plenary invited talks.



List of AComIn-related papers of IICT-BAS scientists published in the IWIF 2015 Proceedings

1. Atanas Nikolov, Dimo Dimov. 2D Video Stabilization for Industrial High-Speed Cameras. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
2. Iu. D. Chyrka, I. P. Omelchuk. Multichannel modified covariance estimator of a single-tone frequency. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
3. Nevena Popova, Geogi Shishkov, Petia Koprinkova-Hristova, Kiril Alexiev. 3D Visualization of Sound Fields Perceived by Acoustic Camera. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
4. Volodymyr V. Kudriashov, Artem Yu. Garbar, Konstantin A. Lukin, Lukasz Maslikowski, Piotr Samczynski, Krzysztof S. Kulpa. Fusion of Images Generated by Radiometric and Active Noise SAR. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
5. J. Dezert, A. Tchamova, P. Konstantinova. The Impact of the Quality Assessment of Optimal Assignment for Data Association in a Multitarget Tracking Context. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
6. Kiril Alexiev, Georgi Shishkov, Nevena Popova. Human activity registration using multisensor data fusion. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.

6. ACOMIN NEWSLETTERS

6.1. ACOMIN NEWSLETTER №4 (IN ENGLISH)

AComIn Newsletter №4

Advanced Computing for Innovation

September 2014

AComIn Mission: to strengthen the research and innovation capacity of the Institute of Information and Communication Technologies – Bulgarian Academy of Sciences (IICT-BAS) by increasing the knowledge and skills of its researchers in emerging areas as well as by purchasing modern research infrastructure. AComIn should help the institute to successfully accomplish its strategic mission: by 2016, i.e. 5 years after its creation, IICT-BAS has to become a leading RTD Centre in Eastern Europe, providing facilities and working conditions comparable to the average standards of the EU Centres of Excellence in ICT. The institute will support the sustainable regional and national growth and employment by providing RTD results to advanced industrial organisations; it will be a focal point of high-quality research and training in advanced ICT topics.

Progress Report (April 2014 – September 2014)

WP1: Strengthening the IICT-BAS Human Potential

Employed Incoming Post-docs

Dr. Volodymyr Kudriashov was appointed to a post-doc position in IICT-BAS in August 2014. He came to the institute from the Department for Nonlinear Dynamics of Electronic Systems at the O. Ya. Usikov Institute for Radiophysics and Electronics of the National Academy of Sciences of Ukraine, where he was working on image



and signal processing in both bistatic radiometer and noise waveform radars based on antennas with beam synthesizing. While working at the IICT-BAS he will conduct a research on improvement of image formation algorithms for noise sources classification, using the Brüel & Kjaer acoustic camera from the SmartLab equipment.

Short Employments of Experienced Researchers



Prof. Darina Dicheva and **Prof. Christo Dichev** came to the IICT-BAS from Winston Salem State University, USA. During their stay in the institute (June 9–July 9, 2014) they continued the joint research with their local hosts – Prof. Gennady Agre and Prof. Galia Angelova, initiated in 2013, in the area of the use of semantic and game techniques for supporting educational systems. The accent was on *gamification* – a fairly new and growing field defined as the use of game design elements in non-game contexts. A meta-study of the published peer-reviewed case studies on using gamification in education was conducted. The results of the research will be published in two papers: D. Dicheva, Ch. Dichev, G. Agre, G. Angelova. *Gamification in Education: A Systematic Mapping Study* – accepted for publication in the Journal of Educational Technology & Society (Impact Factor 1.34) and Ch. Dichev, D. Dicheva, G. Angelova, G. Agre. *From Gamification to Gameful Design and Gameful Experience in Learning* – accepted for publication in the Cybernetics and Information Technology journal (SJIR rank 0.216). Two lectures reviewing the state of the art and the trends in the use of gamification in education were given to representatives from relevant academic, administrative and educational communities in the frame of



the AComIn Technology Transfer seminar held on July 3, 2014. Prof. Dicheva and Prof. Dichev had also two meetings (on June 13 and July 3, 2014) with the development team of “Уча.се” – a popular Bulgarian online learning portal. Based on the careful evaluation of the portal, several recommendations to the developers’ team were made. In such a way the large community of end-users of the site, having a benefit of those innovative technologies, was actually reached.

Prof. Milena Dobreva came to IICT-BAS from the University of Malta with the main goal to continue the joint research with her local hosts – Prof. Galia Angelova and Prof. Gennady Agre on digital repositories of cultural heritage artefacts and access to collections of digitized models. During her stay (June 10–July 17, 2014) Prof. Dobreva worked on the preparation of an overview on 3D models of archaeological objects, for the purpose of building a User Community of 3D modelling in cultural heritage in AComIn. Prof. Dobreva established connections to experts from the Visualization Lab of King’s College London and assisted in preparation of the program of the



Technology Transfer seminar on 3D visualization of cultural heritage held on 10th September 2014 as an associated event of the International Conference AIMS 2014. Prof. Dobreva took part in an AComIn Technology Transfer seminar held in Sofia on July 9, 2014, where she gave a lecture on new trends in the development of cultural heritage digital libraries.

WP2: Purchasing Smart Lab Equipment and Building User Communities

During the reporting period the SmartLab of IICT-BAS was completed with two new devices: an *integrating server environment (ISE)* and a *3D printer*. The *ISE* is intended to ensure data concentration and acquisition between SmartLab device interfaces



and the High Performance Computing (HPC) core. It also manages functionalities related to control of transportation systems, modelling, simulation and optimization of traffic systems and their parameters. The ISE provides an environment for design, test and simulation of various control policies on a wide range of transportation systems: free way traffic, motorway control, macro and microscopic modelling. The ISE supports simulation tasks on *AIMSUN software suit*, an optimal control by *TRANSYT package* as well as real time communications with traffic lights controllers.



The ProJet 460Plus full-colour 3D printer is the world's most affordable colour 3D printer with the highest ease-of-use in its class. It incorporates advanced 3-channel CMY full-colour 3D printing and operates with safe build materials, active dust control and a zero liquid waste. Some of the ProJet 460Plus technical specifications: resolution - 300 x 450 dpi, minimum feature

size - 0,15 mm, layer thickness - 0,1 mm, input data file formats supported - STL, VRML, PLY, 3DS, FBX, ZPR. The ProJet 460Plus 3D printer can rapidly design, create, communicate, plan, guide, prototype or produce functional parts, devices and assemblies, empowering customers to manufacture the future.

Technology Transfer Seminars

The serial seminar for **User Community "Intelligent Management of Digital Content"** devoted to new trends in e-learning was held in ICT-BAS on July 3, 2014. (www.ict.bas.bg/acomin/news/3_July_2014.pdf).

During the seminar 3 lectures were presented. Prof. Christo Dichev gave a lecture entitled *"Using game elements in educational systems: theoretical and technological perspectives"* that was focused on the



psychology of gamification in education and training. Prof. Darina Dicheva gave a lecture entitled *"Gamification in Education: What, Why, How?"* with an accent on the results of the conducted meta-study. The lectures were followed by a lively discussion about the possibilities of using gamification in Bulgarian educational institutions. The final presentation *"How learning can be a game"* was done by Mr. Darin Madzharov, the founder of the company "Уча.се". He presented the popular Bulgarian online learning portal "Уча.се" (www.ucha.se) - a comprehensive platform for online learning and supporting online interactive sessions with teachers. The emphasis was on the comprehensive coverage of the learning material in the form of appealing video lectures and on the user interactivity. The following



discussion was focused on enhancing the online platform to meet the growing students' needs and to increase its acceptance from the teachers. The seminar was attended by 28 participants from academic

institutions, secondary schools and Bulgarian companies.

The next seminar of the **"Intelligent Management of Digital Content" User Community** was held on July 9, 2014 (www.ict.bas.bg/acomin/news/9_July_2014.pdf). The seminar was aimed at presenting new trends in the development of cultural heritage digital libraries and discussing best practices and innovative approaches of their usage for education and citizen science. It was organized with the active participation of Ontotext (www.ontotext.com) - a leading Bulgarian company in the area of semantic technologies and digitalization of cultural heritage. The seminar program included 4 presentations: Prof. Milena Dobreva (from the University of Malta) gave a talk on best practices in using digital resources in education and citizen science. Dr. Vladimir Alexiev (from Ontotext) spoke about using semantic technologies for cultural heritage. Mr. Petar Miladinov (from the University of Sofia) presented an example of integrated learning - the Virtual Museum

group. In his presentation Mr. Ilian Uzunov from Ontotext discussed approaches for enhancing the educational resources with material from digital libraries as well as other actual tendencies in e-learning. The seminar ended up with an interesting discussion on what are the current challenges in using digital libraries' resources for education and research purposes. The seminar was attended by 23 participants from research institutions and companies.



The seminar on **3D Visualization of Cultural Heritage** (www.aimsconference.org) was held in Varna on September 10, 2014. It was organized as an associated event to the 16th International Conference on Artificial Intelligence AIMS'A14. The seminar was designed to give an introduction to the theory, process and practice of capturing and preparing digital models of cultural heritage artefacts. The event was implemented as a one-day tutorial that combined several theoretical lectures with a number of practical sessions allowing delegates to get



hands on experience with technologies available with an emphasis on low cost, ease of use and sustainability. The morning session included the following lectures: Drew Backer (Kings College,

London, UK). *"Digitising Cultural Heritage - An overview of the state of digital cultural heritage, its importance, use and potential"* and *"Making Spaces - An entry level introduction to multi dimensional theory (space, time and probability), interaction design and dissemination"*; Martin Blazeby (Kings College, London, UK): *"Best Practice for 3D Digitisation - The London Chapter"* and *"3D Capture Techniques"*. The afternoon session consisted of two hands on workshops - Depth Map Sensor scanning and Handyscan and Photogrammetry. The event was attended by 20 participants from Bulgarian research institutions.

The serial seminar of the **Industrial Mathematics User Group** was organized in the frame of 8th International Conference on Numerical Methods and Applications (NMA'14) and was held in Borovets on August 21, 2014. The seminar consisted of the lecture *"Walk on equations and*



sequential Monte Carlo to solve linear systems presented by Dr. Sylvain Maire from Université du Sud Toulon-Var, France, and the discussion *Ultimate numerical methods for solving problems in modern physics and emerging technologies* moderated by Prof. Ivan Dimov from IICT-BAS. The discussion paved the way towards more sophisticated studies involving devices such as MOSFETs (Metal On Silicon Field Effect Transistor), double-gates transistors, nanowires, etc. The

seminar was attended by 20 participants - scientists as well as practitioners from Austria, Belgium, Bulgaria, France, German, Switzerland, UK etc.

The Seminar on Robotics and Innovations was held on September 18 – 19, 2014 at IICT-BAS. The seminar program included 4 lectures of Prof. Kenichi Yano from the MIE University, Japan, that were dedicated to the computation framework in modelling and intelligent control of industrial and medical robotics and several presentations of young scientists from IICT-BAS. The first day of the seminar was dedicated to the application of the computation fluid dynamics and finite element



analysis in the optimization and control of robots for die casting process, mold shape design as well as an innovative liquid transferring

robot. In the second day the problems of medical and life support robotics were discussed. Prof. Yano presented his research on development of robots for physical therapy that assist therapeutic exercise for shoulder joint in order to relieve the physical load on physiotherapists and demonstrated several life support systems and rehabilitation robots developed in his laboratory. The seminar ended with an interesting discussion about possibilities for a future collaboration in the area of robotics, intelligent control, computational methods and mathematics based on the SmartLab equipment and the HPC infrastructure provided by IICT-BAS.

WP3: Networking with Leading EU Partners

Incoming Short Visits



Prof. Siegfried Selberherr from the Institute for Microelectronics of the Technical University of Wien had a working visit to IICT-BAS in the period 29 April - 02 May 2014. The purpose of the visit was twofold: the official part comprised several meetings with the ACoMIn coordinator, work package leaders and collaborators, concerning the organization of the activities and novel trends as well as the open research

problems raised by the progress of nanoelectronics. The informal part comprised meetings, a seminar and discussions concerning the completion of several common papers, future research objectives and the management of the collaboration. In particular the discussions focused on an actual research problem related to the existence and uniqueness of the solution of the Wigner equation. A particular result has been derived and a plan for dissemination has been elaborated.



Prof. Hermann Rohling, the Head of the Institute of Telecommunications at Hamburg University of Technology, Germany visited IICT-BAS in the period May 18 – 24, 2014. During his stay he had meetings and discussions with leading scientists from the Mathematical Methods for Sensor Data Processing Department. On 21.05.2014 Prof. Rohling gave a lecture entitled *Automotive Radar Systems*, which caused fruitful discussions and raised interest in a further development of the research contacts.

Prof. Oleg Iliev from the Fraunhofer Institute of Industrial Mathematics (ITWM), Kaiserslautern, Germany visited IICT-BAS in the period 17-22



May 2014. Some problems of a common research interest were discussed during the visit, focusing on the experience of ITWM in application and analysis of CT voxel data and on some specific information concerning the functionalities of GeoDict software. Prof. Iliev took part in the organized by IICT-BAS International Conference on Numerical Methods for Scientific Computations and Advanced Applications, Bansko, 19-22 May 2014, where he presented a plenary invited talk *Upscaling Based Preconditioners for Composite Materials*.



Prof. Asen Asenov and **Dr. Campbell Miller** from the Glasgow University (UoG) visited IICT-BAS in the period 11 – 17 June 2014. Prof. Asenov and Prof. Ivan Dimov (head of Parallel Processing Department of IICT-BAS) discussed about the state of the collaboration between the both institutions and planned future actions and interactions. Dr. Miller and Dr. Jean Michel Sellier (from IICT-BAS) discussed preparation of a Horizon 2020 application on advanced quantum modelling of nanoelectronic devices and made plans for the submission of a joint project. Prof. Asenov and Dr. Miller visited the research groups of Prof. Ivan Dimov, Prof. Galia Angelova and Prof. Kostadin Kostadinov and were thoroughly informed about the research capabilities and the active research projects. This information will be disseminated in the School of Engineering of UoG to foster future collaboration in the frame of Horizon 2020.

Prof. Kenichi Yano, the Head of Mechatronics Laboratory and the Dean of Mechanical Engineering Department at MIE University, Japan visited



IICT-BAS in the period 18-20 September 2014. Prof. Yano took part in the ACoMIn Transfer Technology Seminar on Robotics and Innovations, which was held on September 18-19, 2014 in IICT-BAS. At this seminar Prof. Yano gave 4 lectures on robotics and innovations; computation methods and simulations in industrial robotics; development of machining support robots as well as on the development of medical and human support robots. During his stay Prof. Yano was familiarized with the SmartLab equipment and had several meetings and discussions with leading scientists from the Embedded Intelligent Technologies Department, where some possibilities for future cooperation with IICT-BAS were discussed.

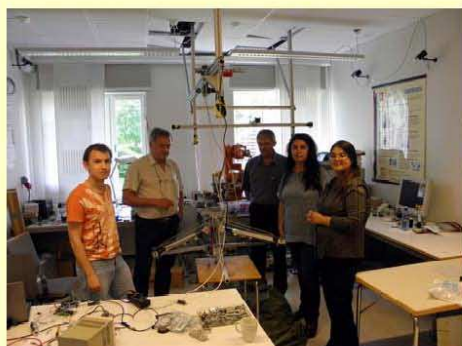
Secondments to Project Partners



In the periods May 7 – 23 and June 22 – 4 July, 2014 IICT-BAS was visited by **Prof. Virgilio Cantoni** from the University of Pavia, Italy. During his stay Prof. Cantoni conducted

collaborative research with Prof. Dimov from IICT-BAS on the creation of a database with 3D images of human ears for biometrics purposes. The images were created using the 3D Scanner of AComIn Smart Lab. The results of this research were presented in two joint papers: Virgilio Cantoni, Dimo T. Dimov, and Atanas Nikolov. "3D Ear Analysis by an EGI Representation" and Dimo T. Dimov and Virgilio Cantoni. "Appearance-Based 3D Object Approach to Human Ears Recognition", that were presented at BIOMET'2014 workshop held in Sofia, June 23-24, 2014. The proceeding of the workshop will be published as a special volume in the series Lecture Notes in Computer Science by Springer Publ. house. As a program chair Prof. Cantoni together with Prof. Dimov prepared and successfully carried out the BIOMET'2014 workshop. Prof. Cantoni also took part in the 15th issue of the International Conference CompSysTech, where on June 27, 2014 he gave the invited lecture "Eye-tracking systems, research and applications".

During the period of May 15 – June 16, 2014, **Prof. Liubka Dukovska**, **Prof. Vladimi Monov** and **Dr. Vasia Atanassova** from IICT-BAS visited the School of Science and Technology and the Centre for Applied and Autonomous Sensor Systems at the University of Orebro, Sweden. During their stay they conducted joint research with their Sweden colleagues on some optimization and intelligent control topics. The results of this research were published in a paper: Atanassova V., L. Doukovska, D. Karastoyanov, František Čapkovič. *InterCriteria Decision Making Approach to EU Member States Competitiveness Analysis: Trend Analysis*, presented at the 7th IEEE International Conference Intelligent Systems - IS'14, September 24–26, 2014, Warsaw, Poland. They also discussed possibilities to use the specialized software package EDEM purchased in the frame of the AComIn project, for modelling the processes of production, transportation and usage of granular materials. At a seminar of the School of Science and Technology, Dr. Atanassova presented a lecture entitled "InterCriteria Decision Making using Intuitionistic Fuzzy Sets".



From June 30 to July 31, 2014 **Prof Kiril Simov** and **Prof. Petia Osenova** from IICT-BAS visited the Faculty of Arts at the Vrije University



of Amsterdam. The visit had two main tasks: 1) to complete and release the first Bulgarian Core WordNet; and 2) to adapt the Bulgarian NLP pipe for processing of big amounts of texts in currently used standards, as NAF, and to enrich it with modules

for semantic annotation. The first task was performed in close cooperation with the group of Prof. Piek Vossen (the Head of the Computational Lexicology and Terminology Lab) and with Prof. Francis Bond (from the Singapore University), who was a visiting fellow in the Vrije University of Amsterdam. At the moment the Bulgarian Core Wordnet is freely available (<http://compiling.hss.ntu.edu.sg/omw/>). The second task was also performed in close cooperation with Prof. Piek Vossen's group. The pipe was adapted to process big data in NAF format and incorporates the available WordNet senses. The pipe will be ready in December 2014 and will be included for Bulgarian in the EU 7FP project NewsReader: Building structured event Indexes of large volumes of financial and economic Data for Decision Making.

Dr. Maria Lymbery from IICT-BAS visited the University of Duisburg-



Essen, Essen, Germany in the period September 1 – September 28, 2014. The main objective of her visit was conducting a joint research with Prof. Johannes Kraus. During this visit in Essen a preconditioning technique known as incomplete factorization by local exact factorization (ILUE) was studied analytically and numerically. A technique for constructing ILUE preconditioner based on splitting of the domain into overlapping and/or non-overlapping subdomains was proposed and a condition number estimate was derived. The scientific results obtained during the visit are presented in a paper entitled "Incomplete Factorization by Local Exact Factorization (ILUE)" submitted to a special issue of the "Journal of Mathematics and Computers in Simulation" (Impact Factor: 0.856) devoted to the 80th birthday of the distinguished Professor Owe Axelsson.

WP4: Development of IP and KT Plan and Innovation Capacity Building

In the period of April 22-25, 2014 **Prof. Galia Angelova**, **Prof. Ivan Dimov** **Prof. Dimitar Karastoyanov** from IICT-BAS and **Prof. Kostadin Kostadinov** (AComIn innovation consultant) visited the Glasgow University (GU – an AComIn partner) and Gold Standard Simulation Ltd. – a company associated to GU. The main objective of the visit was to gain impression about the GU approach for working with external clients, making joint projects for industrial research, transferring technologies to industry and offering access to extremely expensive high-tech equipment. Several important meetings were implemented, among them are short meetings with Prof. Neal Juster, Senior Vice-Principal and Deputy Vice-Chancellor of GU, as well as with Prof. John Marsh, the Head of the GU School of Engineering, a meeting with Dr Brendan Casey, CEO of Kelvin Nanotechnology (www.kelvinnanotechnology.com/index.html), a company owned by GU that implements projects with clients and enables access of industrial users to the James Watt Nanofabrication Centre; talks

with Melville Anderson, Head of GU IP and Commercialisation Division; Prof. James Conroy, Vice Principal responsible about the internationalisation; Dr Neil Bowering, Head of Knowledge Exchange Unit in the GU

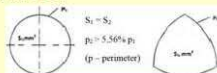


Research Strategy and Innovation Office; and Joe Galloway, Research Support Manager. They presented the GU knowledge exchange strategy as well as the GU commercialisation strategy. The Bulgarian guests had meetings and talks in the James Watt Nanofabrication Centre and visit in the clean room; talks and exchange of experience with colleagues from Gold Standard Simulation Ltd. (www.goldstandardsimulations.com/) located in the GU premises. The visit to Glasgow was extraordinarily useful and enlightening, given that the created contacts and gained experiences are combined with concrete plans for activities in the next months.



In September 2014 an application for a patent was sent to the European Patent Office. The invention named "**Braille Display**" relates to a special tactile matrix, which can be used for creating an auxiliary computer interface for the visually impaired people. The proposed Braille display has a simple structure and an easy conversion technology with an improved static, dynamic and energy performance. It applies a common link between all moving parts and provides an extended tactile feedback and a highly efficient start up with a low consumption of energy.

In September 2014 a group of scientists from the Embedded Intelligent Technologies Department of IICT-BAS applied for **Bulgarian patent for their invention named "Nail"**. The application concerns a nail with a special shape - it has three spherical surfaces and three edges. The nail cross-section forms so called Rele triangle, providing the nail with a greater resistance to collapse of the structure; a greater security of wooden buildings as well as a greater resistance to the transverse force actions. In 2015 it is planned to extend the patent application of the nail in the EU.



AComIn has been recently presented in the **annual International Technical Fair in Plovdiv** from the 29th of September to the 4th of October 2014, which is the biggest fair in the country. More than fifty companies from the local and international market have shown interest in the topics proposed by the AComIn project, with a particular view on the SmartLab. Companies from Israel, Austria, Romania, Russia, Serbia, Macedonia, Greece and Poland have expressed their interest in using novel technology such as three-dimensional printers, tomograph and infrared camera. At a **seminar "ICT innovations in Small and Medium Enterprises"** organized by the Bulgarian Association on Information Technologies (BAIT) in the frame of the fair, Prof. Galia Angelova

described the main objectives of AComIn emphasizing on the development of scientific prototypes for innovative applications. She presented SmartLab devices and their application for solving practical tasks. The event was attended by IT specialists mainly from the software



industry, participants and guests of the fair.



WP5: Dissemination

Scientific Events Supported by AComIn

The International Workshop on Advanced Control and Optimisation: Step Ahead (ACOSA) was held on 8-10 May 2014 in Bankya. The workshop gathered 28 specialists (24 of them – from Bulgaria) interested in the areas of control and optimization, decision making techniques, process control systems, intelligent agents and systems, as well as other related topics. The event was structured in 5 sessions: three of them were devoted to presentation of new research results (15 presentations), and two – to discussions on benefits of applying advanced control and optimization, and on the implementation of advanced control concepts and technologies in small and medium-sized enterprises. The 15 AComIn-related papers will be published in workshop proceedings. Selected best papers will be proposed for publication in relevant renowned research journals.

The International Workshop on Biometrics (BIOMET' 2014) was held on June 23-24, 2014 in Sofia with the main objective to disseminate recent advances in Biometrics among the research groups and companies in Bulgaria and Balkan countries. The workshop was attended by 32 participants from Bulgaria, Italy, UK, Cyprus, Finland, Saudi Arabia, etc. The scientific program of the event included 4 invited talks and 17 presentations selected after peer-reviewing by the workshop Program Committee. The workshop proceedings will be published as a special volume in Springer series Lecture Notes in Computer Science (LNCS).

The workshop on Control in Transportation Systems (CTS'14) was held on September 10 - 11, 2014 in Sofia and was organized as an associated event of the COST TU1102 Training School. The goal of this event was to review the achievements following the first edition of this CTS workshop, which was held in September 2012, and to demonstrate advanced solutions and state of the art approaches to formal modelling, design issues and solutions, applied for transport and information systems. The workshop gathered 22 participants mainly from Bulgarian academic society. The scientific program of the event contained 2 invited

talks and 12 regular presentations selected by the Program Committee after peer-reviewing. Selected papers will be published in a post-workshop proceeding.

The 8th International Conference on Numerical Methods and Applications (NMA'14) was held in Borovets on August 20-24, 2014.

The conference topics included efficient methods and algorithms for advanced computing, modelling and understanding the behaviour of materials and how those materials could be applied for the advancement of ICT, application of advanced computing for development of large-scale environmental models, novel results in CMOS modelling and application of



results, new methods and models for computing small sensitivity indices, etc. The scientific program of the event consisted of 5 invited talks and 69 regular papers. 75 participants of the conference were coming from 21 countries, namely, Bulgaria, Germany, Austria, UK, China, USA, Belgium, Spain, Czech Republic, Switzerland, Norway, Greece, Turkey, Slovakia, Poland, Russia, Sweden, The Nederland, Denmark, France, and Canada. The NMA'2014 proceedings will appear as a special volume of Springer LNCS in 2014 and will include 16 AComIn-related papers.



The 16th International Conference AIMS A 2014: Artificial Intelligence: Methodology, Systems, and Applications was held in Varna, Bulgaria on September 10-13, 2014.

The AIMS A conference series has been providing a biennial forum for the presentation of Artificial Intelligence research and development since 1984. The event provided a forum for exchanging ideas between scientists developing and studying methods and algorithms for Artificial Intelligence as well as researchers, who apply them for solving real life problems. The conference was preceded by a one day seminar on 3D visualisation of Cultural Heritage that was aimed to give an introduction into the theory, process and practice of capturing and preparing digital models of cultural heritage artefacts, and how these digital objects can be used to enrich the understanding of our past.

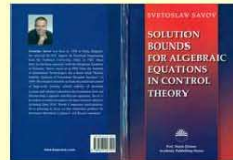


The scientific program of the conference consisted of 3 invited talk, 14 long papers and 17 short papers accepted for presentation after peer-reviewing by the conference Program Committee. The conference proceeding was printed as a special volume of the Springer LNAI series

and contains 2 AComIn-related papers. One of them: Ivelina Nikolova, Dimitar Tcharaktchiev, Svetla Boytcheva, Zhiyko Angelov, and Galia Angelova. "Applying Language Technologies on Healthcare patient Records for Better Treatment of Bulgarian Diabetic Patients" was bestowed the AIMS A 2014 Best Paper Award. The event was attended by 47 participants from 14 countries.

Published Monographs Supported by AComIn

In June 2014, the monograph of *Dr. Svetoslav Savov* from IICT-BAS: **Solution Bounds for Algebraic Equations in Control Theory** (205 pp, ISBN 978-954-322-750-1) was published by Prof. Marin Drinov Academic Publ. House. The book is intended for a wide readership including engineers, applied mathematicians, graduate students, etc., seeking a comprehensive view of the main results on the estimation of the solutions of four algebraic equations, namely, the continuous-time and the discrete-time Lyapunov and Riccati equations.



In September 2014 the monograph of *Dr. Svetozar Ilchev* and *Prof. Zlatolliya Ilcheva* from IICT-BAS **A New Approach for Data Handling for Web-based Applications** (150 pp, ISBN: 978-954-322-780-8) was published by Prof. Marin Drinov Academic Publ. House. Among potential readers of the book are developers of corporate Internet portals, news and advertising agencies, security footage producers, keepers and communicators of sensitive private data, government administrators etc.



WP7: Project Management

In April 2014 European Commission evaluated the work done in the first reporting period of the project AComIn (project months 1-18, 1 October 2012 – 31 March 2014) as *successful*. The information about all performed activities and results achieved is presented in 7 public Deliverables available at the project site (www.iict.bas.bg/acomin/deliverables.htm).

In order to increase the networking opportunities, in August 2014 the AComIn Consortium was extended by **a new partner - Prof. Johannes Kraus** from the Department of Mathematics, University of Duisburg-Essen, Germany. The University of Duisburg is among the largest research universities in Germany and Prof. Kraus is one of the leading scientists in the area of Advanced Computing.

In July 2014 the Bulgarian Ministry of Education and Science provided to IICT-BAS substantial co-financing in order to complement and further strengthen the AComIn performance. The national support enables the integration of young Bulgarian researchers and PhD students into AComIn activities as well as equipment of the SmartLab devices with additional functionality and modern accessories.



This Project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 316087

AComIn: Advanced Computing for Innovation
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<http://iict.bas.bg/acomin/>

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The electronic version of this newsletter can be found in <http://www.iict.bas.bg/acomin/docs/e-newsletters/E-Newsletter-no4.pdf>

6.2. ACOMIN NEWSLETTER №4 (IN BULGARIAN)

ACoMIn БЮЛЕТИН №4

Advanced Computing for Innovation Септември 2014

Цели и задачи на проекта ACoMIn: да се засили научният и иновационен потенциал на ИИКТ-БАН чрез увеличаване на знанията и уменията на учените в актуални и нови научни области, както и чрез закупуване на модерно оборудване. Проектът ще позволи на ИИКТ да изпълни своята стратегическа цел: до 2016, т.е. 5 години след създаването си, Институтът би трябвало да се превърне във водещ научно-изследователски център в Централна и Източна Европа, който предоставя условия за работа, съвместими със средните стандарти на Центровете за върхови постижения по ИКТ в ЕС. ИИКТ-БАН ще подпомага регионалния и национален растеж и откриването на нови работни места чрез предоставяне на научно-приложни резултати на високотехнологични индустриални организации. Институтът ще бъде център за висококачествено обучение на млади учени.

Дейности по Работни пакети (април – септември 2014)

РП1: Увеличаване на човешкия потенциал на ИИКТ

Назначени пост-докторанти

Д-р Владимир Кудряшов започва работа на пост-докторантска позиция през август 2014 г. Той пристига в ИИКТ-БАН от Отдела по нелинейна динамика на електронни системи към Института по радиофизика и електроника „А. Я. Усиков“ на Украинската национална академия на науките, Харков, където е защитил докторска дисертация по обработка на образи и звуци в двуместни радиометри и радарни антени със синтезиране на лъча. В ACoMIn той ще изследва алгоритмите за формиране на изображения, използвани при класификация на източниците на шум/звук при акустичната камера Brüel & Kjær от интелигентната периферия Smart Lab. Негов ръководител е доц. Кирил Алексиев.



Краткосрочни назначения на гостуващи учени

Проф. Дарина Дичева и **проф. Христо Дичев** пристигат в ИИКТ-БАН от Winston Salem State University, САЩ. По време на престоя си (9 юни – 9 юли 2014) те продължават започнатите през 2013 г. съвместни изследвания с доц. Геннадий Агре и проф. Гали Ангелова в областта на използване на семантични и игрови техники в системи за електронно обучение. Акцентът беше поставен върху игровизацията (gamification) – относително нова и бързо разрастваща се област, която изследва прилагането на игрови елементи в неигрови контекст. Беше проведено и мета-изследване на публикуваните досега проучвания върху специфични приложения на игровизацията в образованието. Резултатите ще бъдат публикувани в две статии: D. Dicheva, Ch. Dichev, G. Agre, G. Angelova, *Gamification in Education: A Systematic Mapping Study* (приета за печат в научното списание *Journal of Educational Technology & Society*, Impact Factor 1.34) и Ch. Dichev, D. Dicheva, G. Angelova, G. Agre, *From Gamification to Gamiful Design and Gamiful Experience in Learning* (приета за печат в списанието *Cybernetics and Information Technology Journal*, SJR rank 0.216). За представители на съответните академични и образователни общности на 3 юли 2014 г. бяха изнесени два лекции относно най-новите тенденции при използване на игровизацията в системи за електронно обучение. Проф. Дичева и проф. Дичев също така проведоха

два срещи с изследователския отдел на „Уча.се“ – популярен български онлайн портал, ориентиран изцяло към началното и средно образование. Бяха направени няколко препоръки за развитие на портала след внимателна оценка на текущото му състояние. Така беше установено сътрудничество с реални крайни потребители, които използват на практика иновативни образователни технологии.



Проф. Мелена Добрева пристига в ИИКТ-БАН от Университета на Мелта, за да продължи съвместните си изследвания върху цифрови хранилища на артефакти, част от културното наследство, и на цифровизирани модели, заедно с проф. Гали Ангелова и доц. Геннадий Агре. По време на посещенията си (10 юни – 17 юли 2014 г.) проф. Добрева подготви обзор на разработки за 3D моделиране на обекти от културното наследство, с цел да се формира потребителско общество по 3D моделиране на културното наследство в рамките на проект ACoMIn. Проф. Добрева установи контакти с експерти от Лабораторията по визуализация на King's College, Лондон и участва в подготовката на програмата на семинара по трансфер на технологии за 3D визуализация в културното наследство, който се проведе на 10 септември 2014 г. като съпътстващо събитие на Международната конференция AIMSA-2014 във Варна. На 9 юли 2014 г. проф. Добрева нанесе лекция за новите тенденции в развитието на цифровите библиотеки за културно наследство.



РП2: Закупуване на интелигентна периферия за Smart Lab и формиране на Потребителски групи

В периода април-септември 2014 г. Умната лаборатория SmartLab беше допълнена с две нови устройства: интерактивна сървърна среда (ISE) и 3D принтер. ISE подпомага концентрацията и обмена на данни между интерфейсите на устройствата от SmartLab и високопроизводителното изчислително ядро на Института. Освен това ISE осигурява среда за провизиране, тестване, симулиране и оптимизация на различни методи за управление на трафика при



различни транспортни системи. Средата поддържа пакета за симулиране *AMSUN software suite*, осигурява оптимален контрол чрез светлата *TRANSYT*, както и комуникация в реално време със светофари при извършване на симулации.

Пълноцветният 3D принтер ProJet 460Plus е един от най-удобните за ползване и достъпни 3D принтери от този клас в света. Той осигурява съвременно трицветно пълноцветно 3D принтиране с безопасни материали и активен контрол на праховите частици без топлинни отпадъци. Някои от техническите спецификации на устройството са: разделителна способност – 300 x 450 dpi, минимален размер на макетите – 0.15 mm, дебелина на отделните слоева – 0.1 mm, поддържани формати на файлове с входни данни – STL, VRML, PLY, 3DS, FBX, ZPR. С принтера ProJet 460Plus може бързо да се проектират и създават прототипи или да се произвеждат макети на функционални части, устройства и конструкции.



Семинари за трансфер на технологии

Поредният семинар на **Потребителската група „Интелигентно управление на цифрово съдържание“**, посветен на новите тенденции в електронното образование, беше проведен в ИИКТ-БАН на 3 юли 2014 г. Проф. Христо Дичев изнесе лекция на тема: *„Използване на игрови елементи в образователни системи: теоретични и технологични перспективи“*, с фокус върху ролята на игровизацията в образованието и обучението. Проф. Дарина Дичева представи лекция на тема: *„Игровизация в образованието: какво, защо, как?“*, акцентирайки върху



результатите от проведеното мета-изследване в рамките на проект AComIn. Лекциите бяха последвани от оживена дискусия за възможностите да се приложи игровизация в българските образователни институции. Последната презентация: *„Как ученето може да бъде игра?“* беше изнесена от г-н Дарин Маджаров, основател на компанията *Уча.се*. Той представи популярния учебен портал *Уча.се* (www.uchase.bg) – цялостна платформа за онлайн обучение, която поддържа интерактивни сесии с ученици и учители. Разгледани бяха най-важните функционалности на портала и главните предизвикателства, включително как да се осъществи по-пълно покриване на учебния материал под формата на атрактивни за учениците видео-лекции. Обсъдени бяха въпроси за обогатяване на онлайн платформата, така че да посрещне нарастващите нужди на учениците и да се постигне по-голяма видимост и възприемчивост сред учителите. Семинарът беше посетен от 28 участници от академични организации, гимназии и български фирми.

Последният за периода семинар по **„Интелигентно управление на цифрово съдържание“** беше проведен на 9 юли 2014 г. Той имаше за цел да представи съвременните



тенденции в областта на цифровизация на културното наследство, връзките на цифровите библиотеки, както и да породи дискусии за добрите практики и иновативни подходи в

използването им в образованието и така наречената „гражданска наука“. Семинарът беше организиран с активното участие на Ontotext (www.ontotext.com) – водеща българска фирма в областта на семантичните технологии и цифровизацията на културно наследство. Програмата включваше 4 презентации. Проф. Милена Добрева (от Университета в Малта) изнесе доклад за най-добрите практики в използването на цифрови ресурси в образованието и гражданската наука. Д-р Владимир Алексиев (от Ontotext) говори за използването на семантични технологии в областта на културното наследство. Г-н Потър Миладинов (от Софийски Университет) представи един пример за интегрирано обучение –



„Виртуален музей“. Г-н Илиан Узунов от Ontotext разгледа подходите за обогатяване на образователния ресурс с материал от цифрови библиотеки, както и други актуални тенденции в електронното обучение. Семинарът завърши с интересна дискусия относно използването на ресурси от цифровите библиотеки за целите на образованието и науката. Събитието беше посетено от 23-ма участници от научни организации и фирми.

Поредният семинар на **Потребителската група „Индустрална математика“** се проведе в рамките на 8-мата Международна конференция по числени методи и приложения (NMA'14) на 21 август 2014 г. в Боровец и включваше лекцията: *„Walk on equations and sequential Monte Carlo to solve linear systems“*, представена от д-р Силван Мер от Université du Sud Toulon-Var, Франция, както и дискусията *„Ultimate numerical methods for solving problems in modern physics and emerging technologies“* с модератор проф. Иван Димов от ИИКТ-БАН. Дискусията проправи път към по-задълбочени изследвания, свързани с устройства като MOSFETs (Metal On Silicon Field Effect Transistor), дву-портни транзистори, нано-жичи и др. На семинара присъстваха 20 участници – учени и специалисти от Австрия, Белгия, България, Франция, Германия, Швейцария, Великобритания и др.



Семинарът по **3D Визуализация на културно наследство** (www.aimsacollaborates.org) се проведе във Варна на 10 септември 2014 г., като съпътстващо събитие на 16-тата Международна конференция по изкуствен интелект AIMS'14. Той беше организиран под формата на еднодневен



учебен курс с цел да въведе участниците в теорията, процесите и практиката по изготвяне на цифрови модели на артефакти, обекти на културно наследство. Няколко теоретични лекции бяха комбинирани с практически упражнения, позволяващи на присъстващите да придобият непосредствен опит с популярна технология, като беше наблегнато на лесна употреба, достъпни цени и устойчивост. Съвременната сесия включваше следните лекции: Draw Backer (Kings College, London, UK) *„Digitising Cultural Heritage – An overview of the state of digital cultural heritage, its importance, use and potential“* и *„Making Spaces – An entry level introduction to multi dimensional theory“*

(space, time and probability), Interaction design and dissemination”, Martin Blazeby (King’s College, London, UK): “Best Practice for 3D Digitisation – The London Chapter” и “3D Capture Techniques”. Следобедната сесия включваше практически занимания: осанирана в Darfth Mar Belasog и Handpussel, както и извършване на фотограметрия на артефакти с използване на онлайн софтуер. Събитието беше посетено от 20 участници от български научни организации, предимно млади учени от ИИКТ-БАН.

Семинарът по роботика и иновации се проведе на 18-19 септември 2014 г. в ИИКТ. Програмата на семинара включваше 4 лекции на проф. Кенчи Яно от MIE University,



Япония, посветени на изчислителната рамка при моделирането и интелигентния контрол в индустриалната и медицинска роботика, както и няколко презентации на млади учени от ИИКТ-БАН.

Първият ден от семинара беше насочен към приложения на изчислителната динамика на флуиди и анализ по метода на крайните елементи в оптимизицията и управлението на работи и форми за отливане, както и на иновативен робот за пренос на течности. През втория ден бяха обсъдени задачи, свързани с медицинската и животоподдържаща роботика. Проф. Яно представи изследванията си по разработка на работи за физиотерапия, които подпомагат терапевтичните упражнения за раменните стави и намаляват физическото натоварване върху физиотерапевта. Той демонстрира как работят и няколко системи за подпомагане и работи за рехабилитация, създадени в неговата лаборатория. Семинарът приключи с интересна дискусия относно възможностите за бъдещо сътрудничество в областта на роботиката, интелигентния контрол, изчислителните методи и математиката, на базата на апаратурата от SmartLab и високпроизводителната инфраструктура на ИИКТ-БАН.

