

STATEMENT

by Prof. Toshko Ganchev Nenov, PhD,
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on the materials submitted for participation in a competition
for the academic position "Professor"
in professional field 5.2 Electrical Engineering, Electronics and Automation,
specialty "Automated systems for information processing and control"

In the competition for the academic position "professor", announced in the State Gazette, issue 57 from 09.07.2021 for the needs of the section "Information technologies for sensor data processing" at the Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences as a candidate participates Assoc. Prof. Kiril Metodiev Alexiev, PhD.

The statement was prepared in accordance with Order № 200 of 07.09.2021 of the Director of the Institute of Information and Communication Technologies (IICT) at the Bulgarian Academy of Sciences (BAS) and of a decision of the scientific jury on the procedure (Minutes № 1 of 21.09. 2021).

1. General characteristics of the scientific and scientific-applied activities of the candidate

Assoc. Prof. Kiril Alexiev has 114 scientific publications and one author's certificate. Of these publications, 11 relate to the dissertation for obtaining an educational and scientific degree "Doctor", and with 32 publications he participated in the competition for Senior researcher II degree (Associate Professor) in 2004. He participated in this competition with 48 publications of the remaining 71 publications.

The presented scientific publications are divided into two groups:

I. Publications equivalent to a monograph (group of indicators B4) - **12** in editions, which are referenced and indexed in world-renowned scientific databases Scopus and Web of Science (WoS). Of these publications, 5 are articles in journals, 5 - in proceedings of Springer and 2 - papers at international scientific conferences. One of the articles is in an edition with Impact factor (WoS) and 4 are in editions with Impact rank (Scopus).

II. Publications other than those equivalent to a monograph - divided into two subgroups:

- in editions that are referenced and indexed in world-renowned scientific databases (group of indicators G7) – **14**.

The publications are 2 articles, 3 book chapters and 9 papers at international scientific conferences.

- in unreferenced journals with scientific review or in edited collective works (group of indicators G8) - **22**.

Of these publications, there are 8 articles and 14 papers.

Total of the presented publications:

- Articles - **15**;
- Book chapters – **3**;
- In books and proceedings published by Springer – **5**;
- Papers in proceedings at international conferences – **25**.

By relevance:

- Articles in foreign journals with impact factor (WoS) – **1**;
- Articles in foreign journals with impact rank (Scopus) – **4**;
- Articles in proceedings of Springer, referred to in Scopus and WoS – **5**;
- Papers in scientific proceedings at international conferences, referenced in Scopus – **8**;
- Book chapters – **3**.

By place of publication:

- Articles in international and foreign journals – **9**;
- