

ACoMIn Newsletter №3

Advanced Computing for Innovation

March 2014

ACoMIn Mission: to strengthen the research and innovation potential of the Institute of Information and Communication Technologies (IICT-BAS) by increasing the knowledge and skills of its researchers in emerging areas and by purchasing modern research infrastructure. ACoMIn helps the Institute to accomplish successfully its strategic mission: in 5 years after its creation IICT-BAS should become a leading RTD center in Eastern Europe, providing facilities and working conditions comparable to the average standards of the EU Centers of Excellence in ICT. The Institute will support the sustainable regional and national growth and employment by providing RTD results to advanced industrial organizations. It will be a gathering point of high-quality research and training in advanced ICT topics.

ACoMIn Appreciation

On 10 February 2014 **the President of the Republic of Bulgaria Rossen Plevneliev** visited the Institute of Information and Communication Technologies. During his visit the President was introduced to the current ACoMIn results and met the post-



doctoral researchers Dr Jean Michel Sellier, Dr Clemens Hofreither, Dr Ivan Georgiev, Dr Stanislav Stoykov and Dr Vladimir Kotev. The President was accompanied by Mrs. Anna-Marie Vilamovska - the Secretary of Healthcare, Education and Science and Dr Martin Ivanov – the



Secretary of Culture, Education and National Identity. The Bulgarian Academy of Sciences was represented by acad. Stefan Vodenicharov – the BAS President, acad. Damyan Damyanov and cor. member Nikolay Miloshev – BAS Vice-Presidents, and Prof. Evdokia Pasheva – the Scientific Secretary General of BAS.



Information about the President's visit to IICT-BAS was broadcasted on the Bulgarian National TV Channel 1.

On 17 February IICT-BAS was visited by **Mr. Wolfgang Burtscher, Deputy Director General of DG Research and Innovation, European Commission**. Prof. Svetozar Margenov, the Director of IICT-BAS, presented the activities of the Institute emphasizing the participation of IICT-BAS in EU-funded projects, while Prof. Galia Angelova - the ACoMIn Coordinator, briefly introduced the project.

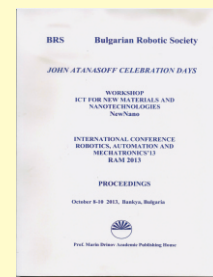


On 18 February 2014 during the Horizon 2020 Launch Conference held in Sofia, **Prof. Anelia Klisarova, Minister of Education and Science of the Republic of Bulgaria**, praised the project ACoMIn with an **Award** for developing the research capacity in the Seventh Framework Programme. The Diploma was bestowed on **Prof. Galia Angelova**, ACoMIn Coordinator, in the presence of Mr. Wolfgang Burtscher, Deputy Director General of DG Research and Innovation, European Commission.



workshop presentations, were published in Volume 13, No 4, 2013 of the "Cybernetics and Information Technologies" Journal.

Workshop "ICT for New Materials and Nanotechnologies" was held on 8-10 October in Bankya as a co-event of the International Conference "Robotics, Automation and Mechatronics" RAM 2013. The Workshop presentations covered major research topics related to the ACoMIn optimization and control topics, such as mobile systems, micro- and nanorobotics, robot mechanisms and design, robot perception and control, application of robotics and mechatronics, new materials, nano technologies, etc.



Three oral presentations were given by invited lecturers, 11 - by Bulgarian IICT partners and 21 - by IICT staff members. The Workshop has published its own Proceedings with an ISBN number. Selected papers will be published in a special issue of "Cybernetics and Information Technologies" Journal.

Upcoming Events Supported by ACoMIn

The International Workshop "Advanced Control and Optimization: Step Ahead" (ACOSA '14) will be held from 8 to 10 May 2014 in Bankya, Bulgaria. The aim of the workshop is to gather specialists interested in the field of Control and Optimization, decision making techniques, process control systems, intelligent agents and systems as well as other related topics, and to give them the opportunity to present their latest achievements and to take part in fruitful discussions concerning theoretical and practical aspects.



The International Workshop on Biometrics (BIOMET 2014) will be held on 23-24 June 2014 in Sofia, Bulgaria. Biometrics (or biometric authentication) refers to the identification of humans by their characteristics or traits. Biometrics is used in computer science as a form of identification and access control and in order to identify individuals in groups that are under surveillance. BIOMET 2014 is primarily connected with the ACoMIn objective to disseminate the recent advance in Biometrics among the research groups and companies in Bulgaria and Balkan countries as well. The selected workshop papers will be published in a special volume of Springer Lecture Notes in Computer Science.

