REVIEW

For procedure for academic position "**professor**"

domain of High education: **5. "Technical Sciences"**,

professional field of study: **5.2 „Electrical engineering, Electronics and Automatics"**

scientific specialty: **„Automation systems for information processing and control";**

for the needs of the department **"Information Technologies for Sensor Data Processing"**

The competition is published in "State newspaper" N57/9 July 2021 for the needs of Institute of Information and Communication Technologies – Bulgarian Academy of Sciences (IICT-BAS)

with candidate: **associate professor Ph.D. Kiril Metodiev Alexiev** from Institute of Information and Communication Technologies – Bulgarian Academy of Sciences

Member of the jury: prof. D.Sc.,Ph.D. Eng. **Todor Atanasov Stoilov** , Institute of information and communication technologies – Bulgarian Academy of Sciences, Sofia, Acad.G.Bontchev str., BL.2

I. Common biographical data of the candidate

Main data about the education and for his scientific degree and academic position of the candidate are summarized in Table1

Table 1.

Name	born	High education	Scientific degree Ph.D.	Chief assistant
Kiril Metodiev Alexiev	1957	1978-1984 Kiev Polytechnical Institute, Ukraine, USSR, engineer, Automation control systems 1977-1978 Computer technics, Technical University of Sofia	1994 – High Attestation Commission, IPOI-BAS	2005 – High Attestation Commission, IPOI-BAS

Kiril Alexiev started his high education in Technical University of Sofia. After finishing his first year of education according to the practice of this time he has been

approved to continue his education abroad in Kiev Polytechnical Institute, Ukraine, USSR. He graduated in 1984 as engineer-master for the specialty "Automation control systems". He started his professional works in 1984 in the Institute of special electronics-Sofia. Since 1989 he moves to Bulgarian Academy of Sciences in the Center for Informatics and Computer Technology. This institution during the years changed its title to Central laboratory for parallel data processing, Institute of information and communication technologies. In 1994 he started his Ph.D. education. He defended the educational and scientific degree Ph.D. in 1997. In 2005 he has been elected for associated professor. Both scientific degrees have been approved by the National High Attestation Commission.

During his stay in Bulgarian Academy of Sciences he took the positions assistant and associated professor. Currently he is a head of department "Information Technologies for Sensor Data Processing" in IICT-BAS.

II. Common presentation of the candidate's materials for the competition

The presented research papers for the competition for the academic position "professor" are prepared according to the legislative requirements in Bulgaria: The Law for academic promotion, The Rules for the application of this law. The internal rules for this position in the IICT-BAS are particularly a more restrictive. That's why the referee makes assessments about the candidate achievements towards the internal requirements of IICT-BAS.

The candidate presents a list with 48 research publications for this academic position. Additionally, he presented one approved patent and list of titles of projects, where the candidate had participated with his research developments.

In the document "REFERENCE for the completion of the minimal requirements of IICT-BAS for the academic position professor" the candidate presents these 48 titles, which are given in two sections: papers, which are indexed and referred in SCOPUS and no referred papers. Additionally, there is a document "LIST of papers.....presented for the competition...", where the titles of the papers are numbered from 1 to 48.

Indicators group A: it is presented a diploma for defense of the educational and scientific degree Ph.D. The title of the Ph.D. thesis is "Implementation of Hough Transform as Trajectory Detector in Radar Data Processing".
The candidate satisfies the requirements for this indicator.

Indicators group B: These indicators insist that the candidate achieves 100 points with habilitation thesis or to have (at least 10) publications, which are indexed and referred to world known data bases. The candidate satisfies this indicator, presenting twelve publications.

The papers are published in journals (Cybernetics and Information Technologies, Comptes Rendus de L'Academie Bulgare des Sciences), scientific conferences (CompSysTech-Bulgaria, IEEE International Symposium on INnovations in Intelligent SysTems and Applications-INISTA-Romania) and specialized edition (Springer Nature Switzerland, Studies in Computational Intelligence, Lecture Notes in Computer Science, Proceedings of SPIE - The International Society for Optical Engineering). The presented data about indicators group B give full bibliographic

records with corresponding virtual links for assessment of these publications. This is an advantage of the presented document.