РПЗ: Обмен с водещи партньори от ЕС

Краткосрочни посещения в ИИКТ-БАН

Проф. Зигфрид Зелберхер от Института по микроелектроника към Техническия университет във Виена, Австрия, гостува на проект ACoMIn в периода 29 април – 2 май 2014 г. Той се запозна с организацията на дейностите в ACoMIn, както и с постиженията на проекта при решаване на актуални научни теми, възникващи при развитието на съвременната наноелектроника. Бяха проведени срещи, семинар и обсъждания относно завършването на няколко общи статии, набелязаха се теми за бъдещи съвместни изследвания и възможности за финансиране на сътрудничеството. По-конкретно, дискусията беше фокусирана върху научна задача, свързана със съществуването и единствеността на решението на уравнението на Векслер. Беше получен значим научен резултат и обсъден план за публикуването му.

Проф. Херман Ролник, Директор на Института по телекомуникации към Технологичния университет в Хамбург, Германия, посети ИИКТ в периода 18-24 май 2014 г. Той проведе срещи и дискусии с учения от



Секцията “Математически методи за обработка на сензорна информация”. На 21 май 2014 г. проф. Ролник изнесе лекция, озаглавена: “Automotive Radar Systems”, която породила оживени дискусии и повиши интереса към задълбочаване на научните контакти.

Проф. Кенчи Яно, Ръководител на Лабораторията по мезатроника и Декан на Факултета по машинно инженерство към Университета MIE, Япония,



посети ИИКТ в периода 18-20 септември 2014 г. Той участва в семинара за трансфер на технологии в областта на роботиката и иновациите по проект ACoMIn. Бяха изнесени 4 лекции с цел представяне на дейността на ръководената от него Лаборатория, която е свързана главно с разработването на медицински и асистирани работи. Проф. Яно се запозна с уредите от интелигентната периферия SmartLab и проведе срещи и дискусии с водещи учени от Секцията “Вградени интелигентни технологии”, на които бяха обсъдени възможности за бъдещо сътрудничество.

Визити на учени от партньорски организации

Проф. Олег Илчев от Фраунхоферовия Институт по индустриална математика (ITWM) в Кайзерслаутерн, Германия посети ИИКТ-БАН в периода 17-22 май 2014 г.



Бяха обсъдени теми от общ научен интерес, с фокус върху опита на ITWM в анализе на томографски вокселни данни и приложения, които ги използват. Беше разгледана и специфична информация за функционалността на софтуера GeoDiot. Проф. Илчев взе участие в Международната конференция по числени методи за научни пресмятания и съвременни приложения в Банско, 19-22 май 2014 г., организирана от ИИКТ-БАН, където представи пленарен доклад на тема: “Upscaling Voxel Preconditioners for Composite Materials”.

Проф. Асен Асенов и д-р Кемпбъл Милър от Университета в Глазгоу (UoG) посетиха ИИКТ на 11-17 юни 2014 г. Проф. Асенов и проф. Иван Димов (ръководител на Секция “Паралелни пресмятания” в ИИКТ)



обсъдиха текущото състояние на сътрудничеството между двете организации и направиха план за бъдещи съвместни дейности. Д-р Милър и д-р Жан Мишел Салие (пост-докторант в ACoMIn) обсъдиха подготовката на общо проектно предложение в рамките на програма Хоризонт 2020, свързано със съвременен квантов моделиране на наноелектронни устройства, и съставиха планове за подаване на подходящ конкурс през 2015 г. Проф. Асенов и д-р Милър посетиха научните групи на проф. Иван Димов, проф. Галя Ангелова, проф. Димитър Карастоянов и проф. Костадин Костадинов и бяха информирани за научния капацитет и действащите научни проекти. Тази информация ще бъде разпространена във Факултета по инженерни науки към UoG, с цел да се насърчи бъдещото сътрудничество в рамките на програма Хоризонт 2020.

Проф. Вержиния Кантони от Университета в Павия, Италия беше гост на ИИКТ в рамките на проект ACoMIn в периода 7-23 май и 22 юни – 4 юли 2014 г. Проф. Кантони извърши съвместни научни изследвания с доц. Димо Димов от

Секция "Обработка на сигнали и разпознаване на образи" с цел създаване на база данни от 3D изображения на човешки уши, които да се използват в биометрията. Изображенията бяха създадени чрез 3D скенера от интелигентната периферия на ACoMIn. Резултатите от тези изследвания бяха представени в две съвместни статии: V. Cantoni, D. T. Dimov, and A. Nikolov "3D Ear Analysis by an EGI Representation" и D. T. Dimov and V. Cantoni "Appearance-Based 3D Object Approach to Human Ears Recognition", представени на семинара BIOMET2014, състоял се в София на 23-24 юли 2014 г., успешно организиран от проф. Кантони и доц. Димов по проект ACoMIn. Сборникът с трудове на семинара ще бъде издаден като отделен том на Lecture Notes in Computer Science от издателство Springer.



Проф. Кантони взе участие и в 15-тата Международна конференция CompSysTech в Русе, като на 27 юни 2014 г. изнесе доклада "Eye-tracking systems, research and applications".

Командировки до партньорски организации

В периода 15 юни – 16 юли 2014 г. доц. Любка Духовска, доц. Владимир Мочов и д-р Вася Атанасова от ИИКТ-БАН посетиха Департамента по Науки и технологии и Центъра за приложения и автономни сензорни системи към Университета в Оребро, Швеция, където извършиха научни изследвания, свързани с теми от оптимизирането и интелигентния контрол, заедно с шведските си колеги. Резултатите бяха публикувани в научната статия: Atanasova V., L. Doukova, D. Karastoyanov, František Šarponč "InterCriteria Decision Making Approach to EU Member States Competitiveness Analysis: Trend Analysis", представена на 7th IEEE International Conference Intelligent Systems – IS'14, 24-26 септември 2014 г. във Варшава, Полша. Те обсъдиха също и възможностите за използване на специализирания софтуерен пакет EDEM, закупен по проект ACoMIn, за моделиране на процеси на производство, транспортиране и употреба на грануларни материали.



Д-р Атанасова изнесе лекция, озаглавена: "InterCriteria Decision Making using Intuitionistic Fuzzy Sets" по време на семинар, организиран от Департамента по Науки и технологии.

От 30 юни до 31 юли 2014 г. доц. Кирил Симов и доц. Лена Осмаев от Секцията за лингвистично моделиране посетиха Факултета по изкуствата към Свободния университет в Амстердам, Холандия, където работиха върху две задачи: да извършат и разпространят първия български ресурс Core WordNet със свободен достъп; да адаптират българската среда за постатична обработка на естествен език NLP pipe към големи количества текст и да я обогатят с модули за семантична анотация. Тези



задачи са изпълнени в тясно сътрудничество с проф. Пик Вазен, ръководител на Лабораторията за изчислителна лексикология и терминология, с учени от Лабораторията, както и с проф. Франсис Бонд от Университета на Сингапур, гостуващ учен в Свободния университет в Амстердам. В момента българският Core WordNet е достъпен безплатно на <http://compling.haz.nyu.edu/core/>. Средата NLP pipe е адаптирана към обработка на големи данни в NAF-формат и в нея са интегрирани наличните значения от WordNet. През декември 2014 г. нейната версия за български език ще бъде включена в европейски проект, финансиран по Седма рамковия програма "NewsReader: Building structured event indexes of large volumes of financial and economic data for Decision Making".

Д-р Мария Лимбъри от ИИКТ-БАН посети Университета в Дуйсбург-Есен, Германия в периода 1-28 септември 2014 г. с цел да извърши съвместни изследвания заедно с проф.



Йоханес Краус. Изследвания са аналитично и числено техники за преобуславяне, известни като непълна факторизация с помощта на локални точни факторизации (ILUE). Предложен е подход за конструиране на ILUE преобуславятели, на базата на разделяне на областта на подобласти със (или без) припокриване. Получени са оценки на числото на обусловеност. Резултатите са представени в статията: "Incomplete Factorization by Local Exact Factorization (ILUE)", подадена за публикуване в специален брой на Journal of Mathematics and Computers in Simulation (Impact Factor: 0.856), посветен на 80-годишнината на професор Уве Акселсон.

РП4: Създаване на план за управление на интелектуалната собственост, трансфера на знание и развитие на иновационен потенциал

В периода 22-25 април 2014 г. проф. Гая Анашкова, проф. Иван Димов, проф. Димитър Карастойнов от ИИКТ и проф. Костадин Костадинов (иновационен консултант на ACoMIn) посетиха Университета на Глазгоу (UoG – партньор ACoMIn) и Gold Standard Simulation Ltd. – фирма, свързана с UoG. Основната цел на посещението беше запознаване с подхода и опита на UoG за работа с външни клиенти, разработване на съвместни проекти за индустриални изследвания, трансфер на технологии към индустрията и предоставяне на достъп до наличното изключително скъпо високо-технологично оборудване. Бяха проведени няколко важни срещи, изключително: кратки срещи с проф. Нейл Дъжестър, Зам-ректор на UoG, както и с проф. Джон Марш, декан на Факултета по инженерни науки; работна среща с д-р Брендан Кейси, изпълнителен директор на Kelvin Nanotechnology – фирма на UoG, която изпълнява проекти с клиенти и осигурява технич. достъп до нанопроизводства



център „Джеймс Уат“; разговори с г-н Мелвил Андерсън, ръководител на отдела на UoG за интелектуални права и комерсиализация; с проф. Джеймс Конрой, зам.-декан отговорен за международните дейности; с д-р Нийл Бауеринг, ръководител на отдел за обмен на знания към службата по научни стратегии и иновации; и с Джо Галауей, ръководител на отдел за подпомагане на научните изследвания. Те представиха стратегиите на UoG за обмен на знания и комерсиализация. Българските гости проведоха срещи в нанопроизводствения център „Джеймс Уат“, посетиха чистата стая и обмениха апли с колегите си от фирма Gold Standard Simulation Ltd. (www.goldstandardsimulations.com/), разположена в комплекса на UoG. Посещението беше изключително ползотворно и обогатяващо, като създадените контакти и придобитият опит бяха допълнени с конкретни планове за съвместни дейности през следващите месеци.

През септември 2014 г. беше подадено заявление към WIPO за международно разширение на българския патент „Брайлов дисплей“. Иновативният елемент в това



устройство е специална тактилна матрица, която се използва за създаване на компютърен интерфейс за незрящи хора. Предложеният Брайлов дисплей е с опростена структура и с подобрени статични, динамични и енергийни показатели. Международното предложение включва иновативни характеристики на матрицата, които са получени след обстойни изследвания с уредите от SmartLab. Освен символи, устройството представя и опростена графична информация (например компютърни икони).

През септември 2014 г. група учени от Секцията по “Вградени интелектуални системи” на ИИКТ подадоха заявление за български патент за изобретение, наречено “Геоздей”. Предложениято се отнася до пирон със специфична форма на тялото, върха и главата – заоблени повърхности и три ръба. Напречното сечение образува т. нар. “триъгълник на Рыло”, което придава по-голяма устойчивост на сарепените с таквава геометрия конструкции поради по-трудно изваждане.



При ориентирано забиване рязък от оруване е по-малък поради по-голяма стабилност на дървени построянки и устойчивост при напречно действащи сили. Свойствата на гвоздеа се доказават при тестване с уредите на SmartLab. Предвидено е през 2015 г. заявката да бъде разширена чрез WIPO.

Наскоро проект AComIn беше представен на **Международния технически панаир в Пловдив (29 септември – 4 октомври 2014 г.)** – най-големият технически панаир в страната. Над петдесет компании от местния и международния пазар проявиха интерес към темите, по които се



работи в рамките на AComIn, а също така и към апаратурата от интелигентната периферия SmartLab. Фирми от Израел, Австрия, Румъния, Русия, Сърбия, Македония, Гърция и Полша са заинтересовани да използват модерни уреди като 3D принтера, томографа и инфра-червена камера. На семинара “ИКТ иновации в малки и средни предприятия”, организиран на 30 септември 2014 г. от Българската асоциация по информационни технологии (BAIT), проф. Гая Ангелова беше поканен лектор. Тя описа основните цели на AComIn, акцентирайки върху развитието на научни прототипи за иновативни приложения, представя уредите от SmartLab и използването им за решаване на практическите задачи. Събитието беше посетено от специалисти по информационни технологии, най-вече от софтуерни фирми, както и други участници и гости на панаира.

РП5: Разпространение

Научни събития, подпомогнати от проект AComIn

Международният семинар по Съвремененно управление и оптимизация: Step Ahead (ACOSA) се провежда на 8-10 май 2014 г. в Баня. В него взеха участие 28 специалисти с изяви интереси в областта на управление и оптимизация, техники за вземане на решения, системи за управление на процеси, интелигентни агенти и системи, както и други свързани теми. Събитието беше организирано в 5 сесии: три от тях бяха посветени на представяне на нови научни резултати (15 доклада), а други две – на дискусии за внедряването на концепции и технологии от съвременния контрол в малки и средни предприятия. 15 статии, свързани с AComIn, ще бъдат публикувани в Сборника трудове на семинара. Избраните най-добри статии ще бъдат предложени за публикуване в известни научни списания.

Международният семинар по Биометрия (BIOMET'2014) се провежда на 23-24 юни 2014 г. в София. Целта му беше да разпространи последните постижения на биометрията сред научните колективи и фирми от България и балканските страни. Семинарът събра 32-ма участници от България, Италия, Великобритания, Кипър, Финландия, Саудитова Арабия и др. Научната програма на събитието включваше 4 поканени доклада и 17 презентации, рецензирани от членовете на Програмния комитет на семинара. Сборникът с доклади ще бъде публикуван като отделен том на Springer series Lecture Notes in Computer Science (LNCS).

8-мата Международна конференция по Числени методи и приложения (NMA'14) се провежда в Боровец на 20-24 август 2014 г. Темите на конференцията включваха ефективни методи и алгоритми за съвременни пресмятания, моделиране на свойствата на материали и тяхното използване, разработка на модели на околната среда, нови резултати и моделирането на CMOS-схеми и приложения на



тази резултати, нови методи и модели за пресмятане на индекси на чувствителност и др. Научната програма включваше 5 поканени доклада и 69 статии. В конференцията участваха 75 учени от 21 страни.

Сборникът с доклади от NMA'2014 ще бъде издаден като отделен том на Springer Lecture Notes in Computer Science series през 2015 г. и ще включва 16 статии, свързани с ACoMIn.

Семинарът по Управление на транспортни системи (CTS'14) се проведе на 10-11 септември 2014 г. в София и беше организиран като съвместващо събитие на лекционните курсове на Кост-важията TU1102 (COST TU1102 "Autonomic Road Transport Support Systems" Training School). Целта на семинара беше да се демонстрират съвременните решения и най-новите подходи към формалното моделиране на системи за контрол и управление в транспорта. В семинара участваха 22-ма специалисти, най-вече от българската академична общност. Научната програма включваше 2 поканени доклада и 12 презентации, подбрани от Програмния комитет след рецензиране. Избрани доклади ще бъдат публикувани в списанието Cybernetics and Information Technology, SJR rank 0.216.

16-тата Международна конференция AIMSA 2014 "Искусствен интелект: Методология, системи и приложения" се проведе във Варна на 10-13 септември 2014 г. Събитията AIMSA, провеждани в България от 1964 г., са известен форум за представяне на нови научни резултати в областта на Искусствения интелект. Конференцията беше предшествана от еднодневен семинар по 3D визуализация на културно наследство, който представи



подходите, процесите и практиката по изготвяне на цифрови модели на артефакти от културното наследство. Научната програма се състоеше от 3 поканени доклада, 14 дълги статии и 17 по-кратки статии, приети за изясняне след процес на анонимно рецензиране от членовете на Програмния комитет. Сборникът с трудове е отпечатан като том 8722 на Springer Lecture Notes on Artificial Intelligence series и съдържа 2 статии, свързани с проект ACoMIn. Една от тях: I. Nikolova, D. Tchavakichiev, S. Boytcheva, Zh. Angelov, G. Angelova "Applying Language Technologies on Healthcare



"Patient Records for Better Treatment of Bulgarian Diabetic Patients" спечели наградата на AIMSA 2014 за най-добра статия. В събитията участваха 47 учени от 14 страни.

Монографии, издадени с подкрепата на проект ACoMIn

През юни 2014 г. монографията на д-р Светослав Саваев от ИИКТ: *Solution Bounds for Algebraic Equations in Control Theory* (205 страници, ISBN 978-954-322-750-1) беше



публикувана от Академичното издателство на БАН "Проф. Марин Дринов". Книгата е предназначена за широка читателска аудитория, в това число инженери, приложни математици, докторанти, които се интересуват от

придобиване на цялостна представа за основните резултати, свързани с оценките на решенията на четри алгебрични уравнения, а именно непрекъснатите и дискретни уравнения на Ляпунов и Рихати.

През септември 2014 г. монографията на д-р Светозар Илчев и доц. Златолулия Илчева от ИИКТ: *A New Approach for Data Handling for Web-based Applications* (150 страници, ISBN 978-954-322-780-8) беше публикувана от Академичното



издателство на БАН "Проф. Марин Дринов". Сред потенциалните читатели на книгата са специалисти, разработващи корпоративни интернет портали; новинарски и рекламни агенции; специалисти, работещи с охранителни

записи; експерти, работещи с лични данни; държавни администратори и др.

РПТ: Мениджмънт

През юли 2014 г. Европейската Комисия оцени като успешен първия отчетен период на ACoMIn (1 октомври 2012 – 31 март 2014). Информация за постигнатите изследователски резултати, издадените научни публикации и извършените дейности е представена в седем публични отчета, които са достъпни на уеб-сайта на проекта:

(www.iict.bas.bg/acomin/deliverables.html).

С цел създаване на възможности за мобилност и установяване на контакти, през август 2014 г. консорциумът на проект ACoMIn се увеличи с още един партньор – проф. **Йоханес Краус** от Факултета по математика към Университета в Дюисбург-Есен, Германия, който е сред най-големите немски университети с научно-изследователска насоченост. Проф. Краус е един от водещите европейски учени в областта на съвременните пресмятания.

През юли 2014 г. Министерството на образованието и науката на България предостави на ИИКТ-БАН значително по размер съфинансиране, за да се допълнят и засилят постиженията по проект ACoMIn. Националната подкрепа спомага за интеграцията на млади български учени и докторанти в дейностите по проекта, както и за комплектуване на интелигентната периферия SmartLab с допълнителни функционалности и аксесоари.



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 316087

ACoMIn: Advanced Computing for Innovation
Съвременните пресмятания в полза на иновациите
<http://iict.bas.bg/acomin/index.html>

Национално съфинансирано договор ДОТ-192/2014 г. на Министерството на образованието и науката

Координатор: проф. д-н Галия Ангелова
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The electronic version of this newsletter can be found in <http://www.iict.bas.bg/acomin/bg/docs/e-newsletters/E-Newsletter-no4.pdf>

6.3. ACOMIN NEWSLETTER №5 (IN ENGLISH)

AComIn Newsletter №5

Advanced Computing for Innovation

March 2015

AComIn Mission: to strengthen the research and innovation capacity of the Institute of Information and Communication Technologies – Bulgarian Academy of Sciences (IICT-BAS) by increasing the knowledge and skills of its researchers in emerging areas as well as by purchasing modern research infrastructure. AComIn should help the institute to successfully accomplish its strategic mission: by 2016, i.e. 5 years after its creation, IICT-BAS has to become a leading RTD Centre in Eastern Europe, providing facilities and working conditions comparable to the average standards of the EU Centres of Excellence in ICT. The institute will support the sustainable regional and national growth and employment by providing RTD results to advanced industrial organisations; it will be a focal point of high-quality research and training in advanced ICT topics.

Progress Report (October 2014 – March 2015)

WP1: Strengthening the IICT-BAS Human Potential

Employed Incoming Post-docs



Dr. Iurii Chyrka was appointed to a post-doc position in IICT-BAS in January 2015. He came to the Institute from the National Aviation University, Kyiv, Ukraine where he worked on measurement theory, radiolocation and digital signal processing. During his appointment at IICT-BAS he will conduct research on estimating the technical characteristics of the available equipment for acoustic holography and

on enhancing it by aperture modification and algorithm improvement. In his research he is using the Brüel & Kjaer acoustic camera from the SmartLab equipment.



Dr. Aleksey Balabanov was appointed to a post-doc position in IICT-BAS in February 2015. He came to the Institute from the Sevastopol National Technical University Ukraine, where he worked as a senior lecturer in the Department of Technical Cybernetics. His research experience includes solving optimization problems based on matrix algebraic Riccati equation and on making expert decisions on the basis of fuzzy logic.

In the frame of the AComIn project Aleksey is going to conduct research on design, modeling, testing and simulation of control algorithms with the aim to solve large scale and complex systems from the transport domain.

