O P I N I O N

on the competitive procedure for the academic position of "professor" in the professional area 5.2 Electrical Engineering, Electronics, and Automatics, scientific specialization "Automated Systems for Information Processing and Control," for the needs of the "Information Technologies for Sensor Data Processing" Department of the Institute of Information and Communication Technologies (IICT), announced in *State Gazette* no. 57 of 9 July 2021.

Candidate: **Associate Professor Dr. Kiril Metodiev Alexiev**

Member of the Scientific Jury: **Professor Dr. Todor Dimitrov Tagarev**, Institute of Information and Communication Technologies

The single candidate in the procedure is an "engineer" (equivalent to a masters' degree) in automated control systems. He is a graduate of the Kyiv Polytechnic Institute, Ukraine, in 1984. In 1997 he received his PhD degree, and in 2005 became "Associate Professor" with scientific specialization 02.21.07 "Automated Systems for Information Processing and Control."

For the participation in the competitive procedure for "Professor" Dr. Alexiev has submitted 48 scientific publications, including 27 conference papers, 15 articles, five chapters in books and book series (that have also been presented initially at conferences) and one White Paper. Seven of these publications are in Bulgarian, and the remaining 41 – in the English language. In 15 of these publications the candidate is the lead (first) author, while for another seven he is the sole author.

The candidate has presented a declaration for the lack of plagiarism in the works submitted for review. I have no reasons to doubt this declaration.

A significant number of these publications (18), and especially of those published after 2014, are indexed in Web of Science and/or Scopus. The Web of Science profile of Associate Professor Alexiev includes 26 publications, and the one in Scopus – 30 publications. The numbers of citations of these publications are respectively 43 and 68 (excluding self-citations by the author and his co-authors). I assume that other publications of the candidate are also cited in papers and articles indexed in Web of Science and/or Scopus. This explains why the points in group D are 17 times higher that the "minimal requirements" of IICT, in particular those in

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group D12 accounting for citations in scientific works indexed in world known databases of scientific information.

Associate Professor Alexiev has presented information on his participation in 25 research projects. Four of them have been financed by the National Science Fund, nine aimed to increase competitiveness and facilitate innovation in Bulgarian companies, one is financed through the budget subsidy for IICT, two are for providing practice of university students, and the remaining ones are part of programmes for bilateral cooperation or with EU funding (e.g. COST actions). That indicates a good balance between the scientific (fundamental) and the applied research of the candidate. He has led three of these projects, while according to the information provided, he has participated in some of the smaller project in an individual capacity.

Associate Professor Alexiev has significant experience in leadership positions in the Bulgarian section of IEEE, in organising international scientific conferences, preparing thematic journal issues, and reviewing scientific articles, conference papers, and project proposals.

There is no specific data (disciplines, academic hours, etc.) for the teaching activity of the candidate in the higher education. However, in the reference document of his scientific and applied contributions he points to courses thought in the technical universities of Sofia and Gabrovo, Sofia University "St. Kliment Ohridski" and the Higher School on Telecommunications and Posts, as well as to serving as thesis advisors for students from those schools.

The works, submitted for review, can be thematically classified in four areas: (1) signal processing; (2) image processing; (3) multi-sensor data fusion; and (4) visualisation.

The studies in the first and the third areas continue the research of the candidate from his doctoral dissertation and, especially when they combine respective research techniques, raise significant interest in the scientific community (indicated by the high number of citations of the respective publications). The main scientific contributions in the first area are in the evaluation of nonlinearities, decomposition and encryption of signals, and the candidate has published applied results in restoring satellites' telemetry information [5] and automated identification of irregular pulse in ECG signals in Holter records [1]. For the main part of the publications in this area Dr. Alexiev is the sole author.

Research results in the second area are published by teams of authors. The studies combine various methods and techniques and find applications for discovering underground targets, analysis of geological structures, medical purposes, and for the purposes of criminal forensics.

In the third area Associate Professor Alexiev has interesting research results in advancing the classic navigation task by fusing information from accelerometers and gyroscopes, in part by using fuzzy logic, with applications in the medicine and our daily lives (e.g. calculating the spent calories based on information from the sensors of a mobile phone). Other studies fuse information from acoustic sensors for industrial applications.

In the last of the four areas, the candidate has studied various methods and techniques for visualising 3D surfaces, with applications for visualising the activity of neurons in the cerebral cortex.

About a quarter of the submitted publications treat related topics, e.g. modelling the traffic of vehicles in a large city and the design of simulators, also fit into the scientific specialization "Automated Systems for Information Processing and Control," and are of practical value.

Overall, the work of the candidate covers a rather broad area of scientific and applied problems, but the impression is that there is no focus in his research. That is a possible explanation for the fact that, even though Associate Professor Alexiev has significant professional experience, he has not led major research projects and there is no data for PhD students he has advised or who have succeeded in getting a PhD degree.

CONCLUSION

My overall evaluation of the scientific and applied activities of Associate Professor Alexiev is positive. My assessment is that the requirements of the Law on the Development of the Academic Personnel in the Republic of Bulgaria, the national regulations for its implementation, and the regulations the Bulgarian Academy of Sciences and the Institute of Information and Communication Technologies are fully met. On that basis I am recommending that the Scientific Jury makes a proposal to the IICT Scientific Council to elect Associate Professor Dr. Kiril Metodiev Alexiev for the academic position of "Professor" in the area of higher education "Technical Sciences", sub-area 5.2 Electrical Engineering, Electronics and Automatics, scientific specialization "Automated Systems for Information Processing and Control."

Member of the Scientific Jury

27 October 2021

Prof. Dr. T. Tagarev

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