The 8th International Conference on Numerical Methods and Applications NM&A'14 will be held on 20-24 August 2014 in Borovets, Bulgaria. The conference covers the full range of research topics in the area of numerical methods and their applications including Numerical methods for solving differential and integral equations, approximation techniques in numerical analysis, numerical linear algebra, multi-scale and reduced order numerical methods, hierarchical and domain decomposition methods, parallel algorithms, Monte Carlo methods, computational mechanics, computational physics, chemistry and biology, engineering applications, advanced

computing for innovation, etc. The list of the specialized sessions includes: Monte Carlo and Quasi-Monte Carlo methods, metaheuristics for optimization problems, advanced numerical methods for scientific computing, advanced numerical techniques for PDEs and applications, solving large engineering and scientific problems with advanced mathematical models, as well as numerical simulations and back analysis in civil and mechanical engineering. The refereed and presented papers will be published as a special volume of Springer Lecture Notes in Computer Science (LNCS).



The International Workshop "Control in Transportation Systems" will be held on 10-11 September 2014 in Sofia. The Workshop will feature two invited speakers from France and numerous international participants who will present advanced ICT control solutions in modern transportation systems. Selected papers will be published in the journal "Cybernetics and Information Technologies".

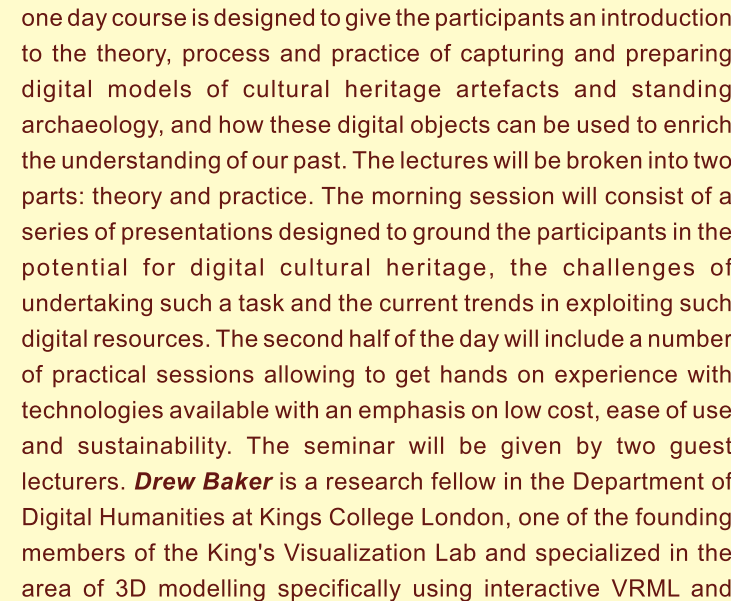
The 16th International Conference on Artificial Intelligence: Methodology, Systems, Applications (AIMSA 2014) will be held on 11-13 September 2014 in Golden Sands resort, Varna, Bulgaria. The AIMSA conferences, held in Bulgaria since 1984, have provided a biennial forum for the presentation of Artificial Intelligence (AI) research and application results. The conference in 2014 covers the full range of AI topics and the related disciplines providing an ideal forum for international scientific exchange. The conference proceedings will be published as a special volume of Springer Lecture Notes in Computer Science. As a co-event of AIMSA 2014, ACoMIn organizes on 10 September 2014 a Technology Transfer Seminar related to the 3D digitalization and visualization of cultural heritage artefacts. This one day course is designed to give the participants an introduction to the theory, process and practice of capturing and preparing digital models of cultural heritage artefacts and standing archaeology, and how these digital objects can be used to enrich the understanding of our past. The lectures will be broken into two parts: theory and practice. The morning session will consist of a series of presentations designed to ground the participants in the potential for digital cultural heritage, the challenges of undertaking such a task and the current trends in exploiting such digital resources. The second half of the day will include a number of practical sessions allowing to get hands on experience with technologies available with an emphasis on low cost, ease of use and sustainability. The seminar will be given by two guest lecturers. **Drew Baker** is a research fellow in the Department of Digital Humanities at Kings College London, one of the founding members of the King's Visualization Lab and specialized in the area of 3D modelling specifically using interactive VRML and

virtual world technologies. **Martin Blazeby** is a core member of the lab, his main area of research focuses on architectural and archaeological visualizations of heritage sites. His visualizations have been displayed in exhibitions around the world and featured on television documentaries.

WP7: Management

The 2nd ACoMIn Steering Committee meeting (held after the first project year) took place in Starosel, Bulgaria within the framework of an Information Day discussing the ACoMIn achievements heretofore. The Information Day included 13 reports on various ACoMIn activities. Three of them summarized the results of the incoming post-docs, recruited in ACoMIn during the first year (Dr Jean Michel Sellier, Dr Stanislav Stoykov and Dr Irina Temnikova). A report about the project progress was presented too, including a discussion about the objectives and achievements as well as financial analysis. After the Information Day presentations, the Steering Committee members met at a special session to discuss findings, plan further tasks for the following year and to make suggestions. They concluded that IICT had succeeded in attracting several excellent post-docs with the potential to become future team leaders. The young people feel like they are part of the team. The partners considered the first year as an excellent start of the project. The Steering Committee members also noted that ACoMIn had been a catalyst of a very important process for Bulgaria – Technology Transfer from academia to industry. The project enabled the institute IICT to adopt better practices in innovation and to develop related normative documents. This is an extremely positive project effect and ACoMIn is the right type of project for Bulgaria as it builds upon the existing sound basis of the Institute, strengthens it and prompts IICT to develop further innovation policies. The next Steering Committee meeting is scheduled for October 2014.

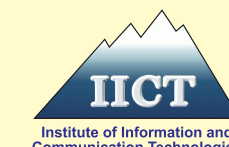
virtual world technologies. **Martin Blazeby** is a core member of the lab, his main area of research focuses on architectural and archaeological visualizations of heritage sites. His visualizations have been displayed in exhibitions around the world and featured on television documentaries.



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
FP7-REGPOT-2012-2013
Grant Agreement: 315087
<http://iiict.bas.bg/acomin/index.html>

Project Coordinator: Prof. Galia Angelova
Institute of Information and Communication Technologies, Bulgarian Academy of Sciences
Acad. G. Bonchev St., Block 2, Sofia 1113, Bulgaria
tel. +3592 979 6607, e-mail: acomin@bas.bg



Scientific Events Supported by ACoMIn

The International Workshop "Autonomic Computing and Automatic Control in Computer Systems" (ACACCS) was held on 3-4 October 2013 in Sofia as a co-event of the International conference "Automatics and Informatics" 2013. The workshop was devoted to presentations of the research results achieved by the scientific work connected with the ACoMIn project and gathered scientists from the Bulgarian Academy of Sciences, the Technical University of Sofia, the University of Artois, France, the Research Institute of Transport Technologies, Paris, France, and the University of Technologies, Belfort, France, who participate actively in the research and development of modern transportation systems. Most of the particular topics, considered in the workshop, concerned modelling, control and optimization of transportation systems. The event contained 3 invited talks and 16 oral presentations. Six papers, considering results discussed in the



research and development of modern transportation systems. Most of the particular topics, considered in the workshop, concerned modelling, control and optimization of transportation systems. The event contained 3 invited talks and 16 oral presentations. Six papers, considering results discussed in the

Progress Report (October 2013 – March 2014)

WP1: Strengthening the IICT-BAS Human Potential Employed Incoming Post-docs

Dr Vladimir Kotev was appointed to a post-doc position in AComIn in December 2013. He came to the institute from Gifu University – Japan, where he was working on design, dynamic modeling and simulations, control and development of a drilling and cutting robotized hand-held system in the field of orthopedic surgery. In AComIn Dr Kotev will conduct research on design and control



of robots and mechatronic systems for biomedical applications, using the SmartLab thermo- and high-speed cameras, the tomography and the 3D printer. His supervisor is Prof. Dimitar Karastoyanov.

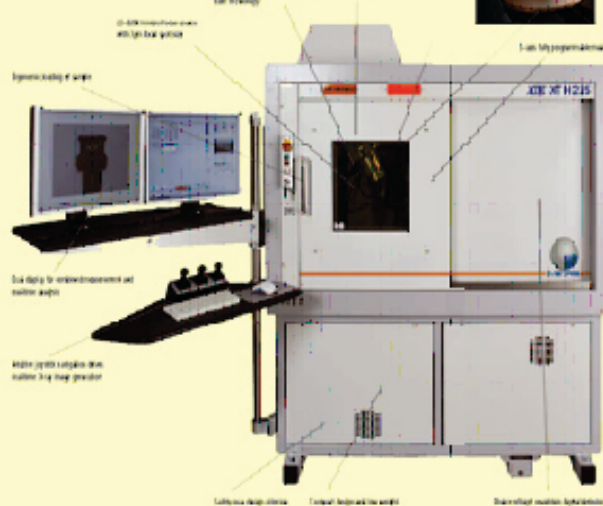
WP2: Purchasing Smart Lab Equipment and Building User Communities

We have presented three SmartLab devices, purchased after a public tender completed in August 2013, in the Newsletter 2. Here we present five more Smart Lab devices.