For his research he is currently using the integrating server environment from the SmartLab equipment.



Dr. Kristina Jakimovska was appointed to a post-doc position in IICT-BAS in January 2015. She came to the Institute from the Faculty of Mechanical Engineering of Ss. Cyril and Methodius, Skopje, the Former Yugoslav Republic of Macedonia. Her current research interests are focused

on predictive maintenance, technical diagnostics, lifecycle management, safety and security in industry. In her research she is actively using the 3D laser scanner from the SmartLab equipment.



Dr. Stanislav Harizanov was appointed to a post-doc position in IICT-BAS in November 2014. He came to the Institute from the Image Processing group of Kaiserslautern University, Germany, where he had been working on solving constrained convex optimization problems based on epigraphical projections, which he later used for image (Poisson) denoising and deblurring. Within the frame of AComIn he is going to improve the quality of the 3D image reconstruction, derived by the Computed Tomography scan, purchased within the project. In order to do this he is developing new mathematical models and algorithms that should be then efficiently implemented.



Dr. Olga Kanisheva was appointed to a post-doc position in IICT-BAS in January 2015. She came to the Institute from the National Technical University "Kharkov Polytechnic Institute", Kharkov, Ukraine, where she worked as an associate professor in Computer Science of the Department of Intellectual Computer Systems. Her current research interests are in the field of

analysing multimedia collections that integrate electronic text, graphics, images, sound, and video. Within the frame of AComIn she is going to develop algorithms for semantic analysis of text information contained in multimedia collections.



Dr. Emilia Abadjieva was appointed to a post-doc position in IICT-BAS in December 2014. She came to IICT from Kawasaki & Mouri Laboratory at Gifu University, Japan, where she worked as a post-doc. The current research activities

and scientific interests of Emilia are in the field of mathematical modelling of the processes of spatial motion transformation, oriented towards the synthesis of spatial mechanical transmissions and on mathematical modelling of vehicle crashes, dedicated to reconstructing the origin of the processes and intended for the needs of the judicial authorities. In the moment Dr. Abadjieva is working on creating a pilot strategy for 3D technological realization of miniature micro-module hyperboloid gears.



Dr. Mladen Savov was appointed to a post-doc position in ICT-BAS in January 2015. He came to the Institute from the University of Reading and the University of Oxford. During his research career Mladen has predominantly been working in the area of probability theory with emphasis on Levy processes, Markov processes and Random walks. Within AComIn he joined the group of Prof. Dimov with the aim to help the team theoretically understand some outstanding problems with respect to the Wigner Monte Carlo method which was developed and implemented by the same group. So far Dr. Savov has managed to formalize the Wigner Monte Carlo method in the language of modern probability and to consider it from several directions.

WP2: Purchasing Smart Lab Equipment and Building User Communities

During the reporting period ICT's SmartLab was complemented by a new laboratory – *Speech Lab*. Its equipment includes:

- **Soundproof room**



Sound insulation – ISOVER FDPL 50 mm. + ISOVER Akusto 50 mm

Sound absorption – Echoabsorb PT 600 x 600 L

- **Showcase for visual monitoring**



Digital multitrack recorder and mixer TASCAM DP-32 – 32 channel – 8 input channels, 48 KHz, 24 bit

- **Omnidirectional and unidirectional high quality microphones**



SENNHEISER Pro Audio MK 4
 SM pro audio MC03
 BEHRINGER ECM8000
Electropalatograph (EPG) ARTICULATE INSTRUMENTS WinEPG – 62 cont. pts

- **Electroglottograph (EGG)** GLOTTAL ENTERPRISES EG2-PCX2 – 2 channels EGG
- **Combined Electromyogram Electroencephalograph** NEURON-SPECTRUM - 4/EPM: 4 channels EMG and 23 channels EEG

- **Digital stereo camera for gesture recording** OTEK DVX-5F9 3D – Full HD 1080p, 5 Mpx



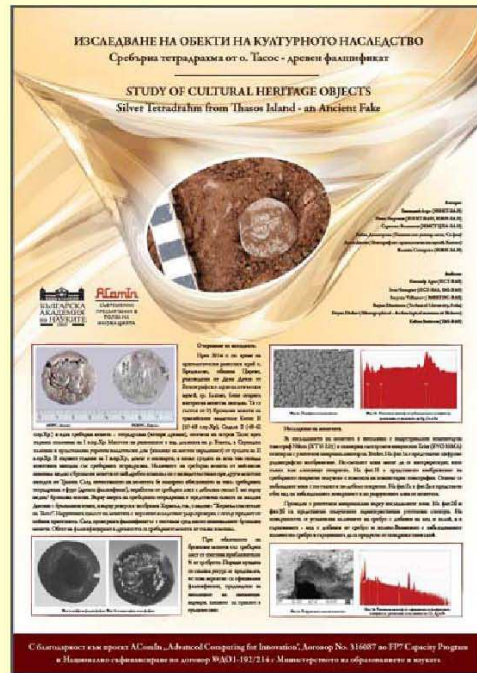
The equipment is currently used to research and develop new approaches for human machine interface, which will be based on a multimodal stream of

audio, video, electric and other signals.

Pilot Applications of SmartLab Equipment

In order to demonstrate the potential of the SmartLab Equipment to different User Communities, several Pilot Applications have been developed during the reporting period.

A joint team from ICT-BAS, the Technical University of Sofia, and the Ethnography-Archaeological Museum of Elhovo carried out a *multidisciplinary study of a silver coin (tetradrahm)* minted in Thasos in the first half of I century BC.



The coin was found during an archaeological excavation of a Thracian ruler's residence near the village of Brodilovo – in Southwest Bulgaria. The team discovered that the coin was an ancient fake consisting of a copper kernel covered by a silver sheet. The study was conducted by means of industrial computer tomograph Nikon (XT H 225) and scanning electronic microscope Zeiss (EVO 10MA) equipped with a Bruker roentgen analyser.

An interesting application of 3D technologies has emerged in collaboration between ICT-BAS and Pavia University, Italy. The team creates *3D models of historical persons, objects and scenes extracted from 2D photos of tapestries presenting the Pavia Battle*. The models then are 3D printed and the created figures will be used in a 3D restoration of a historical event (the Pavia Battle) that will be

demonstrated in an Exhibition in Pavia Castle – a satellite event of EXPO 2015, 2015.



A joint team from IICT-BAS, IMI_BAS and the National Archaeological Museum conducted a 3D scanning of a sculpture of a stone lion dated to II-III century AD that had been discovered during an archaeological excavation of the ancient city of Raecaria, located near the village of Archar, Northwest Bulgaria.



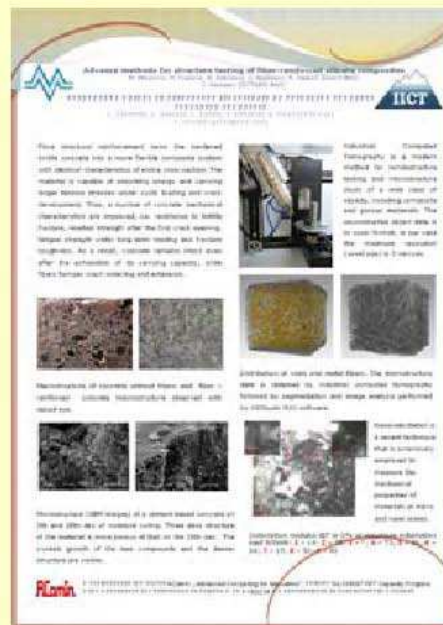
The scanning was conducted at the exhibition hall of the museum by means of the mobile 3D scanner Creafom VUScan from SmartLab, the post-processing of the obtained 3D model was carried out by the software package VxElements 2.1. The final 3D model will be used as part of a museum passport of the exponent, as well as for long-term digital preservation of this object of Bulgaria's cultural heritage.

A Pilot Application of 3D Digitizing Technologies in Paleoanthropology was realized by a joint team from IICT-BAS and from the Institute of Experimental Morphology, Pathology and Anthropology with Museum – BAS. Two 3D digital models were created - one of a medieval skull of an adult male individual with an intentional artificial cranial deformation and one of a thigh bone of an adult individual with an oblique fracture of the shaft healed with displacement of the fragments. The fracture was concomitant with damages of the overlying muscles and post-traumatic

myositis ossificans and osteomyelitis. The SmartLab computer tomography was also used for scanning the thigh bone with an excessive amount of callus formation around the fracture site.

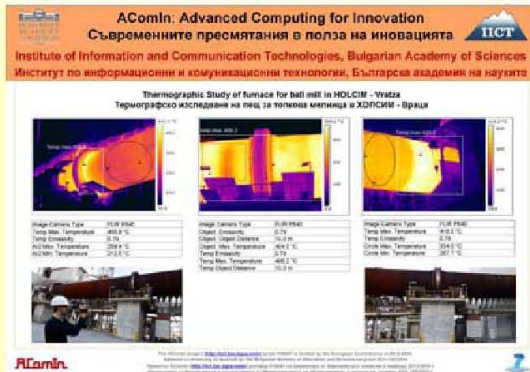


A Pilot Application of Advance methods for structure testing of fiber-reinforced silicate composites was realized by a joint team of scientists from IICT-BAS and the Institute of Mechanics-BAS. The microstructure data was obtained by industrial computed tomography followed by segmentation and image analysis performed by VGStudio MAX software.



Two pilot applications of SmartLab thermo camera FLIR P640 were conducted by a joint team from IICT-BAS and the Technical University of Sofia. The first one was a thermographic study of a furnace for a ball mill in HOLCIM Ltd., Vratza, located in Northwest Bulgaria. The temperature distribution in the furnace for cement material depending on

the rotation speed and the cement brand was analysed. The analysis showed that the blowing devices, cooling the mill, were not located optimally under the mill. As a result, one of three roller bearings of the mill began to heat up, which would cause damage of the mill. Based on these results the company decided to rearrange the blowing devices.



The second application was a thermographic study of bandage rolls from a Gondola Lift located in the mountains near the city of Borovetz. The study included creating and analysing the temperature distribution in bandage rolls according to the speed of the gondola lift and the carrying load. The study concluded that one of the rolls did not operate properly and had to be changed.



WP3: Networking with Leading EU Partners

Incoming Short Visits



In the periods 18-21 February 2015 IICT-BAS was visited by **Prof. Virginio Cantoni** from the University of Pavia, Italy. The main goal of the visit was to discuss a collaboration between project AComIn and the University of Pavia. The planned collaboration is in the field of cultural heritage restoration, in particular the restoration of the Battle of Pavia. Prof. Cantoni is working on a cultural heritage restoration project and one of the tasks

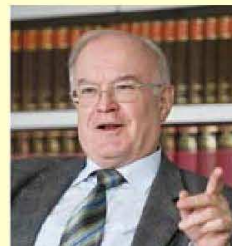
includes the creation of a model of the battle. This is the reason why he would like to use the technical equipment, bought in the frame of project AComIn, mainly the 3D printer, for the creation of this model by means of a scientific collaboration. Prof. Cantoni had several meetings with the project participants and presented his first ideas and drafts of 3D-historical images. The project participants will assist in processing these

3D-images, modify them and make them suitable for the 3D-printer software (part of the SmartLab equipment). Some problems connected with the processing were discussed and some test models were 3D printed. It was a very fruitful visit and the main plan about the future collaboration was set.



In the period 2-15 February 2015, IICT-BAS was visited by **Prof. Raytcho Lazarov** from Texas A&M University College, Station, USA. The main goal of his visit was to do joint research with Prof. Svetozar Margenov in the area of development, study, analysis and implementation of

preconditioners for systems arising in FEM approximation of second order elliptic problems, describing processes in highly heterogeneous media. There were also regular working discussions with the scientific staff of the Scientific Computing Department, including the AComIn Postdocs Dr. Ivan Georgiev, Dr. Stanislav Harizanov and Dr. Stanislav Stoykov. Prof. Lazarov also discussed the organization of a Special Session on "Numerical Methods for Multiphysics Problems" at the 10-th Conference on Large Scale Scientific Computing (LSSC'15), Sozopol, June 8 – 12, 2015. The aim of this Special Session will be to bring together researchers working in the area of large scale simulation and computations of coupled processes of different physics and different scales in space and in time.



In the period 20-24 February 2015, IICT-BAS was visited by **Prof. Otto Spaniol** from the University of Aachen, Germany. Prof. Spaniol had meetings with the AComIn project participants and made a presentation on *Security in Communication Networks: Technical and Nontechnical Issues*, which aroused big interest in the audience.

After the discussions Prof. Spaniol took part in a meeting with scientists from the Department of Computer Networks and Architectures.

Secondments to Project Partners

In the period 13 October-12 November 2014, **Prof. Kiril Alexiev** visited



the Computer Vision and Multimedia Lab in Pavia University, Italy. During his stay he worked on several topics of joint interest, among them 3D scene reconstruction (based on multi-view geometry or using only one image), eye tracking (based on statistics (detect and analyze) of randomly generated trajectories in each moment of time and on measuring the correlation between this statistics and answers of the examined person), acoustic analysis and

modelling as well as development of interactive multimedia applications for the Violin Museum in Cremona. Prof. Alexiev gave two presentations (on October 21 and November 6 2014) for PhD students and the Lab staff. Along with Prof. Virginio Cantoni, Prof. Alexiev prepared a proposal for collaboration and joint research in the field of 3D scene/object restoration between Mathematical Methods for Sensor Data Processing

Department of IICT-BAS and the Computer Vision and Multimedia Lab in Parva University.



From 17 September to 17 October 2014 Prof. Todor Stoilov and Prof. Krasimira Stoilova visited the Dynamic Systems and Simulation Laboratory (DSSL) of the Technical University of Crete. The main goal of the visit was the joint research of problems of control in transportation systems.

During their stay Prof. Stoilov and Prof. Stoilova evaluated the METANET model for ramp metering control on highways that took into consideration the traffic flow after the ramps of motorways. The model will enable the authorities to improve the traffic on the motorways by measuring the flow density. They had been acquainted with the experience of Greek partners about their experimental works with the Department of "Transport" of the Municipality of Chania. The colleagues expressed their concerns about the difficulties of implementing new control strategies in freeway transport control. Because of the specific infrastructure of the city and the enormous number of tourists the practical results of the control policies were not always satisfactory. On 1 October 2014 Prof. Stoilov and Prof. Stoilova gave presentations to the DSSL staff. Prof. Stoilova presented the main research fields of IICT-BAS, the ACOMIN project, the technical equipment purchased within ACOMIn, and the possibility of exchanging researchers within the frame of ACOMIN. Prof. Stoilov presented a lecture "Trough multilevel optimization to self-optimization control" which related to the current research of the department on traffic control. The main idea of this study was connected with improving the urban traffic management and is based on changing the duration of the traffic lights cycles and the relative duration of the green light of some of the streets with the most intensive traffic in Sofia. As a result of the visit Prof. Stoilov and Prof. Stoilova decided to prepare a joint paper with Prof. M. Papageorgiou and I. Papamichail on integration of optimization problems in the traffic control domain.

WP4: Development of IP and KT Plan and Innovation Capacity Building

On 24-26 November 2014 the ACOMIn innovation consultant Dr. Frank Heemskerck visited IICT in order to discuss further project developments concerning strengthening the Institute's innovation potential and to give lectures at IICT.



On 24 November Dr. Heemskerck met Prof. Galia Angelova, ACOMIn coordinator, and Prof. Svetozar Margenov, the director of IICT. They discussed the IICT Innovation strategy and the draft of the IICT Sustainability strategy, produced within ACOMIn and offered to the IICT governing bodies for implementation. On 25 November a full-day innovation

workshop was held at the IICT premises. In the morning two lectures were delivered by ACOMIn seniors - Prof. Galia Angelova and Prof. Dimitar Karastoykov. In the afternoon, Dr Heemskerck presented two lectures: "Research, Innovation and Society Impact: Stimulating Innovation in an International/global context" and "Innovation for Value creation in practice". Demonstrations of innovative applications, created

using the ACOMIn Smart Lab equipment, followed the lectures. The event was attended by more than 25 participants. On 26 November Dr. Heemskerck met members of the Sofia Municipality Innovation Committee (Prof. Ivan Dimov, Prof. Kostadin Kostadinov, and representatives of Sofia Municipality) and discussed with them the initiative to develop an Innovation Strategy of Sofia.

WP5: Dissemination

Scientific Events Supported by ACOMIn

The Technology Transfer Workshop on Biomedical Simulation (BIO 2014) was held on December 4, 2014 in Sofia. This interdisciplinary event brought together 31 specialists in the fields of scientific computing, fluid dynamics, biomechanics, computer linguistics, physicians and medical equipment producers. The scientific program started with the presentation of the topics and activities at IICT-BAS by the vice-director Assoc. Prof. Krassimir Georgiev. Afterwards the program continued with a plenary lecture given by Dr. Wolfgang Fenz from Johannes Kepler University Linz. Then Dr. Vanya Georgieva from Sofamed hospital presented typical cases from the medical practice, where iomedical simulations could improve significantly the treatment of the patients. Prof. Galya Angelova presented some of the recent ACOMIn



activities related to the analysis of large repositories of patient records. Another biomedical application developed in the IICT based on computer simulation of radio frequency ablation was presented by Yavor Vutov. The workshop was closed with a hands-on demonstration of real-time virtual clipping simulations.

Upcoming Events Supported by ACOMIn

The 10th International Conference on Large-Scale Scientific Computations (LSSC'15) will be held on June 8-12, 2015 in Sozopol.



The conference is expected to bring together scientists working on Hierarchical, adaptive, domain decomposition and local refinement methods; Robust preconditioning algorithms; Monte Carlo methods and algorithms; Numerical linear algebra; Control systems; Parallel algorithms and performance analysis; Large-scale computations of environmental, biomedical and engineering problems, etc.

The conference proceeding will be published by Springer in its series Lecture Notes in Computer Sciences.

The 10th International Conference Recent Advances in Natural Language Processing (RANLP 2015) will be held on 5-11 September 2015 in Hissar. RANLP has established itself over the years as one of the most influential and competitive NLP conferences. The event is held



biennially and grew out of the International summer schools "Contemporary topics in Computational Linguistics", which were organised for many years as training events. The conference will take the form of addresses from invited keynote speakers plus presentations of peer-reviewed individual papers. There will also be an exhibition area for poster and demo sessions. The conference will be preceded by two days of tutorials (5-6 September 2015). Post-conference workshops will be held on 10-11 September 2015. A Student Research Workshop will run in parallel to the main conference. The RANLP Student Research Workshops have become active discussion forums for young researchers.

The Technology Transfer Seminar on Advanced Computing for Innovation - Industrial Applications will be held on May 14-15, 2015, in Bankya. The event aims at presenting the ongoing research results related to the use of AcomIn SmartLab devices to industrial applications. The seminar is organized as associated event to the 23th International Symposium on Control of Power Plants, Industrial and Ecological Systems.

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The International Workshop on Information Fusion will be held on September 25, 2015 in Sofia. The event is a forum for interchange of the latest research on information fusion and discussion of its impacts on society. It is organized by the Department of Mathematical Methods for Sensor Data Processing, IICT, as a dissemination activity within AComIn project in order to spread out the project results and the IICT excellence at the regional, national and international level by bringing together researchers from the academia and industry to report on the latest scientific and technical advances in the field. Authors are invited to submit papers describing advances and applications in information fusion.

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The Intensive Course on Digitalization and Creating 3D Replicas of Cultural Heritage Objects will be held on May 19-21 on 25-27, 2015 in Sofia. The course aims at familiarizing museum experts with some of the newest technologies for digitalization, 3D scanning and 3D printing of replicas of cultural heritage objects. The event is organized by project AComIn in collaboration with the innovative Bulgarian companies Smart Fab Lab (<http://www.smartfablab.org/>), Digital Spaces Living Lab (<http://www.digitalspaces.info/>), and B2N (<http://b2n.bg/>).

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The Technology Transfer Workshop on Advanced Techniques in Non-Destructive Testing will take place on June 18-19, 2015 in Sozopol. The workshop is devoted to advanced techniques for non-destructive testing. The topics of interest include but are not limited to Digital Radiography, Industrial CT Scanning, 3D Laser Scanning, Acoustic Holography and Beamforming, Thermography, Nano-indentation, Assessment of the mechanical properties of materials, etc. The event is organized by the Institute of Information and Communication Technologies - Bulgarian Academy of Sciences in association with the Bulgarian Society for Non-Destructive Testing.