The candidate has correctly evaluated his score at 322 points. This score considerable exceed the level of indicator group B. The referee assumes that the candidate satisfies the legislative requirements for this indicator group.

Indicators group Г: it insists achieving 220 points. The candidate presents a list with 36 research publications for the categories Г7 and Г8.

The category Г7 is for publications, which are refereed and indexed in world recognizes data basis with scientific information. The candidate presents 14 titles. The publications are presented in special editions, published according the developments of international projects (VLADA, PRICE, NATO Advance Study Institute); on international conferences (IEEE International Symposium on INnovations in Intelligent SysTems and Applications, INISTA-Turkey, Bulgaria, Italy, Spain; CompSysTech-Bulgaria; IEEE 8th International Conference on Intelligent Systems-Bulgaria; International Conference "Modelling and Development of Intelligent Systems"-Romania).

The category Г8 concerns publications in no referred editions or edited books with several authors. Publications of the candidate have been published in research journals (Information technology and Control, Automatics and Informatics, e_Learning, Acoustic – Bulgaria); on scientific conferences (Telecommunications, Informatics, Energy, Safety management, Automatics and Informatics, Space, Ecology, Safety, National congress of Bulgarian society for physiological sciences).

All this set of publications is identified with full bibliographic records for checks and access. The candidate has evaluated his score for this indicator group to 429.1 points. The referee has evaluated the presented data up to the requirement of 220 points and didn't evaluate the full range of presented publications. The results of the candidate overreach the needed level for group Г.

The referee assumes that the legislative requirements for indicator group Г are satisfied.

Indicators group Д: This indicator requires achieving 60 points. This indicator group concerns citations in scientific publications, monographs, collective preprints, patents, which are referenced and indexed in world recognized data bases with scientific information and citations in non-referenced editions. The candidate with the list of presented citations has 208 citations, which cover 2059 points, which overrates the legislative requirements for this indicator. The referee had used the given data up to the level of 220 points. Obviously following the presented documents, the candidate's result exceeds many times the legislative requirements.

The referee assumes that the candidate satisfies the legislative requirement for this indicator group Д.

Indicators group E: participation in projects, attracted resources from projects, publication of University textbook. The requirements for this indicator are 150 points. The candidate declares participation in national and international projects. They have been funded by Scientific fund of Bulgaria, Executive Agency for Support of Small an Medium Enterprises, National Center of Super-computer applications. The candidate had participated in ERASMUS program, which contained formal visits in Italy.

The candidate has evaluated his score to 430 points. The referee has checked this result till the legislative level of 150 points. It was obviously that the candidate's results exceed considerably the legislative requirements.

The referee assumes that the candidate satisfies the legislative requirement for this indicator group E.

The final conclusion of the referee confirms that the candidate satisfies the legislative requirement and for part of them he overrates according to his declared research and application activities. The referee had evaluated the presented scores up to the levels of the legislative requirements.

III. Assessment of the pedagogical activities of the candidate

The candidate is working in a position of associated professor in academic institution of the Bulgarian Academy of Sciences. The main activities in such academic institution are research and scientific activities. Pedagogical activities are not required for the current position of the candidate in the Bulgarian Academy of Sciences. But the candidate has such activities, because he has been invited on individual bases for teaching University courses. The presented document for this competition illustrates that the candidate had teaching activities in Technical Universities in Sofia and Gabrovo, Sofia University, The High school of Telecommunications and posts. No data have been provided about the topics of these University courses.

IIV. Main research and experimental achievements

The candidate presents a list with 48 research publications for this competition. The documents "LIST..." and "REFERENCE..."contain 48 titles of publications. The candidate correctly gives a list with all titles of his publications (114) and these ones, which are not used in previous procedure. It has been chosen 48 from them for the current procedure of "professor". The presented documents give statistics that 17 of the presented publications are refereed in SCOPUS, 15 in Web of Science, 10 of the publications are in editions with IF and/or SJR. The suit of documents for this procedure contains the electronic versions of these publications.