High Speed Camera NacMemrecam HX6 offers an astounding 5 MegaPixel resolution at up to 1,000 fps, Full HD resolution at up to 2,330 fps, 1 MegaPixel resolution at up to 4,600 fps, and much more. The HX-6 ensures the best possible solutions for the user: the highest available resolutions and light sensitivity in addition to an ultra fast imaging.



Tomograph XT H 225 Compact industrial CT scanning is a real-time inspection system offering both fully programmable and manual operations. It is designed to deliver high quality results in a quick and straightforward process. XT Software also brings the fastest reconstruction of CT data currently available on a single PC. With its high resolution and measurement volume suited for a wide range of objects, the tomograph is useful for various applications: inspection of small parts and castings as well as study of organic materials.



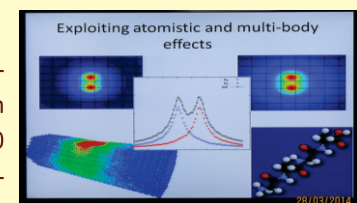
The Video Conference module Radvision Scopia consists of:

- Video conference display Radvision (Avaya) Scopia XT Meeting Center S55 – a high performance HD video conferencing solution powered by the Scopia XT5000. It integrates a single 55" 1080p premium display in a specially designed cart for creating a high quality meeting environment;



- Video conferencing codec Radvision (Avaya) XT5000 endpoint;

- Device for multi-stream telepresence connectivity Radvision (Avaya) Scopia Elite 5105/20 with 1080p High Definition processing, multi-stream connectivity, 24 video layout options with up to 28 participants displayed simultaneously through Continuous Presence;



- Video communication Server Supermicro 825TQ-600LPB;
- Display for 2D and 3D visualization Lirex Delux Screen Wall SCW1500M;
- Digital Projection M-Vision 1080p 400 Cine 3D.

Hand-held color 3D laser scanner Handyscan 3D VIUScanCreaform

stands out as one of the most accurate portable 3D scanners on the market today. It has geometry resolution of 0.1 mm, accuracy of up to 50 µm, texture resolution of 50 to 250 DPI (user configurable), texture colors of 24 bits, sRGB-calibrated, depth of field of 30 cm and outputs in file formats: .ma, .dae, .obj, .x3dz, .x3d, .zpr, .wrl, .fbx, .ply, .stl, .txt.



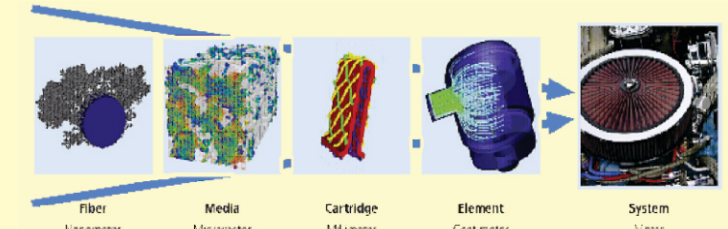
The Brüel & Kjær system for sound analysis allows merging/fusing of information from the different modality sensors – microphone array and camera. Acoustic Holography and Beamforming techniques are used for localizing sound sources. Two

patented innovations are embedded in the system – microphone technology and irregular (random) antenna array. The system measures the acoustic noise in indoor and outdoor applications and visualizes them. The measurement objects can range widely in their size.

Technology Transfer Seminars

The seminar on Industrial Mathematics was held on 19 December 2013 in IICT-BAS. The event was organized in collaboration with Fraunhofer ITWM, Kaiserslautern, Germany

(partner in the AComIn project). The cooperation with the Bulgarian Branch Chamber of Machine Building (www.castingarea.com/societies/bbcmh.htm) and the Cluster of Mechatronics and Automation (<http://www.cluster-mechatronics.eu/>) was highly appreciated. The aim of the event was to demonstrate the potential of the available SmartLab



equipment and to confirm IICT's intention for cooperation and know-how transfer with industrial partners. The first part of the seminar was devoted to the presentation of the SmartLab equipment, recently purchased in the framework of the AComIn project. The programme continued with a plenary lecture given by



Prof. Oleg Iliev from Fraunhofer ITWM, followed by presentations of particular industrial applications developed by the IICT researchers. The workshop was closed with a panel discussion about problems and perspectives in industrial mathematics. A key topic was related to practical questions /experiences concerning the collaboration in real life. The seminar gathered 6 researchers from IICT-BAS and 26 participants outside IICT: 18 of them from industrial entities (mostly representing SMEs), 7 from universities and academic institutes from Bulgaria and 1 from Germany.