WP7: Project Management

The Steering Committee meeting after year 2 was held in Panagyurishte, Bulgaria, on 23 October 2014. It took place following 12 presentations of IICT experienced researchers who overviewed the project achievements in year 2 (see <http://www.iict.bas.bg/acomin/events-23-Oct-2014.html>). Two AComIn incoming post-docs presented their achievements (Dr Jean Michel Sellier and Dr. Ivan Georgiev). The Progress report for year 2 was presented too, including a summary of the project progress towards the objectives, explanation of deviations and related contingency plan, as well as use of resources.



After the presentations of the IICT seniors, AComIn post-docs and the project manager, the Steering Committee members met at a special session to discuss findings, make suggestions and plan further tasks in year 3.

On November 1, 2014 D7.6 the **ACoMIn Deliverable D7.6 Strategy for Sustainable Development of the Institute of Information and Communication Technologies** was published. The Deliverable contains the draft of a Sustainable Development Strategy (SDS) for IICT-BAS which is proposed to the IICT governing bodies (Scientific Council and Director) for consideration and adoption. The SDS is a regulatory document proposed by AComIn in order to enable the innovation capacity development in the Institute. Together with all other regulatory documents, proposed by AComIn, SDS provides a consistent normative framework for the development of IICT's Innovation potential.



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ACoMIn: Advanced Computing for Innovation
FP7-REGPOT-2012-2013
Grant Agreement: 315087
<http://iict.bas.bg/acomin/>

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The electronic version of this newsletter can be found in <http://www.iict.bas.bg/acomin/docs/e-newsletters/E-Newsletter-no5.pdf>

6.4. ACOMIN NEWSLETTER №5 (IN BULGARIAN)

ACoMIn

Advanced Computing for Innovation

Бюлетин №5

Март 2015

Цели и задачи на проекта ACoMIn: да се засили научният и иновационен потенциал на ИИКТ-БАН чрез увеличаване на знанията и уменията на учените в актуални и нови научни области, както и чрез закупуване на модерно оборудване. Проектът ще позволи на ИИКТ да изпълни своята стратегическа цел: до 2016, т.е. 5 години след създаването си, Институтът би трябвало да се превърне във водещ научно-изследователски център в Източна Европа, който предоставя условия за работа, сравними със средните стандарти на Центровете за върхови постижения по ИКТ в Европейския съюз. ИИКТ-БАН ще подпомага регионалния и национален растеж и откриването на нови работни места чрез предоставяне на научно-приложни резултати на високотехнологични индустриални организации. Институтът ще бъде център за висококачествено обучение на млади учени.

Дейности по Работни пакети (октомври 2014 – март 2015)

РП1: Увеличаване на човешкия потенциал на ИИКТ

Назначени пост-докторанти

Д-р Юрий Чирка е пост-докторант в ACoMIn от януари 2015 г. Той пристига от Националния авиационен университет в Киев, Украйна, където е работил по теория на измерванията, радиолокация и обработка на цифрови сигнали. В ACoMIn той ще извършва изследвания за оценка на техническите характеристики на акустичната камера Brüel & Kjær и подобряването им чрез изменения на апертурата и усъвършенстване на алгоритмите. Негов ръководител е доц. Кирил Алексиев.



Д-р Алексей Балабанов е пост-докторант в ACoMIn от февруари 2015 г. Той идва от Националния технически университет в Севастопол, Крим, Факултет по техническа кибернетика. Научните му резултати са в областта на решаване на задачи за оптимизация чрез матрично алгебрично уравнение на Рикати и вземане на експертни решения с използване на размити множества. Алексей ще изследва задачи за проектиране, моделиране, тестване и симулации на алгоритми за управление в големи комплексни транспортни системи. Д-р Балабанов работи с интегриращата сървърна среда от Smart Lab. Негов ръководител е проф. Тодор Стоилов.



Д-р Кристина Якимовска е пост-докторант в ACoMIn от януари 2015 г. Тя пристига в ИИКТ от Факултета по машинно инженерство на Университета „Св. Св. Кирил и Методий“ в Скопие, Македония. Нейните научни интереси са фокусирани върху прогнозна поддръжка, техническа диагностика, управление на жизнения цикъл, безопасност и сигурност в индустрията. Д-р Якимовска активно използва 3D лазерния скенер и 3D принтера. Нейн ръководител е проф. Димитър Карастоянов.



Д-р Станислав Харизанов е пост-докторант в ACoMIn от ноември 2014 г. Той пристига от Групата по обработка на изображения към Университета в Кайзерслаутерн, Германия, където е работил по решаване на излъкнали оптимизационни задачи с ограничения, базирани на епиграфски проекции, които след това се използват за възстановката на дигитални образи, замърсени с шум от Поасонов тип. В ACoMIn той ще подобри възстановяването на 3D изображения, създадени чрез томографа от Smart Lab. За целта се разработват нови математически модели и ефективни алгоритми. Негов ръководител е проф. Светозар Маргенов.



Д-р Олга Каницева е пост-докторантка в ACoMIn от януари 2015 г. Тя е доцент във Факултета по интелигентни компютърни системи на Националния технически университет „Харковски политехнически институт“ в Харков, Украйна. Нейните научни резултати са в областта на анализ на мултимедийни колекции, които включват електронен текст, графики, изображения, звук и видео. В ACoMIn д-р Каницева ще разработва алгоритми за семантичен анализ на текстова информация в мултимедийни колекции. Неин ръководител е проф. Галя Ангелова.



Д-р Емилия Абаджиева е пост-докторантка в ACoMIn от декември 2014 г. Тя пристига от Лабораторията „Кавзаки и Моури“ в Университета Гифу, Япония, където е работила като пост-докторант. Научните интереси и дейности на д-р Абаджиева са свързани с математическо моделиране на процесите на пространствена трансформация на движението, както и с математическо моделиране, подпомагащо реконструиране на динамичните процеси при автомобилни катастрофи за нуждите на съдебните власти. В ACoMIn д-р Абаджиева създава пилотна стратегия за технологична 3D реализация на миниатюрни микро-модулни хиперболоидни предавки. Макетите се отпечатват на 3D принтера от Smart Lab. Неин ръководител е проф. Димитър Карастоянов.



Д-р Младен Савов е пост-докторант в ACoMIn от януари 2015 г. Той пристига от Университетите в Рединг и Оксфорд, Обединеното кралство. Д-р Савов е работил най-вече в областта на теорията на вероятностите с фокус върху процеси на Леви, процеси на Марков и случайно обхождане. В рамките на ACoMIn д-р Савов се включи към колектива на проф. Иван Димов с цел да го подпомогне с теоретично разбиране на някои нерешени задачи, свързани с метода Вигнер Монте Карло, който беше разработен от групата на проф. Димов в рамките на ACoMIn. Д-р Савов вече е успял да формулира метода Вигнер Монте Карло на езика на съвременните вероятности и да го разгледа от няколко посоки.



Оборудването се използва за изследване и разработка на иновативни подходи за построяване на човеко-машинен интерфейс, който ще се базира на мулти-модален поток от аудио, видео, електрически и други сигнали.



Пилотни приложения на апаратурата от SmartLab

С цел да се демонстрира потенциалът на уредите от Smart Lab на различни потребители бяха разработени няколко пилотни приложения с устройства, закупени по проект ACoMIn.

РП2: Закупуване на Smart Lab и формиране на потребителски групи

През октомври 2014 г. SmartLab беше окомплектована с нова Лаборатория за изследване на реч. Тя включва:

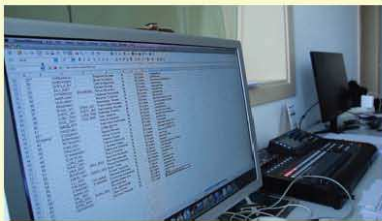
- Звукоизолирано студио



Звукоизолация – ISOVER FDPL 50 mm. + ISOVER Akusto 50 mm

Звукопоглъщане – Echoabsorb PT 600 x 600 L

Витрина за визуална връзка



- Цифров многоканален микшпульт TASCAM DP-32 – 32 channel – 8 входни канала, 48 KHz, 24 bit

- Насочени и ненаочени висококачествени микрофони



SENNHEISER Pro Audio MK 4, SM pro audio MC03, BEHRINGER ECM8000

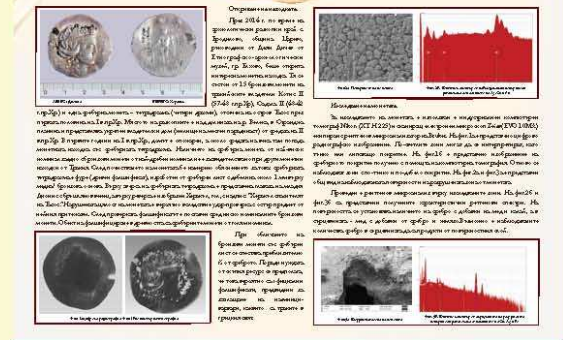
- Електропалаграф (EPG) ARTICULATE INSTRUMENTS WinEPG – 62 контролни точки

- Електроглограф (EGG) GLOTTAL ENTERPRISES EG2-PCX2 – 2 канален EGG

- Комбиниран електромиограф и електроенцефалограф NEURON-SPECTRUM - 4/EPM: 4 канален EMG и 23 канален EEG

- Цифрова стерео камера за запис на жестове и мимики OTEK DVX-5F9 3D – Full HD 1080p, 5 Mpx

Колектив от учени от ИИКТ-БАН, Техническият университет (ТУ) София и Етнографско-археологическият музей в Елхово извърши изследване на сребърна монета (tetradrahm), изсечена в Тасос през първата половина на I-ви век пр.Хр. Монетата е открита при археологически разкопки на двореца на тракийски владетел близо до с. Бродилово, Югоизточна България. Екипът установи, че монетата е древен фалшификат, съставен от медно ядро, покрито със сребърен слой. Изследването е извършено с индустриалния компютризиран томограф Nikon (XTH 225) от Smart Lab и сканиращ електронен микроскоп Zeiss (EVO 10MA), оборудван с рентгенов анализатор на Bruker.



С благодарност към проект ACoMIn „Advanced Computing for Innovations“ Договор № 314087 по FP7 Свързан Програм и Национално съфинансиране по договор № ОО1-102/21 в с. Мисово на речово на образованието и науката

Учени от ИИКТ и Университета в Павия, Италия разработват съвместно едно интересно приложение на 3D технологиите. Екипът създава 3D модели на исторически персонажи, предмети и сцени, извлечени от 2D снимки на гоблени, представящи битката при Павия. След това моделите се принтират на 3D принтера от Smart Lab. Фигурите ще

се използват за 3D реконструкция на историческото събитие (Битката при Павия 1525 г.), която ще бъде представена на Изложба в Павия, в Замъка на Висконти – съпътстващо събитие на ЕКСПО 2015.

ACoMIn: Advanced Computing for Innovation
Съвременните пресмятания в полза на иновацията

Institute of Information and Communication Technologies, Bulgarian Academy of Sciences
Институт по информационни и комуникационни технологии, Българска академия на науките

Restoration of historical events for EXPO 2015 – Milan, Italy
Реставрация на исторически събития за ЕКСПО 2015 – Милано, Италия

Tapestries From Pavia Battle - 3D Printing of 3D Models Гоблени от битката при Павия – 3D принтиране на 3D

ACoMIn

Колектив учени от ИИКТ-БАН, Института по математика и информатика на БАН и Националния археологически музей извършиха 3D сканиране на каменна скалптура на лъв, датирана от II-III в. сл.Хр., открита по време на археологически разкопки на древния град Рациария в близост до с. Арчар, Видинско. Сканирането е направено в изложбената зала на музея с преносимия 3D скенер Creafomr ViUScan от Smart Lab, а обработката на полученния 3D модел е осъществена със софтуерния пакет VXElements 2.1. Моделът ще стане част от музейния съхранение на експоната и ще служи за дългосрочно цифрово съхранение.

3D ДИГИТАЛИЗАЦИЯ НА ОБЕКТИ НА КУЛТУРНОТО НАСЛЕДСТВО
Каменен лъв от с. Арчар, Видинско (Рациария)

3D DIGITIZATION FOR CULTURAL HERITAGE OBJECTS
Stone lion, found at Archar village (Ratziařia)

ACoMIn

СЪВРЕМЕННИ ПРЕСМЯТАНИЯ В ПОЛЗА НА ИНОВАЦИЯТА

БЪЛГАРСКА АКАДЕМИЯ НА НАУКИТЕ

© Българският център за проект ACoMIn - Advanced Computing for Innovation; Договор № 316087 по FP7; София и Видин, и Национално-информационно център по договор МАО 01-192/214 с Милано в сътрудничество с иновациите

3D технологиите са приложени за цифровизация в областта на палеоантропологията от екип учени от ИИКТ-БАН и Института по експериментална морфология, патология и антропология с музей - БАН. Създадени са два 3D цифрови модела – на череп, принадлежал на мъж от средновековието, с нарочна причинена изкуствена краниална деформация, както и на бедрена кост на мъж със следи от заздравяла коса фрактура с разместване на фрагментите. Фрактурата е съпътствана от увреждания на надлежащите меки тъкани и пост-травматичен осифициращ миозит и остеомиолит. Компютърният томограф от Smart Lab беше използван и за сканиране на бедрената кост с цел визуализиране на вътрешната структура на мястото на фрактурата и на формирания калус.

Application of 3D Digitizing Technologies in Paleoanthropology

Diana Toneva¹, Silviya Nikolova², Ivan Georgiev^{3,4}, Kristina Jakimovska¹

¹ Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences
² Institute of Information and Communication Technologies, Bulgarian Academy of Sciences
³ Institute of Mathematics and Informatics, Bulgarian Academy of Sciences

3D Printing

The 3D prints represent exactly the shape of the real objects, but can differ in size. Some of the applications of this technology are:

- to preserve the original objects replacing the valuable specimens; with their copies in museum exhibits;
- to replicate specimens for making souvenirs (pendants, keychains, etc.) for popularization of museum exhibits;
- to provide multiple copies of bone samples for practical training of students for educational purposes.

3D Scanning Surface Digitization

The 3D digital models represent copies of the original specimens and can be used for different investigations, such as macroscopical and medical analyses. Besides, they are applicable to visualization, virtual archiving as well as preservation of the movable cultural heritage from damage and loss.

Using an appropriate post-processing, the 3D digital models can also be used for virtual reconstruction of fragmented bones and recovery of missing bone parts as well as for facial reconstruction.

CT Scanning (Computed tomography) Volume Digitization

CT scanning of bones visualizes not only the outer surfaces, but also the internal structure. This technology is very applicable in the field of paleopathology, where the structure of the bone tissue is of great importance for correct diagnosis and interpretation of the cases.

A 3D digital model of a medieval skull of an adult male individual with an intentional artificial cranial deformation.

A 3D digital model of a thigh bone of an adult individual; oblique fracture of the shaft healed with displacement of the fragments. The fracture was concomitant with damages of the overlying muscles and post-traumatic myositis ossificans and osteomyelitis.

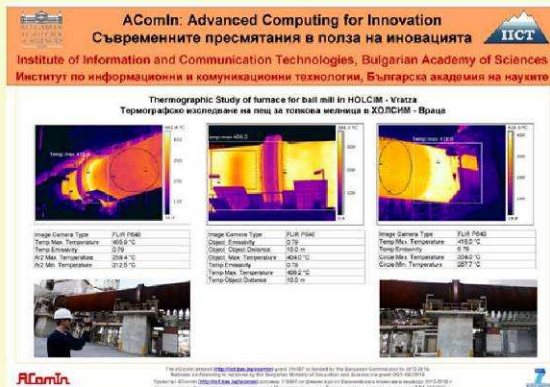
CT scans of the thigh bone with an excessive amount of callus formation around the fracture site.

Acknowledgments
This work was supported by ACoMIn "Advanced Computing for Innovation", grant 316087, funded by the FP7 Capacity Program.

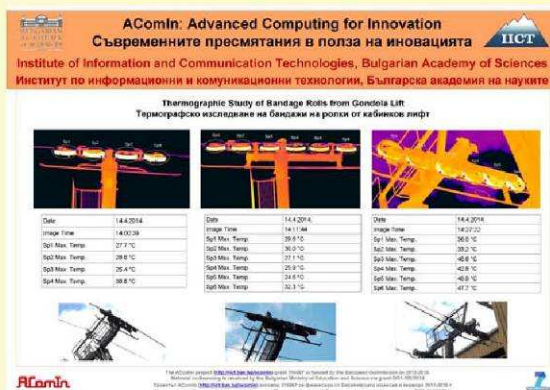
ACoMIn

Пилотно приложение на съвременни методи за структурно тестване на силикатни композитни материали, подсилени с карбонови нишки, беше създадено от съвместен научен колектив от ИИКТ и Института по механика на БАН. Данните за микроструктурата бяха получени чрез компютърна томография, последвана от сегментация и анализ на изображенията със софтуера VGStudio MAX.

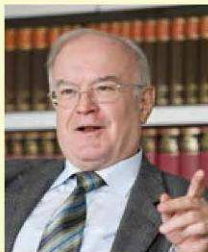
Екип от ИИКТ-БАН и ТУ-София осъществи две изследвания с термокамерата FLIR P640. Първото е термографско изследване на пещ на мелница на фирма Холсим АД, Враца. Анализирано е разпределението на температурата в пещта за цимент в зависимост от скоростта на въртене и марката цимент. Анализът показва, че вентилаторите, охлаждащи мелницата, не са разположени оптимално под нея. В резултат един от ролковите лагери започва да прегрява, което може да доведе до повреда. След запознаване с резултатите фирмата реши да пренареди вентилаторите. Второто приложение беше термографско изследване на ролките на кабинковия лифт до Боровец. Изследването включваше анализ на температурното разпределение в ролките в зависимост от скоростта на движение на лифта и товара. Заключение е, че една от ролките не функционира правилно и трябва да бъде заменена.



задачи от втори ред, описващи процеси в силно хетерогенни среди. Провежда се и редовни работни дискусии с учените от Секцията по научни пресмятания, включително с пост-докторанти по проект AComIn – д-р Иван Георгиев, д-р Станислав Харизанов и д-р Станислав Стойков. Проф. Лазаров обсъди и организацията на специална сесия по Числени методи за йерархични физически модели по време на 10-тата конференция LSSC'15, Созопол, 8 – 12 юни 2015 г. Целта на специалната сесия ще бъде да събере заедно учени, работещи в областта на големи симулации и изчисления на свързани процеси в йерархични физически модели по отношение на пространствените и времеви компоненти.



В периода 20-24 февруари 2015 г. проф. **Ото Шпаньол** от Университета в Аахен, Германия посети ИИКТ-БАН. Проф. Шпаньол се срещна с тима на проект AComIn и изнесе презентация на тема „Сигурност в комуникационните мрежи: технически и нетехнически аспекти“, която породила голям интерес сред аудиторията. След дискусиите проф. Шпаньол взе участие в срещи с учени от Секцията по компютърни мрежи и архитектури.



Посещения на партньорски организации

В периода 13 октомври – 12 ноември 2014 г. **доц. Кирил Алексиев** посети Лабораторията по компютърно зрение и мултимедия към Университета в Павия, Италия. По време на престоя си той работи по няколко теми от общ интерес, сред които: възстановка на 3D сцени, следене на поглед, акустичен анализ и моделиране, както и разработка на интерактивни мултимедийни приложения за Музея на цигулката в Кремона. На 21 октомври и 6 ноември 2014 г. доц. Алексиев изнесе две презентации пред докторанти и учени от лабораторията. Заедно с проф. Кантони, д-р Алексиев подготви предложение за сътрудничество и съвместни научни изследвания в областта на възстановка на 3D сцени и обекти между Секцията по математически методи за обработка на сензорни данни към ИИКТ и Лабораторията по компютърно зрение и мултимедия към Университета в Павия.



**РПЗ: Обмен с водещи партньори от ЕС
Краткосрочни посещения в ИИКТ-БАН**



В периода 18-21 февруари 2015 г. ИИКТ-БАН беше посетен от **проф. Вирджинио Кантони** от Университета в Павия, Италия. Основната цел на визитата му бе да обсъди една идея за съвместна работа между учените от AComIn и Университета в Павия. Планира се разработка в областта на възстановяване на културно наследство, в частност възстановка на участници в битката при Павия 1525 г. Проф. Кантони предложи закупеният по AComIn 3D принтер да се използва за създаване на модели на участници в битката в рамките на съвместна научна задача. Бяха проведени няколко срещи с участници в проекта, където проф. Кантони представи първите си идеи и 3D скици на исторически образи. Българският тим ще помогне за обработката и модифицирането на изображенията, така че да бъдат съвместими със софтуера на 3D принтера. Няколко тестови модела бяха принтирани в 3D. Посещението беше много плодотворно и се създаде работен план за съвместна дейност.