The main research and application contributions of the candidate, presented in his publications are related towards the research domain "signal processing". Appropriate methods and algorithms of signal processing are worked out and adapted for their application in image processing, multiple sensor data processing.

A research achievement is defined for the case of signal identification with estimation of a set of specific quantitative and qualitative parameters. Such analysis allows being evaluated additional signal parameters, assessment of nonlinearities, forecast and identification of the source of such signals. The signal processing can be used for detection of small buried objects by ground penetrating radars, ultrasound screening for early diagnosis of prostate cancer, 3D scene restoration having a set of 2D images.

These set of researches have important scientific and application importance, because they allow to be solved problems like:
- non-destructive control of the dynamics of roller bearings;

- design of a precise eye tracking tool;
- assessment of ECG signals for the estimation of vital and medical processes;
- identification of different geological structures;
- development of new algorithm for encryption of digital data.

The candidate has additional research results concerning the spread of acoustic signals in space, identification of linear objects using images obtained from satellites, processing ultrasound images for the identification of a cancer on prostate, detection and recognition of human faces,

These results are presented in publications in research journals in Bulgaria, on international conferences and books of international academic edition houses.

The reviewer finds that research and application achievements have been presented in these publications, which concern developments of new methods about signal processing and application of these methods in practical cases and problems.

As a result, the presented publications of the candidate contain theoretical results, which have also pragmatically applications for the case of 3D object design using 2D data, diagnosis of medical processes and conditions, estimation of object characteristics from images of human faces. The reviewer assesses that in the candidates' publications it has been presented useful examples of research achievements and applications in engineering solutions.

V. Significance of the contributions for the science and practice

The reviewer assesses that in the research of the candidate it is evident the will for the design and implementation of different models and application of methods in real practical engineering solutions. In the candidates documents there are given data about participation in an international research projects (ACOMIN, COST), projects, funded by the government Agency for support of small and medium sized enterprises. It has been given data about the participation in specific business contracts. The outcommes of these projects result with development of practical solutions for diagnosis of human prostate, ground penetrating radar, acoustic pressure map of "Solvay soda" and others. These practical developments are indirect prove for the utility, usefulness and significance of the research and practical contributions of the candidate.

VI. Critical remarks and recommendations

The reviewer doesn't have critical opinion towards the content of the presented documents for this procedure. Here are discussed few subjective assessments, which are not obligatory to be considered by the candidate.

The reviewer fids that the candidate 's scores overrate many times the needed legislative requirements. This is demonstrated and proved with the rich research and application results and academic production, presented in this competition. The correct assessments of such enormous research production require usage of considerable efforts by the scientific jury.

I would be grateful for fewer amounts of presented publications, because this will decrease the workload for the preparation of reviews in this academic procedure.

I recommend the candidate in his future activities to limit the number of coauthors in his publication activities.

These assessments from the reviewer don't concern the content and the significance of the results, obtained by the candidate. They are not mandatory, but reflect the specific personal opinion of the reviewer.

The documents prepared for the competition are very well prepared. They are easy to process and do not create difficulties in assessing the results obtained by the candidate.

Conclusion

The candidate in this competition associate professor Ph.D. Kiril Metodiev Alexiev is presented with enough set of research works. In the candidate's works there are original research and practical contributions.

I find that the legislative requirements of The Law for academic promotion and The Rules for the application of this law and the internal rules IICT-BAS are satisfied. All upper said and after my acquaintance with the presented documents and their contributions with research and practical results give me ground to suggest **associate professor Ph.D. Kiril Metodiev Alexiev** to take the academic position "**professor**" in IICT-BAS, department "Information Technologies for Sensor Data Processing" for the professional field of study: 5.2 „**Electrical engineering, Electronics and Automatics**", scientific specialty: „**Automation systems for information processing and control** ".

7.10.2021

Reviewer:

Prof. DSc Todor Stoilov