The 2nd seminar on Video segmentation: applications to medical imaging and life-logging data was held on 16 January 2014. The lecturer was Prof. Petia Radeva from the University of Barcelona, Spain. The seminar gathered 13 researchers from the Technical University of Sofia, the University of Library Studies and Information Technologies and several research institutes from the Bulgarian Academy of Sciences.

A three day training course on Thermography – making and analysing thermograms made by FLIR P640 Thermo camera was held on 11-13 February 2014. The course was primarily oriented to the IICT-BAS researchers. The lecturer was Dr Todor Bagarov from STEDOR Ltd., the representative of FLIR Systems in Bulgaria. The main purpose of the course was to provide knowledge of the basic concepts concerning the infrared Thermography and to teach the participants how to operate the camera under different conditions and for various purposes, to do an appropriate treatment of the measurement situation in the field or laboratory conditions, to identify and correct potential error sources / issues, to be able to do IR inspections following



written guidelines and to be able to create database from the result of inspection and final reports using FLIR Reporter Pro software. The course was attended by 18 specialists from IICT-BAS and 1 specialist from VIDAKO Ltd. Company.

The seminar on 3D Scanning and Digitalization was held in IICT-BAS on 17 March 2014. The seminar was organized by IICT-BAS and two Bulgarian companies – ADA 3D (www.ada3d.com) and GeoCAD-93 (www.geocad93.com). Prof. Galia Angelova, the Coordinator of AComIn project, briefly presented the project objectives and described the 3D equipment bought in the frame of AComIn. Mr. Jury Radkov, the Manager of ADA 3D, made a presentation titled "3D scanning – general review of the technology of 3D scanning and types of 3D scanners; main application areas and example of best practices". The presentation of Mr. Milush Blagoev from GeoCAD-93 considered 3D laser scanning, digitalization and preservation of immovable



objects of cultural heritage. The seminar was attended by 36 listeners from 16 organizations.



WP3: Networking with Leading EU Partners

IICT-BAS was visited by **Prof. Petia Radeva** from the University of Barcelona (UAB), Spain, from 14 to 20 January 2014. This was the 2nd visit of Prof. Radeva in the frames of the AComIn project. On 16 January she gave a lecture entitled "Video segmentation: applications to medical imaging and life-logging data" presented to the AComIn User Group "Advances in Image and Video Analysis".



Prof. Vlastimir Nikolic from Nis University, Serbia visited IICT-BAS in the period 28-30 March 2014. The short visit was aimed at exchanging and sharing experiences and research results, and attending the Doors Open Days organized by AComIn on 28-29 March 2014. During his visit, Prof. Nikolic had meetings and discussions with leading scientists from the "Embedded Systems" Department as well as with some post-docs

employed by the AComIn project. As a result of his visit some topics for joint research in the area of robot control and control of technological processes (using the Laser Particle Nano Sizer and the EDEM Software) were specified.

Prof. Viktor Gavrilovski from Skopje University "St. St. Cyril and Methodius" attended the AComIn Doors Open Days on 28-29 March 2014. Prof. Gavrilovski had meetings and discussions with leading scientists from the "Embedded Systems" Department. Some directions for future joint research in the area of mechanics and mechatronics (using the Thermo Camera and the High Speed Camera) were specified.

Prof. Felix Yanovsky visited IICT-BAS in the period 26-31 March 2014. He is an IEEE Fellow and Head of the Electronics Department at the National Aviation University in Kiev, Ukraine. The main aim of the visit was to present his research results, to exchange and share experience in the field of signal processing as well as to discuss the practical application of some devices purchased within the AComIn project. During his visit

Prof. Yanovsky took part in a series of lectures held within the AComIn Doors Open Days. On 27 March he presented a talk titled "Research in the field of Radars and related areas in the Electronics Department at the National Aviation University of Ukraine", which caused fruitful discussions and raised interest in further deepening the research contacts between both organizations.