В периода 2-15 февруари 2015 г. **проф. Райчо Лазаров** от Университета Texas A&M University College, САЩ гостува на ИИКТ-БАН. Целта на визитата му бяха съвместни научни изследвания с проф. Светозар Маргенов в областта на създаване, изучаване, анализ и разработка на преобуслователи за системи, получени при апроксимация по метода на крайните елементи на елиптични гранични

От 17 септември до 17 октомври 2014 г. **проф. Тодор Стоилов** и **проф. Красимира Стоилова** посетиха Лабораторията за динамични системи и симулации (DSSL) към Техническия университет в Крит, Гърция. Целта на посещението беше да се изследват съвместно задачи, свързани с управление на транспортни системи. Проф. Стоилов и проф. Стоилова извършиха оценка на модела METANET за управление на потока на влизащи коли в магистрала. Те се запознаха с опита на гръцките колеги от работата им с транспортния отдел на община Ханя. Гръцките партньори разказаха за трудностите при внедряване на нови стратегии за контрол на магистралния транспорт. Поради специфичната



градска инфраструктура и огромния брой туристи, практичските резултати от политиките за управление на транспорта не винаги са задоволителни. На 1 октомври 2014 г. на семинар на DSSL проф. Стоилова разказа за основните научни области в ИИКТ-БАН и проекта AComIn. Проф. Стоилов изнесе лекция на тема „Чрез йерархично управление към реализиране на само-оптимизиращо се оптимално управление“, в която представи идеи за подобряване на управлението на градския трафик чрез промяна на циклите на светофарните уредби и относителната дължина на зеления светлинен сигнал по някои от улиците с най-интензивно движение в София. Проф. Стоилов и проф. Стоилова планират да подготвят обща статия заедно с проф. М. Папагеоргиу и д-р Й. Папамихаил относно интегриране на оптимизационни задачи в управлението на транспорта.

РП4: Разработка на план за управление на интелектуална собственост и трансфер на знания и развиване на иновационен капацитет



На 24-26 ноември 2014 г. консултантът на AComIn по иновации – д-р Франк Хеемскерк посети ИИКТ, за да обсъди текущите дейности по проекта, свързани със засилването на иновационния потенциал на Института и да изнесе лекции в ИИКТ.

На 24 ноември д-р Хеемскерк се срещна с проф. Галя Ангелова – координатор на проект AComIn, и проф. Светозар Маргенов, директор на ИИКТ. Те обсъдиха подготовките

в AComIn Иновационна стратегия и Стратегия за устойчиво развитие на ИИКТ, предложени за приемане от ръководните органи на института. На 25 ноември беше проведен целодневен семинар в областта на иновациите. Сутринта бяха изнесени две лекции за постиженията на проекта от проф. Галя Ангелова и проф. Димитър Карастоянов. Следобед д-р Хеемскерк изнесе две лекции: „Изследвания, иновации и въздействие върху обществото: стимулиране на иновациите на международно/глобално равнище“ и „Иновации за създаване на добавена стойност в практиката“. След лекциите бяха демонстрирани иновативни приложения, създадени с уредите от Smart Lab. Събитието беше посетено от над 25 участници.

На 26 ноември д-р Хеемскерк се срещна с членове на Експертния съвет по иновации на Столична община (проф. Иван Димов, проф. Костадин Костадинов и представители на Столична община) и обсъди с тях инициатива за създаване на Иновационна стратегия на София.

РП5: Разпространение

Научни събития, подпомогнати от проект AComIn

Семинарът за технологичен трансфер по биомедицински симулации (BIO 2014) се проведе на 4 декември 2014 г. в София. Участваха 31 специалисти по научни пресмятания, динамика на флуиди, биомеханика, компютърна лингвистика, както и лекари и производители на



медицинска апаратура. Научната програма започна с презентация на работните теми и дейности в ИИКТ-БАН, изнесена от зам.-директор доц. Красимир Георгиев, и продължи с пленарен доклад на д-р Волфганг Фенц от Университета „Йоханес Кеплер“ в Линц. Д-р Ваня Георгиева от болница „Софиямед“ представи типични случаи от медицинската практика, в които биомедицинските симулации могат значително да подобрят лечението на пациентите. Проф. Галя Ангелова представи резултати, свързани с анализ на големи архиви от досиета на пациенти. Д-р Явор Бутов представи разработено в ИИКТ биомедицинско приложение, базирано на компютърни симулации на радиочестотна аблация. Семинарът завърши с практически демонстрации.

Предстоящи събития, подпомогнати от AComIn

Семинарът по технологичен трансфер в областта на съвременни пресмятания в полза на иновациите – индустриални приложения ще се проведе на 14-15 май 2015 г. в Баня. Целта на събитието е да представи резултатите от текущите научни изследвания по индустриални приложения, извършвани с уредите от Smart Lab. Семинарът се провежда като сателитно събитие на 23-я Международен симпозиум по управление на електроцентрали, индустриални и екологични системи.

Интензивният курс по цифровизация и създаване на 3D реплики на обекти на културно наследство ще се проведе на 19-21 и 25-27 май 2015 г. в София. Курсът цели да запознае млади учени от ИИКТ и музейни специалисти с някои от най-новите технологии за цифровизация, 3D сканиране и 3D принтиране на реплики на обекти на културно наследство. Събитието е организирано от AComIn съвместно с иновативните български компании Smart Fab Lab, Digital Spaces Living Lab и B2N.



10-та Международна конференция Large-Scale Scientific Computations (LSSC'15) ще се проведе на 8-12 юни 2015 г. в Созопол. На конференцията ще се срещнат учени, работещи върху йерархични и адаптивни методи; методи на разделяне на подобласти и методи за локално съгъстяване; робастни методи за преобуславяне; Монте Карло методи и алгоритми; числена линейна алгебра; системи за управление; паралелни алгоритми и анализ на производителността; мащабни изчисления на биомедицински и инженерни задачи и задачи, свързани с опазване на околната среда и др. Сборникът с доклади ще бъде публикуван от издателство Springer в поредицата Lecture Notes in Computer Science.



Семинарът по технологичен трансфер в областта на съвременни техники за безразрушаващ контрол ще се проведе на 18-19 юни 2015 г. в Созопол. Темите на събитието включват цифрова радиография, сканиране с компютърен томограф за индустриални нужди, 3D лазерно сканиране, акустична холография, термография, наноидентация, оценка на механичните свойства на материали и др. Семинарът се организира с частична подкрепа от AComIn в сътрудничество с Българското общество за безразрушаващ контрол.



Международният семинар „Големи данни в обработката на естествен език, обучението и дигиталните колекции“ ще се състои на 29 юни 2015 в София. В събитието ще участват учени по аналитика, компютърна лингвистика, интелигентно управление на дигитални колекции, електронно обучение и дигитализация на културно-историческо наследство. Ще бъдат представени и резултати, получени в проект AComIn.



10-та Международна конференция Recent Advances in Natural Language Processing (RANLP 2015) ще се проведе на 5-11 септември 2015 г. в Хисаря. На конференцията ще има 6 доклада от поканени лектори и представяне на 95 индивидуални рецензирани статии, а също и изложбено пространство за постери и демо сесии. На 5-6 септември ще се проведат учебни курсове, а на 10-11 септември – тематични семинари. Паралелно с конференцията ще протече Научен семинар за докторанти.



Международният семинар по обединяване на информация (Information Fusion) ще се проведе на 25 септември 2015 г. в София. Събитието е форум за обмен на идеи и резултати, то се организира от секцията по Математически методи за обработка на сензорна информация към ИИКТ. Ще участват учени от академични организации и експерти от индустрията, които ще представят последните научни и технически новости в областта.



Международният семинар „Съвременни приложения за индустриален контрол“ се организира на 8 октомври 2015 в София. В него ще участват учени, представящи резултати в областите управление и оптимизация, интелигентни системи, многоагентни системи, управление на процеси, роботика и мехатронни системи, както и индустриални приложения на системи за управление.

Международната конференция „Съвременни пресмятания в полза на иновацията“ (AComIn 2015) е заключителното научно мероприятие в проекта, което ще се проведе на 10-11 ноември в София. Конференцията е форум за обмен на иновативни резултати в няколко важни области на съвременната информатика, но цели преди всичко да разпространи постиженията на проект AComIn. Избрани статии ще бъдат публикувани от издателство Шпрингер в специален том на серията Studies in Computational Intelligence.

РП7: Управление на проекта

Третото заседание на Управителния съвет се проведе в Панагюрище на 23 октомври 2014 г. То беше предшествано от 12 презентации на опитни учени от ИИКТ, които направиха преглед на постиженията по проекта за втората година. Пристигналите от чужбина пост-докторанти д-р Жан Мишел Селие и д-р Иван Георгиев разказаха за своите резултати. Беше представен и Доклад за напредъка през година 2, с обяснения на отклоненията от Работния план и мерки за наваксване на закъсненията, както и разбивка на използваните ресурси. На специална сесия членовете на Управителния съвет обсъдиха представената информация и направиха предложения и препоръки относно планираните предстоящи задачи за година 3.



На 1 ноември 2014 г. беше публикуван **Отчет D7.6: Стратегия за устойчиво развитие на ИИКТ-БАН**. Докладът съдържа предложение за Стратегия за устойчиво развитие на института, която се представя на ръководните органи (Научния съвет и Директора) за разглеждане, приемане и прилагане. Стратегията е нормативен документ, предложен от AComIn, с цел да подпомогне развитието на иновационен капацитет на Института. Заедно с всички други документи, третиращи въпроси свързани с иновациите, Стратегията предлага цялостна нормативна рамка за развитието на иновационния потенциал на ИИКТ.



Този проект се финансира от Седма рамкова програма на Европейския съюз за научни изследвания, технологично развитие и демонстрационни дейности по договор 316087.

AComIn: Advanced Computing for Innovation
Съвременните пресмятания в полза на иновацията
<http://iict.bas.bg/acomin/index.html>

Национално съфинансиран договор Д01-192/2014 г. на Министерството на образованието и науката

Координатор: проф. д-мн Галия Ангелова
Институт по информационни и комуникационни технологии (ИИКТ) – БАН
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The electronic version of this newsletter can be found in <http://www.iict.bas.bg/acomin/bg/docs/e-newsletters/E-Newsletter-no5.pdf>.

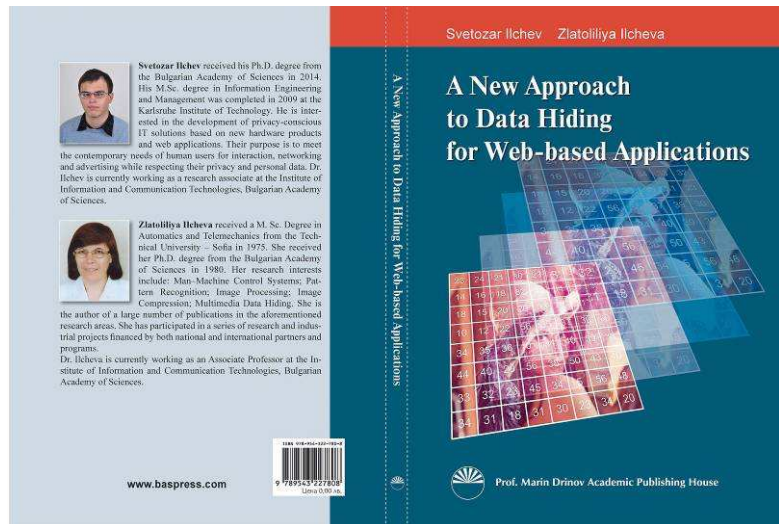
7. OTHER DISSEMINATION ACTIVITIES IN MONTHS 19-38

7.1. PUBLISHING BOOKS AND MONOGRAPHS

During the reporting period the AComIn Management Board has approved for publishing two monographs.

The first monograph is written by Dr. Svetozar Ilchev and Prof. Zlatolilya Ilcheva: *A New Approach for Data Hiding for Web-based Applications*, Prof. Marin Drinov Academic Publ. House, 150 pp, ISBN: 978-954-322-780-8

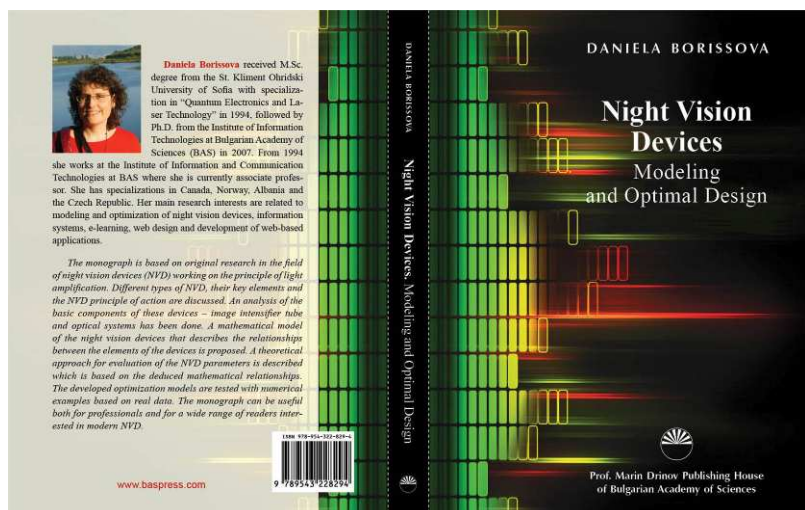
This book presents a summary of the authors' technology for secure data storage, data transmission, multimedia protection and integrity verification on the Internet. As a consequence of recent discoveries, the need for security innovations for use in the modern venues of information publishing and exchange has become clear. The authors address this issue by creating and testing a new data hiding concept targeting Internet applications which use multimedia content. It does not replace the traditional cryptographic protection but



rather enhances it and can be regarded as one further protection level specifically designed for use with multimedia. Among potential users of this book are corporate Internet portals for end-customers, news and advertising agencies, security footage producers, keepers and communicators of sensitive private data, artists, photographers, doctors, astronomers, government administrators and institutions.

The second monograph is written by Prof. Daniela Borissova: *Night Vision Devices - Modeling and Optimal Design*. Prof. Marin Drinov Academic Publ. House, 2015, ISBN 978-954-322-829-4.

The monograph concerns mathematical modelling of NVD taking into account the specifics of these devices. The proposed mathematical models of NVD are used to simulate different design scenario and allows estimating the theoretical evaluations of the designed device parameters before building a prototype. The developed generalized mathematical model of NVD is implemented in three different design methods – iterative, rational and optimal. The other aspect of monograph is related with choice of a proper NVD according to different user's requirements and taking into account both the device parameters and the external surveillance conditions. For the goal, single or multicriteria optimization tasks are formulated. Multicriteria optimization is used to determine different feasible combinations of external surveillance conditions which are compatible with given NVD technical specifications. All of the proposed mathematical models and formulated optimization tasks are illustrated by proper numerical examples.



7.2. PUBLISHING PROMOTIONAL MATERIALS

During the reported period 5 flyers (in Bulgarian) about ACoMIn Smart Lab devices were printed.

Интересуваме се от съвместна работа и възможни приложения в:

- ❖ **Областта на шумовите замърсявания**
Потенциални сфери на изследвания са шума на разположено в София летище, уличния шум, шум, причинен от градска активност, шум от уреди и др.
- ❖ **Идентификация на източници на шум**
Включва откриването и разпознаването на специфични шумове. Към тази категория могат да бъдат причислени анализът на качеството на звука в звукозаписната индустрия, анализ на мултимедийни продукти и др.



- ❖ **Тестване и диагностика на продукти чрез спектърен анализ, време-честотен анализ, анализ на акустични сигнали и др.**
В тези приложения се търси и локализира специфичен шум в машини и агрегати (турбини, двигатели и др.), извършва се тестване на вибрации и др.

- ❖ **Трудово здравеопазване**
Включва изследване на шума в работните помещения, защита на слуха, изследване на вибрациите, на които са изложени работещите, намаляване на шума, звукоизолация на шумогенериращите производства и др.
- ❖ **Приложения във военната област и в областта на сигурността**
Възможни приложения са изграждане на шумооткриващи бариерни детектори, локализиране на шум, изстрелващи устройства като оръдия, снайтери и др., разпознаване на специфични шумове и др.
- ❖ **Използване на акустичната система за научни изследвания**
Акустичната система представлява уникален инструмент за провеждане на научни изследвания в областта: на формирането на насочен лъч, разработка на антени със случайно разположени антени елементи, акустична томография, обработка/ анализ/ филтриране на акустични сигнали, включително адаптивни техники, и др.
- ❖ **Използване с образователни цели**
Акустичната система е превъзходно средство за обучение на дипломанти и докторанти, специализации и др.

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Акустична камера

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Институтът по информационни и комуникационни технологии разполага с уникална акустична апаратура за извършване на измервания и изследвания в областта на акустиката и вибрациите. Апаратурата е закупена по проекта ACoMIn по седмтата рамкова европейска програма с цел разширяване възможностите за използване на високопроизводителната изчислителна техника, налична в института за решаване на редица приложни проблеми, разширяване участието на института в технологичния трансфер към предприятията в промишлеността, подобряване качеството на живота, разширяване участието в национални и международни проекти и осъществяване на висококачествено обучение на магистри и докторанти.



Микрофонна решетка и оптична камера
Лашпо и обработващи програми
Сигнални модули
31/03/2014

Системата за акустична холография, произведена от Brüel & Kjær, осигурява идентификация на източници на шум в пространството в дватазона 10 Hz – 20 kHz в два режима на работа:

- 1) В режим на насочено формиране на лъча се заснема акустичното налягане за отдалечени обекти.
- 2) В режим на акустична холография се заснема акустичното налягане за близко отстоящи обекти.



Системата се състои от всички необходими устройства, осигуряващи качественото и функциониране в посочените два режима на работа като: микрофони, предусилватели, микрофонна решетка/решетки, интелигентен многоканален (от всеки микрофон) модул за събиране, цифровизация и запис на входните сигнали от микрофони на решетката, а също така и устройство за калибриране. В системата е включен и необходимия хардуер и софтуер за обработка на сигналите от адаптивната микрофонна решетка, с помощта на които се определят интензивностите на звуковото поле и картографията им в тримерното върху видеоизображение на изследвания обект, а също и осигурява изход на записаните сигнали към изследователски софтуер за обработка на сигнали на MATLAB. Броят на микрофоните е 18. Доставка с подробна справочна литература за хардуера и софтуера.

Акустичната система включва:

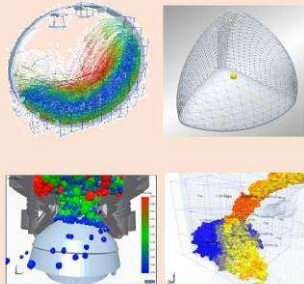
- Крылова антена решетка с 18 случайно разположени микрофона и камера в центъра;
- Многоканално устройство за сигналите от микрофоните и автономно захранване;
- Компютър с инсталиран софтуер за обработка на данните.

Реализирано е подобряване на резолюцията. Бъловата разделителна способност е подобрена до 2.7 пъти в режим на насочено формиране на лъча в честотния обхват от 100 Hz до 18 kHz.



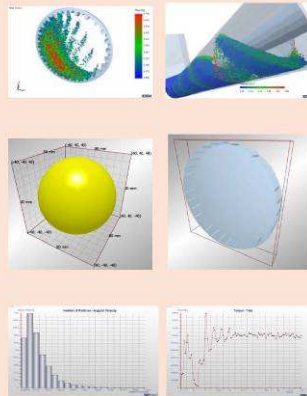
Програмен пакет за индустриално приложение на метода на дискретните елементи DEM (Discrete Element Method)

Програмият пакет включва модули за: изграждане на модели на обекти **EDEM Creator**, симулация на взаимодействие между множество обекти **EDEM Simulator**, анализ на резултатите **EDEM Analyst**.



EDEM Creator създава модели на насипен материал. Предвидени са инструменти за моделиране на формата, плътността и контакта на частичките. EDEM Simulator е средата, в която се конфигурира и симулира движението и взаимодействието на множество частици в поток (струя). Паралелната ефективност увеличава скоростта при работа с големи модели. EDEM Analyst предоставя инструменти за последваща обработка, анализ, визуализация и свлягане на симулационни данни. EDEM осигурява бърза 3D визуализация на системата за насипване на голям брой частици.

Приложения: за моделиране на движението, взаимодействието и обработката на насипни и минни материали, разпределение и разделяне по вид и големина на смес от различни материали и др.



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Юли 2015



Съвременни средства за наблюдение, симулация и моделиране на движението и взаимодействието при насипни и минни материали

Advanced Computing for Innovation

AComIn



7th Framework Programme of the European Commission
Capacity, Research Potential

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Институтът по информационни и комуникационни технологии на БАН (ИИКТ-БАН) разполага с уникална апаратура за симулация и наблюдение на насипни материали. Апаратурата е закупена по проекта AComIn от 7-ма Рамкова програма на Европейската комисия с цел разширяване на възможностите за използване на високопроизводителната изчислителна техника, налична в института за решаване на редица приложни проблеми, разширяване участието на института в технологичния трансфер към предприятията в промишлеността, разширяване участието в национални и международни проекти и осъществяване на висококачествено обучение на магистри и докторанти.

В проекта AComIn се привличат и млади учени, включително пристигащи от чужбина пост-докторанти, с цел повишаване на научния капацитет на ИИКТ.



Лазерен granulометричен анализатор за нано измервания и аксесоари
Анализаторът съдържа измервателен модул, диспергиращ модул за „мокро“ измерване с

диапазон 0.01 – 2000 микрона, диспергиращ модул за „сухо“ измерване с диапазон 0.1 – 2000 микрона, три полупроводникови лазера с живот средно 10000 часа и клас на защита EN 60825, компресор с регулиране, филтри и защити, компютър със софтуер за управление, принтер, принадлежности.

ANALYSETTE 22 NanoTech+ е идеален и универсално приложим за определяне на разпределението на частици по едрината. С цел да се навлезе в нанометричния обхват, допълнителен трети лазерен лъч се използва за измерване на обратно разсеяната светлина. Този трети лазерен лъч облекча пробата директно, като е разположен в предната част на детектора. Малкото разстояние между измервателна клетка и детектор създава много благоприятни условия за точното измерване на светлинни сигнали чрез ползване на преобразуване на Фурие.



Модули за „сухо“ и „мокро“ измерване

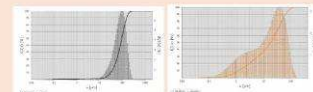


Измервателен модул Измерване на частици

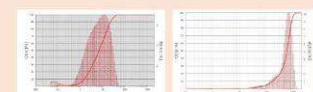
Уредът за мокро измерване е затворена верига от течност, където пробата може да се добави

или като сух прах или като суспензия, като се транспортира непрекъснато по време на измерването. Методът за измерване „мокра дисперсия“ е подходящ за почти всички материали, които не се разтварят в течност. Предимството пред сухата дисперсия е по-високата ефективност и по-голямата гъвкавост на процеса на дисперсия. Мощната радиална помпа в уреда позволява да се премести затворената верига повече от десет пъти в минута. Тази висока производителност позволява превоза и на по-големи частици дори и с по-висока плътност, което е ключово за по-бързо и по-равномерно разпределение на материала в цялата верига.

Приложения: измерване на големината и разпределението на частици в нано- и микро-диапазона за насипни материали, прахове, суспензии и разтвори, органични съединения и др.



Измерване едрината на железен прах и цимент



Измерване едрината на хранителни добавки и сухи храни.

Високоскоростната камера NasMetrescam HX6 за заснемане на сверхбързи обекти и процеси позволява снимки с от 2000 до 370000 кадъра в секунда, с разрешаваща способност регулируема според броя на кадрите в секунда: при резолюция

- 1920x1080 – до 2330 кадъра в секунда,
- 640x480 – до 14000 кадъра в секунда и
- при минимална резолюция 320x24 – до 370300 кадъра в секунда.

Камерата разполага с вътрешна бърза памет 32 GB, външна синхронизация, 3 различни обектива (вкл. варио), температурна калибровка, допълнително осветление от два прожектора по 1 KW, управляващ софтуер с възможност за измерване на позиция, скорост, ускорение и ълови параметри, може да работи с различни програмни продукти, разполага с дистанционно управление, с възможност за playback от самата камера, USB и Ethernet интерфейс.



Тестове за деформации при удари на тела в паракети

❖ Сфери на приложение

Високоскоростните камери намират най-голямо приложение в тестовете за сигурност на автомобилите: при удар на автомобил, тест за задействане на въздушна възглавница, окачване на автомобила, гуми, спирачна система, трансмисия. Също така имат широко приложение в производството и автоматизацията при проектиране на машини, мониторинг на високоскоростни производствени линии, пакетиране, брикетиране на скрап и други. Друг вид приложение са баллистичните тестове, следене на снаряди, експлозивни и пиротехника, изстрелване на ракети.



Брикетиране на метални стружки и метален прах

За контакти:

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Юли 2015



Съвременни средства за изследвания на термографски и високоскоростни процеси

Advanced Computing for Innovation

AComIn



7th Framework Programme of the European Commission
Capacity, Research Potential
<http://ict.bas.bg/acomin>

2012-2016

Институтът по информационни и комуникационни технологии – БАН (ИИКТ-

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В проекта AComIn се привличат и млади учени, както и пристигнали от чужбина постдокторанти, с цел повишаване на човешкия потенциал и като цяло, на капацитета на ИИКТ.



❖ Термографски изследвания

Инфракчервената светлина от инфракчервените измервателни камери се използва, за да се „види“ и измери термичната енергия, излъчвана от даден обект, която ние усещаме като топлина.

❖ Принципи на действие

Инфракчервената камера е безконтактно устройство, което открива инфракчервена енергия (топлина) и я преобразува в електронен сигнал, който след това се използва, за да се създаде термално изображение на екрана и да се направят температурни изчисления. „Усетената“ топлина може да бъде много прецизно определена или измерена, което позволява не само наблюдение, а и диагностика.



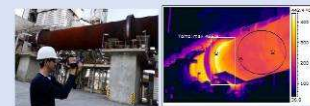
❖ Измерване на температура с инфракчервена камера

Инфракчервените камери, които включват измерване, позволяват на специалистите да предсказват проблеми в електрически и механични обекти на база добра информираност. Температурните измервания могат да бъдат сравнени с обичайните температури на подобни обекти, като значителна промяна в температурата би означавала проблем с надеждността на компонента или агрегата.

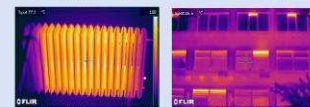
❖ Технически данни

Thermo camera FLIR P640 640x480 Infrared Detector Outstanding Thermal Sensitivity: 0.06°C, optional 0.006°C, Triple Fusion Picture In Picture Technology, Optional WLAN Remote Control, Target Illuminator for Low-light Areas, Voice Annotation with Each Image, High Resolution Array for Viewing at Greater Distances, -40°C to +500°C, in 2 ranges; up to +2000°C, optional.

❖ Приложения



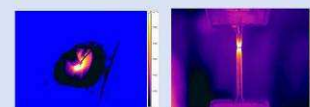
Термография на циментовата пеп – ХОЛСИМ, Враца



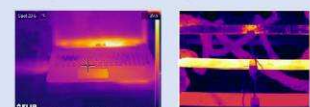
Енергийна ефективност на сгради и електрически уреди



Термография на носачи за кабинков лифт – Боровец



Заваряване с пано частици и разпъване до скъпяне

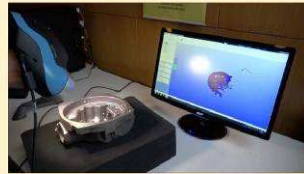


Термография на електроника и шини на трансформатор

3D портативен скенер Handyscan 3D VUScan Creaform, за прецизно 3D сканиране на повърхността на твърди тела, 18 000 измервания в секунда, геометрична резолюция (0.040-0.050 мм), цветност 24 бита, изходни формати: .ma, .dae, .obj, .x3dz, .x3d, .zpr, .wrl, .fbx, .ply, .stl, .txt. Самопозиционираща система. Не се нуждае от външно проследяване или устройства за позициониране. Той използва триангулация за определяне на относителната позиция в реално време. Скенерът може да се калибрира по всяко време, след калибрация се гарантира оптимална работа. Позволява визуализация на образа в реално време.



Приложения: сканиране и изграждане на 3D модели на обекти с възможност за последваща софтуерна обработка на модела и/или 3D принтиране, наслагване на обекти.



За контакти:

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Юни 2015



Съвременни методи и средства за 3D сканиране, 3D томография и 3D реконструкция на вътрешната структура на обекти

Advanced Computing for Innovation

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7th Framework Programme of the European Commission
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2012-2016

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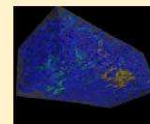


XTH 225 е компютърен томограф за изследване на широк обхват от материали и размери на пробите с диапазон от 20 до 225 KV. Идеален е както в лабораторни и

производство, така и за научни цели. Позволява рентгенова 3D визуализация в реално време. Разполага с пет-осна система за позициониране. Товарносимостта на въртящата маса е 15kg, а максималните габарити на пробата са 15x15x15 cm. Максималната разделителна способност на детектора е 1900x1500 с активна площ 467 cm², петното (сечението) на X-лъча е под 3 μm. Системата разполага и с компютърен софтуер за анализ и 3D реконструиране на вътрешната структура на обекта (кости, органи, предмети).



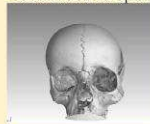
Приложения: в автомобили (конектори, инжектори, сензори, тръби и свързки); за намиране на микроуквукатини в материалите; за изследване на вътрешната структура на природни и биологични материали.



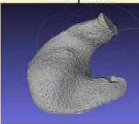
Композитен материал



Аневризъм



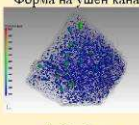
Човешки череп



Форма на ушен канал



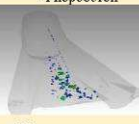
Епоксидно стъкло



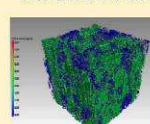
Фибробетон



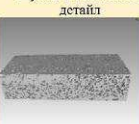
Състав на жълто паве



Шупли в алуминиев детайл



WPC



Зеолит

Модерни информационни технологии за реставрация на исторически събития (Битката при Павия 1525 г.)

Изложба в Замъка „Висконти“ на Павия: съпътстващо събитие към ЕКСПО 2015 в Милано, Италия



Средновековен гоблен със сцени от битката



3D принтирани фигури на герои от гоблените



Откриване на изложбата



3D принтиран гоблен за хора с увредено зрение



3D принтирани гоблени за незрящи



Постер за участието на ИИКТ в изложбата



Съвременни средства
за 3D моделиране и
3D принтиране на обекти

Advanced
Computing for
Innovation

AComIn



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3D принтер ProJet 460Plus, работна област: $\geq 200 \times 250 \times 200$ mm, дебелина на слоевете: ≤ 0.1 mm, резолюция: $\geq 300 \times 450$ dpi, скорост на изграждане: ≥ 20 mm/hour, цветност: full CMY, съвместимост Windows, CAD/CAE



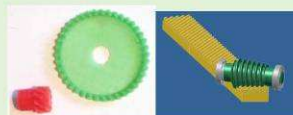
3D прототип на мелещо тяло с нова форма



Приложения: създаване на 3D прототипи по зададени 3D модели на обекти, отговаряване



3D прототип на патентован гвоздей с иновативна форма



3D прототипи на зъбни колела и предавки



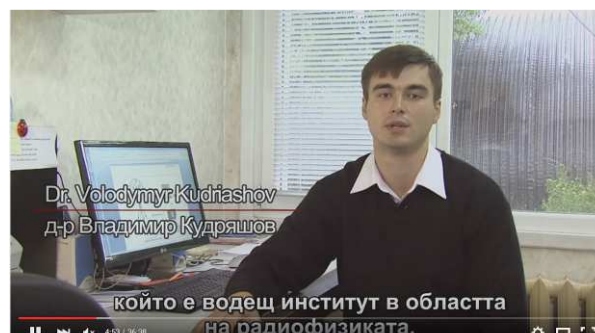
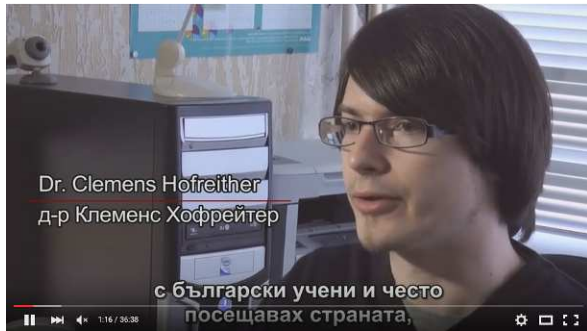
3D прототипи на стандартно мелещо тяло

За контакти:

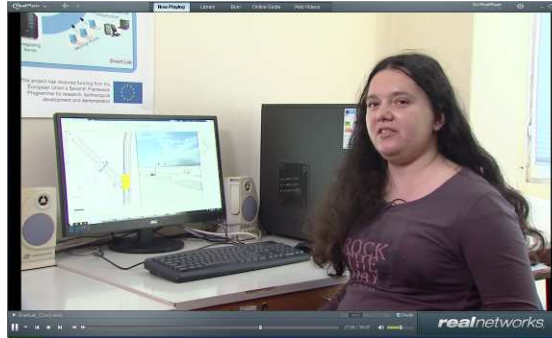
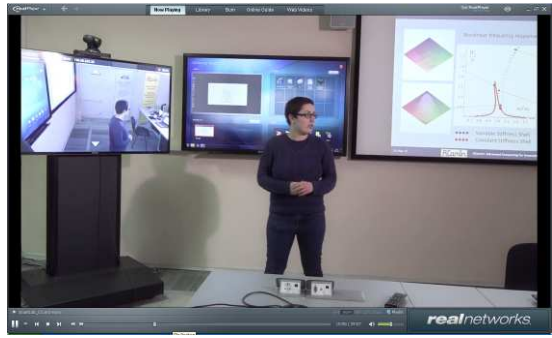
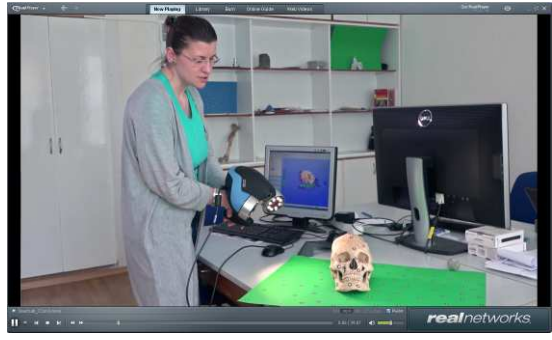
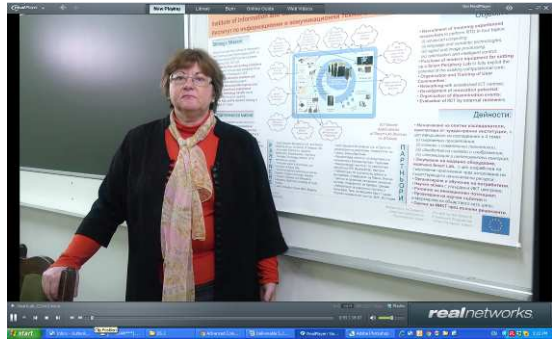
- проф. д-мн Светозар Маргенов, чл.-кор. на БАН, директор на ИИКТ
тел. 9796699, e-mail: margenov@parallel.bas.bg
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Юли 2015

7.3. FIRST MOVIE ABOUT ACOMIN – “ACOMIN: THE PEOPLE”



7.4. SECOND MOVIE ABOUT ACoMIn – “ACoMIn: THE EQUIPMENT”



7.5. PRESENTATION OF ACOMIN AT EXHIBITIONS AND OTHER EVENTS

In June 2014 the AComIn project was promoted by a poster in Sofia downtown as part of the exhibition "Bulgarian Academy of Sciences - science for the society and the country", dedicated to the 145th Anniversary of the Academy.



On 17 February 2015 in the Palace of Culture in Pernik, Bulgaria a regional meeting aiming at presenting the Bulgarian "Innovation Strategy for Smart Specialisation" 2014-2020 was organised. The event was a part of a series of six meetings across the country - one in each of the six regions and hosted by the Regional Governor of Pernik Irena Sokolova, acting Chairman of the South West region. The event was attended by representatives of the Ministry of Economy, Ministry of Regional Development and Public Works, the governors of the five areas in the region, the mayors of the municipalities in the field, academics and rectors of universities in the region, NGOs and others.



At the meeting Prof. Dimitar Karastoyanov from IICT-BAS presented the contribution of the Institute to the national and global development of high technologies and declared readiness to support the

Bulgarian industry and a willingness for a partnership to business. He presented the project AComIn and the purchased high-tech equipment of the Smart Lab.

On 24 May 2015 the AComIn project was presented in the First Children's Festival "iCreate: Children's Workshops for Science, High Tech and Art" organised by the Contemporary Art Foundation in the Vivacom Art Hall, Sofia.



In the period 29 September 2014 – 4 October 2014 AComIn was presented in the *Annual International Technical Fair in Plovdiv*, which is the biggest fair in the country. More than 50 companies from the local and international market have shown interest in the topics proposed by the AComIn project, with a particular view on the Smart Lab.

On 30 September 2014, at a seminar "ICT innovations in Small and Medium Enterprises" organised by the Bulgarian Association on Information Technologies (BAIT) in the frame of the fair, Prof. Galia Angelova described the main objectives of AComIn emphasizing on the development of scientific prototypes for innovative applications. She presented the Smart Lab devices and their application for solving practical tasks. The event was attended by IT specialists mainly from the software industry, participants and guests of the fair.



The AComIn project took part in the exhibition “The Battle of Pavia 1525” which is installed in the Visconti Castle in Pavia in June – November 2015. This exhibition is an accompanying event of Expo 2015 in Milan, Italy, and shows modern IT technologies for restoration of historical events. AComIn participates in the exhibition with 3D figures of historical actors from the Battle of Pavia, printed on a 3D printer, based on the 3D models made by the group of Prof. Virginio Cantoni - Computer Vision & Multimedia Lab, University of Pavia. The modelling was performed in collaboration with the Italian colleagues with the active participation of IICT-BAS researchers for the development of the models. The exhibition also presents 3D tactile matrices of six medieval tapestries about the Battle of Pavia, printed with the colour 3D printer of AComIn. The main research and development activities in IICT-BAS were carried out by the PhD students Nikolay Stoimenov and Stanislav Gyoshev under the supervision of Prof. Dr. Dimitar Karastoyanov. A poster about AComIn and IICT is shown in the hall where the 3D figures and matrices are exposed (see the photos below).





7.6.2. Big Award “Pitagor”

On 18 June 2015 Prof. Galia Angelova, the Coordinator of AComIn, was awarded by the Minister of Education and Science with the Big Award “Pitagor” for successful leadership of international projects in 2013-2014. “Pitagor” awards are adjudged by the Bulgarian Ministry of Education and Sciences to researchers and teams of researchers for considerable contribution to the development of science in Bulgaria. The Award was bestowed by Prof. Todor Tanev – the Minister of Education and Science.



8. DEVIATIONS FROM SCHEDULE IN WP5

There are no principal deviations from schedule during AComIn Period 2, given that the Work Package WP5 will run by 31 January 2016. This allows shifting for later dates some planned dissemination activities that remain to be performed in WP5:

- The Workshop “Advanced Industrial Control Applications” will be held on 8 October 2015 in Sofia, Bulgaria;
- The International Conference AComIn-2015 – final scientific event in the project – will be held on 10-11 November 2015 in Sofia, Bulgaria;
- Movie 3 “*AComIn: Results and Users*” will be finalised in January 2016;
- Newsletter 6 and the last pool of promotional materials will be printed in early January 2016;
- The last Doors Open Days will be held on 15-16 January 2016.

There is another deviation in WP5: the planned “tour in the country” was not implemented literally. There are several reasons for making this decision:

- The AComIn seniors travel quite often to other cities to attend conferences and meetings so in general, information about AComIn is disseminated to the most important academic institutions in Bulgaria;
- Colleagues from various Universities and Academic institutes visit regularly the IICT information events especially the Doors Open Days;
- The Movies about AComIn are public and can be seen in Internet;
- Many interesting devices in SmartLab are not portable, and the others are quite expensive.

Due to all these reasons the AComIn Executive Board made the decision to print and disseminate promotional materials and to partly support visitors who come as guests to the IICT premises, for various types of national events.