Assoc. Prof. Rustem Sinitsyn from the National Aviation University in Kiev, Ukraine visited IICT-BAS on 26–31 March 2014 in order to attend the AComIn Doors Open Days. He took part in discussions dedicated to signal processing. On 27 March 2014 he delivered a lecture titled "Non-Parametric algorithms of signal processing for active and passive MIMO noise acoustic radars".

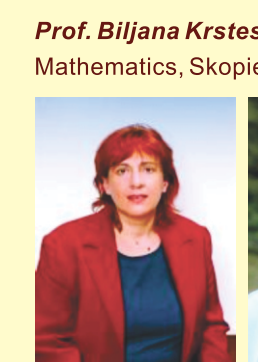


The young researcher **Yuriy Chyrka** from the National Aviation University in Kiev, Ukraine, also participated in the Doors Open Days and delivered the presentation "Harmonic signal parameters estimation".

Prof. Sofia Panteliou from Patras University, Greece visited IICT-BAS in the period 26-30 March 2014. She presented the activities of her department, took part in the demonstrations of the SmartLab devices and participated in the AComIn Doors Open Days. On 27 March 2014 Prof. Panteliou gave a lecture entitled "Design, Bionics, Applications" addressing main elements of biological simulation models and applications in biological modeling of human bones. During her visit Prof. Panteliou had meetings and discussions with leading scientists from the "Modeling and Optimization" and "Embedded Systems" Departments of IICT-BAS. Some topics for joint research in the area of modelling biological objects (using the 3D Tomograph and the 3D Scanner) were specified. Prof. Panteliou also discussed a potential joint collaboration with focus on innovation activities.



Prof. Biljana Krsteska from the Faculty of Natural Sciences and Mathematics, Skopje University "St. St. Cyril and Methodius" and



Assoc. Prof. Gökhan Çuvalcioğlu from the Department of Mathematics at the Mersin University in Turkey visited IICT-BAS on 26–30 March 2014. During their visit

they took part in the AComIn Doors Open Days and actively participated in the discussions concerning future applications of the SmartLab equipment and further deepening the research contacts between IICT-BAS and their universities.

Prof. Konstantin Lukin and **Dr. Vladimir Kudriashov** visited IICT-BAS in the period 24 – 30 March 2014.



Prof. Lukin is an IEEE Fellow and Head of the Laboratory for Nonlinear Dynamics of Electronic Systems at the Institute for Radiophysics and Electronics at the National Ukrainian Academy of Sciences in Kharkov. During his visit Prof. Konstantin Lukin took part in a series of lectures organised within the AComIn Door Open Days. On 26 March 2014 he gave two lectures: "History and current research of the Noise Radar (Fifty Years of Noise Radar)" and "Coherent imaging using Random Signals and Antenna with Aperture Synthesis in active and Radiometric modes", which caused fruitful discussions among the experts in signal processing. On 26 March 2014 Dr Kudriashov gave a talk titled "Radiometric Synthetic Aperture Radar". The visit of Dr Kudriashov was also related to his intention to introduce himself to the AComIn Executive Board in order to apply for a post-doc position in AComIn.

Prof. Venio Pacovski, Vice-Dean of the School of Computer Science and Information Technology at the University American College – Skopje, attended the AComIn Doors Open Days on 28-29 March 2014. Visiting IICT, he discussed the requirements regarding the postdoctoral employment in AComIn in order to inform prospective post-doc researchers from Skopje about the open positions. Prof. Pacovski will also disseminate the information about the potential of the SmartLab equipment to colleagues from the Faculties of Engineering, University of Skopje "St. St. Cyril and Methodius".

Prof. Costin Badica, Dr. Marian Cristian Mihaescu, and Dr. Mihaela-Tinca Udristioiu from the University of Craiova, Romania, attended the AComIn Doors Open Days on 28-29 March. The main objective of their visit was exchange of information about AComIn and discussion of possible topics for joint research: language and semantic technologies and their applications in intelligent systems.

WP5: Dissemination

In the period 28-29 March 2014 the AComIn project organized **Doors Open Days** in which the SmartLab equipment and its applications were demonstrated. At the opening ceremony Prof.



Galia Angelova, the AComIn Coordinator, explained the main objectives of the project and briefly introduced the project tasks and the results already achieved. Then the visitors had the possibility to see the SmartLab equipment in work and to discuss plans about its applications with AComIn team members. The Acoustic Holography was demonstrated in Hall 2 of Block 25A. The application of beam-forming techniques for noise