9. ASSESSMENT OF THE ADDED VALUE OF ALL DISSEMINATION ACTIVITIES IN MONTHS 19-36

The objectives of the dissemination activities accomplished during the second period of the project were: 1) to inform regularly the EU ICT community about the AComIn results and the created new opportunities for cooperation with the IICT-BAS researchers and 2) to promote the leading IICT-BAS technologies at regional and national levels. During these activities the results, work and achievements of the incoming experienced researchers were presented. In this way the successful cooperation on European and world level as well as the opportunities of doing ICT research in Bulgaria were promoted.

All dissemination activities described in this document correspond to the “AComIn Description of Work”. The created project website hosts the information on objectives and planned activities, the project results and the list of present and incoming events. The site provides on-line information on all aspects and keeps documents, presentations, pictures, and other relevant information on AComIn. It also contains information on AComIn User Communities as well as Electronic newsletters oriented towards the academic audience as well as towards industrial readers. In this way the website has created links to all relevant scientific, industrial and governmental institutions.

In order to raise awareness about novel technologies enabled by AComIn and to promote the potential of the Smart Lab devices, 13 technology transfer seminars were organized intended for 5 different User Communities. Two seminars (“New Trends in e-Learning “ and “New Trends in the Development of Cultural Heritage Digital Libraries”) were intended for the user community “Intelligent Management of Digital Content”. The seminars were attended by 47 participants from research institutions and companies.

Three seminars (“3D Visualization of Cultural Heritage”, “Digitisation and Creation of 3D Replicas of Cultural Heritage Objects” and “3D Digitisation and Virtual Reality” were intended for User Community “Advances in 3D Technologies”. The seminars were attended by 88 participants.

Three seminars (“Advanced Numerical Methods”, “Biomedical Simulation” and “Mathematics in Industry”) were organized for the User Community “Industrial Mathematics”. The seminars were attended by 93 participants.

Three Technology Transfer Seminars (“Microstructure Material Analysis”, “Advanced Techniques in Non-Destructive Testing” and “Advanced Material Characterisation, Modelling, and Numerical Simulations”) were organized for User Community “Advances in Material Analysis”. The seminars were attended by 92 participants from universities, academy and industry.

Two seminars (“Robotics and Innovations” and “Advanced Computing for Innovation - Industrial Applications”) were organized for the User Community “Mechatronics and Industrial Applications”. The seminars were attended by 85 participants from universities, academy and industry.

The results of all these technology transfer seminars can be evaluated as very successful since they allowed strengthening the existing and creating new contacts of IICT-BAS researchers with Bulgarian industrial organisations, their regional branches as well as with individual professionals from various spheres. These contacts have served as a basis for carrying out some pilot projects in the area of Industrial mathematics, Non-destructive testing and 3D digitisation.

During the reporting period AComIn has disseminated the project results to a broad scientific audience within 9 scientific events. Four of them belong to world-wide renowned series of International Forums: International Conference on Numerical Methods and Applications (NMA), International Conference Artificial Intelligence: Methodology, Systems, and Applications (AIMSA), International Conference Large Scale Scientific Computations (LSSC) and International Conference Recent Advances in Natural Language Processing (RANLP); other events are workshops oriented mainly towards Bulgarian academic and industrial communities: The International Workshop “Advanced Control and Optimization: Step Ahead’ 2014”, The First International Workshop on Biometrics (BIOMET’2014), The International Workshop “Control in Transportation Systems 2014”, The International Workshop “Big Data in Natural Language Processing, Education and Digital Collections”, and The International Workshop on Information Fusion (IWIF 2015).

The NMA 2014, AIMSA 2015, LSSC 2015 and RANLP 2015 Conferences were attended by 440 participants, 61 of them were supported by AComIn. At these conferences 41 AComIn-related papers were presented; 38 of them were published in a high-ranked international scientific series of Springer’s Lecture Notes in Computer Science, and others 3 were uploaded to the ACL Anthology (USA) (<http://aclweb.org/anthology/>).

The workshops were attended by 131 participants, 30 of them were supported by AComIn. At the workshops 32 AcomIn-related papers were presented; 5 of the were published in a high-ranked international scientific series of Springer’s Lecture Notes in Computer Science, and 12 – in the international journals with SJR rank of SCOPUS.

The organisation of all scientific events supported by AComIn can be assessed as successful. They have contributed to strengthening the scientific cooperation of IICT-BAS on the European and world levels, as well as promoting IICT-BAS as an attractive place for doing ICT research..

Promoting AComIn to society has been achieved by organizing 3 events and by participating in 4 events. The first one was a non-scientific Stakeholder meeting that was held in IICT-BAS on 14 July 2015 and was organized along with the meeting of the Science, Technologies and Innovation Expert Council to the Mayor of Sofia Municipality.. The meeting was attended by more than 35 participants: Vice-ministers of Education and Science, the Mayor of Sofia, Advisors of the President of Republic of Bulgaria, Heads of NGOs related to Sofia Municipality and the Bulgarian government, leading figures in high educational institutions, directors and key scientists in academic institutions, as well as representatives of professional associations.

Promoting AComIn to policy makers was also done at the regional meeting devoted for presentation of the "Innovation Strategy for smart specialization 2014-2020", which was held on February 17, 2015 in the Palace of Culture in Pernik. The event was attended by representatives of the Ministry of Economy, Ministry of Regional Development and Public Works, the governors of the five areas in the North Wes region of Bulgaria, the mayors of the region municipalities, academics and rectors of universities in the region, NGOs and others.

Presenting AComIn to more technical and business oriented audience was done at the annual International Technical Fair in Plovdiv, which is the biggest fair in Bulgaria. The fair was held in the period of 29th of September to the 4th of October 2014. More than 50 companies from the local and international market were shown interest in the topics proposed by the AComIn project, with a particular view on the Smart Lab. The main objectives of AComIn with emphasis on the development of scientific prototypes for innovative applications were also presented .at the seminar “*ICT innovations in Small and Medium Enterprises*” organized by the Bulgarian Association on Information Technologies (BAIT) in the frame of the fair. The event was attended by IT specialists mainly from the software industry, participants and guests of the fair.

The Second Doors Open Days were organized as a wide-scale dissemination event aiming at demonstrating the potential the Smart Lab equipment and attracting young researchers from near-by countries to apply to post-docs positions in IICT-BAS. Two technology transfer workshops (“3D Digitisation and Virtual Reality” and “Microstructure Material Analysis”) were organized as a part of the events. The workshops presented some pilot applications of Smart Lab equipment that were developed by IICT-BAS researches in collaborations with scientists from other institutes from Bulgarian Academy of Sciences and from Bulgarian universities. The event was attended by more than 150 representatives of the state administration, ministries and NGOs, as well as scientists from various institutes of the Academy of Sciences and universities, representatives of Bulgarian companies, students and was also announced and widely presented by several Bulgarian media (TV and papers) and information websites. The event can be assessed as very successful and has resulted in creating new contacts with scientific as well as industrial organizations from Bulgaria and abroad. Several ideas for new joint scientific and application-oriented projects exploring the Smart Lab devices have been proposed.

The Second Information Day that was organized along with the Third Steering Committee Meeting was aimed at demonstrating the project achievements after year 2 and receiving a professional evaluation of the project progress from the project partners. The conclusion was that the general evaluation about the project progress in year 2 is positive. AComIn attracted excellent post-doctoral researchers, who came to Bulgaria from abroad, and continues keeping the high standards in the selection of further incoming experienced scientists.

The AComIn was also promoted at the First Children's Festival “*iCreate: Children's Workshops for Science, High Tech and Art*” organised by Contemporary Art Foundation in the Vivacom Art Hall, Sofia on May 24, 2015, and at the exhibition “*Modern IT technologies for a restoration of historical events*” (the Battle of Pavia in 1525) - an accompanying event of Expo 2015, that was held on June – September 2015 in Milan, Italy. IICT - BAS participates in the exhibition with 3D figures of historical actors from the Battle of Pavia, printed on a 3D printer, based on the 3D models made by the University of Pavia. The excellent results achieved by this pilot collaborative project were acclaimed by Italian newspapers (see e.g. <http://www.iict.bas.bg/acomin/appreciation/11-Oct-2015.pdf>).

The project achievements were appreciated by awarding the “Big Award Pitagor for successful leadership of international projects” to Prof. Galia Angelova, the Coordinator of AComIn. The award was bestowed by the Bulgarian Minister of Education and Science.

APPENDIX 1: LIST OF PAPERS PUBLISHED IN THE PROCEEDINGS OF SCIENTIFIC EVENTS PARTLY SUPPORTED BY ACOMIN

List of AComIn-related papers of IICT-BAS scientists published in the ACOSA 2014 Proceedings

1. Kolchakov K., V. Monov. Examination of an algorithm for non-conflict schedule with diagonal activation of joint sub matrices in a large scale switching matrix, *International Workshop on „Advanced Control and Optimisation: Step Ahead’2014 – ACOSA“*, 8-10 May 2014, Bankya Palace Hotel, Bankya, Bulgaria, 46-50, ISSN 1314-4634
2. Tashev, T., V. Monov, R. Tasheva. Load optimization in a grid structure for parallel computer simulations of the throughput of a crossbar switch node. *Proc. of International Workshop “Advanced Control and Optimisation: Step Ahead’2014 - ACOSA“*, May 8-10, 2014, Bankya, Bulgaria. 51-56. ISSN: 1314-4634
3. Atanasova, T., J. Atanasov, Integrated information system for enterprise management, *International Workshop “Advanced Control and Optimisation: Step Ahead - ACOSA“*, May 8-10, 2014, 40-45, Bankya Palace Hotel, Bankya, Bulgaria, ISSN 1314-4634.
4. Dzambov V. Finding the roots of non-linear equations with high definition using the .NET Framework C# and X-MPIR, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014,11-17, ISSN 1314-4634.
5. Hadjiski M., K. Boshnakov, S. Koynov. Control of milling fan load on the base of residual useful life prediction, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 75-82, ISSN 1314-4634, 2014.
6. Korsemov, Ch. and H. Toshev, Main Types, Comparisons and Working of Wind Generators, In: *Proceedings of the International Workshop on Advanced Control and Optimization: Step Ahead ACOSA 2014*, Sofia, Bulgaria, 2014, 83-87, ISSN 1314-4634.
7. Nikov V., L. Doukovska. Significance of the Advanced Control and Optimisation for SMEs, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 63-66, ISSN 1314-4634.
8. Popchev I., V. Angelova. Improved residual bound of the matrix equation $X + \sigma A_2^H X^{-1} A_2 = A_1$, $\sigma = \pm 1$, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 1-3, ISSN 1314-4634.
9. Radeva I. Synergy in clusters: Approaches to evaluation, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 4-10, ISSN 1314-4634.
10. Shahpazov G., L. Doukovska. Optimisation procedures in SMEs financial mechanism, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 57-62 ISSN 1314-4634.
11. Shahpazov V., L. Doukovska. Forecasting financial markets with artificial intelligence, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 67-74, ISSN 1314-4634.
12. Savov S., I. Popchev. Solution Estimation for the Discrete-Time Parameter-Dependent Lyapunov Equation, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 29-33, ISSN 1314-4634.

13. Sgurev V., St. Drangajov. A Probabilistic approach to optimizing the path of monitoring the nodes of a network, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 34-39, ISSN 1314-4634.
14. Terziyska M., L. Doukovska. Semi fuzzy neural networks, Part 1: Nonlinear system identification, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 18-23, ISSN 1314-4634.
15. Terziyska M., L. Doukovska. Semi fuzzy neural networks, Part 2: Predictive control, *Proceedings of the International Workshop on Advanced Control and Optimisation: Step Ahead - ACOSA*, 8-10 May, 2014, Bankya, Bulgaria, 2014, 24-28, ISSN 1314-4634.

List of AComIn-related Papers of IICT-BAS Scientists Published in BIOMET 2014 Proceedings

16. Boyadjieva, D., G. Gluhchev. On-line signature verification using Neural network and KNN classifiers. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 198-206, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_16
17. Cantoni, V., D. T. Dimov, and A. Nikolov: 3D Ear Analysis by an EGI Representation. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 136-150, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_11
18. Dimov, D.T., V. Cantoni: Appearance-Based 3D Object Approach to Human Ears Recognition. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 121-135, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_10
19. Ouzounov, A.: Noisy Speech Endpoint Detection using Robust Feature. In: Cantoni, V., D. T. Dimov, and M. Tistarelli (Eds.) Proceedings of First International Workshop on Biometrics, BIOMET'2014, June 23-24, 2014, Sofia, Bulgaria, Springer, *LNCS, Biometric Authentication*, Vol. 8897, 105-117, Print ISBN: 978-3-319-13385-0, DOI: 10.1007/978-3-319-13386-7_9

List of AComIn-related Papers of IICT-BAS Scientists Published in NMA 2014 Proceedings

20. J.M. Sellier, Rayna Georgieva, and Ivan Dimov. Sensitivity Analysis of Design Parameters for Silicon Diodes. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 34-43.
21. Todor Balabanov, Iliyan Zankinski, and Bozhidar Shumanov. Slot Machines RTP Optimization with Genetic Algorithms. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 55-61.
22. Petia Koprinkova-Hristova. Hebbian Versus Gradient Training of ESN Actors in Closed-Loop ACD. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 95-102.
23. Clemens Hofreither and Walter Zulehner. Spectral analysis of geometric multigrid methods for isogeometric analysis. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 123-130.

24. Ivan Georgiev, Evgeni Ivanov, Svetozar Margenov, and Y. Vutov. Numerical Homogenization of Epoxy-Clay Composite Materials. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 130-137.
25. Stanislav Stoykov, Clemens Hofreither, and Svetozar Margenov. Isogeometric Analysis for Nonlinear Dynamics of Timoshenko Beams. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 138-148.
26. Angelos Liolios, Anaxagoras Elenas, Asterios Liolios, Stefan Radev, Krassimir Georgiev, and Ivan Georgiev. Tall RC Buildings Environmentally Degradated and Strengthened by Cables under Multiple Earthquakes: A Numerical Approach. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 187-195.
27. Tasho Tashev and Vladimir Monov. A Numerical Study of the Upper Bound of the Throughput of a Crossbar Switch Utilizing MiMa-Algorithm. Numerical Methods and Applications. Lecture Notes in Computer Science 8962, 2015, Springer, ISBN: 978-3-319-15584-5, 285-303.

List of AComIn-related Papers of IICT-BAS Scientists Published in the AIMS 2014 Proceedings

28. Ivelina Nikolova, Dimitar Tcharaktchiev, Svetla Boytcheva, Zhivko Angelov, and Galia Angelova. Applying Language Technologies on Healthcare patient Records for Better Treatment of Bulgarian Diabetic Patients, Artificial Intelligence: Methodology, Systems, and Applications, LNAI 8722, 2014, Springer, ISBN: 978-3-318-10553-6, 92-104.
29. Petia Koprinkova-Hristova and Kiril Alexiev. Dynamic Sounds Fields Clusterization Using Neuro-Fuzzy Approach. Artificial Intelligence: Methodology, Systems, and Applications, LNAI 8722, 2014, Springer, ISBN: 978-3-318-10553-6, 194-205.

List of AComIn-related papers of IICT-BAS scientists published in the special issue on Control in Transportation Systems

30. Todor Stoilov, Krasimira Stoilova, Markos Papageorgiou, Ioannis Papamichail. Bi-Level Optimization in a Transport Network. Cybernetics and Information Technologies, Volume 15, No 5, Sofia, 2015, Special Issue on Control in Transportation Systems, ISSN: 1311-9702, 37-59.
31. Vladimir N. Ivanov. Using a PicoBlaze Processor to Traffic Light Control. Cybernetics and Information Technologies, Volume 15, No 5, Sofia, 2015, Special Issue on Control in Transportation Systems, ISSN: 1311-9702, 131-139.

List of AComIn-related papers of IICT-BAS Scientists Published in the LSSC 2015 Proceedings

32. Georgiev, I., S. Harizanov and Y. Vutov. Supervised 2-Phase Segmentation of Porous Media with Known Porosity. Large-Scale Scientific Computing (LSSC 2015), LNCS 9374, Springer International Publishing Switzerland, 2015, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_38, 343 - 351.
33. Harizanov, S., S. Margenov and L. Zikatanov. Fast Constrained Image Segmentation Using Optimal Spanning Trees. Large-Scale Scientific Computing (LSSC 2015), LNCS 9374, Springer International Publishing Switzerland, 2015, ISBN: 978-3-319-26519-3, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_2, 15 - 29.

34. Koprinkova-Hristova, P. and K. Alexiev. ACD with ESN for Tuning of MEMS Kalman Filter. Lecture Notes in Computer Science, 9374, Springer, 2015, ISSN:0302-9743, DOI:10.1007/978-3-319-26520-9_24, 226 - 233.
35. Kosturski N., I. Lirkov, S. Margenov and Y. Vutov. Thermoelectrical Tick Removal Process Modeling. Large-Scale Scientific Computing, 9374, Springer, 2015, ISSN: 0302-9743, DOI:10.1007/978-3-319-26520-9_41, 369 – 376
36. Kosturski, N., S. Margenov, P. Popov, N. Simeonov, and Y. Vutov. Performance Analysis of Block AMG Preconditioning of Poroelasticity Equations. Large-Scale Scientific Computing, 9374, Springer, 2015, ISBN: 978-3-319-26519-3, ISSN:0302-9743, DOI:10.1007/978-3-319-26520-9_42, 377 - 384. SJR:0.339

List of AComIn-related papers of IICT-BAS Scientists Presented at the Workshop and Published in the Journal “Cybernetics and Information Technologies”

37. Christo Dichev, Darina Dicheva, Gennady Agre, Galia Angelova – Trends and Opportunities in Computer Science OER Development. Cybernetics and Information Technologies, Volume 15, No 3. Sofia, 2015, ISSN: 1311-9702, 114-126.
38. Milena Dobрева, Galia Angelova, Gennady Agre – Bridging the Gap between Digital Libraries and e-Learning. Cybernetics and Information Technologies, Volume 15, No 4. Sofia, 2015, ISSN: 1311-9702, 92-110
39. Svetla Boytcheva, Galia Angelova, Zhivko Angelov, Dimitar Tcharaktchiev – Text Mining and Big Data Analytics for Retrospective Analysis of Clinical Texts from Outpatient Care. Cybernetics and Information Technologies, Volume 15, No 4. Sofia, 2015, ISSN: 1311-9702, 58-77.

List of AComIn-related papers of IICT-BAS scientists published in the RANLP 2015 Proceedings

40. Kanishcheva, O. and G. Angelova. About Emotion Identification in Visual Sentiment Analysis, Proceedings of RANLP-2015, ISSN:1313-8502, 258–265
41. Simov, K., A. Popov and P. Osenova. Improving Word Sense Disambiguation with Linguistic Knowledge from a Sense Annotated Treebank. Proceedings of RANLP-2015, ISSN:1313-8502, 596–603
42. Osenova, P. and K. Simov. Universalizing BulTreeBank: a Linguistic Tale about Globalization. In Proceedings of the 5th Workshop on Balto-Slavic Natural Language Processing, pp. 81–89, ISBN 978-954-452-033-5, 2015

List of AComIn-related papers of IICT-BAS scientists published in the IWIF 2015 Proceedings

43. Atanas Nikolov, Dimo Dimov. 2D Video Stabilization for Industrial High-Speed Cameras. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
44. Iu. D. Chyrka, I. P. Omelchuk. Multichannel modified covariance estimator of a single-tone frequency. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
45. Nevena Popova, Geogi Shishkov, Petia Koprinkova-Hristova, Kiril Alexiev. 3D Visualization of Sound Fields Perceived by Acoustic Camera. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
46. Volodymyr V. Kudriashov, Artem Yu. Garbar, Konstantin A. Lukin, Lukasz Maslikowski, Piotr Samczynski, Krzysztof S. Kulpa. Fusion of Images Generated by Radiometric and Active Noise

SAR. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.

47. J. Dezert, A. Tchamova, P. Konstantinova. The Impact of the Quality Assessment of Optimal Assignment for Data Association in a Multitarget Tracking Context. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.
48. Kiril Alexiev, Georgi Shishkov, Nevena Popova. Human activity registration using multisensor data fusion. Cybernetics and Information Technologies, Volume 15, No 7, Special Issue on Information Fusion, Sofia, 2015.

Scientific Monographs published with AComIn Support in months 19-36

1. Svetozar Ilchev and Zlatolilya Ilcheva: *A New Approach for Data Handling for Web-based Applications*, Prof. Marin Drinov Academic Publ. House, 150 pp, ISBN: 978-954-322-780-8
2. Daniela Borissova: *Night Vision Devices - Modeling and Optimal Design*. Prof. Marin Drinov Academic Publ. House, 2015, ISBN 978-954-322-829-4.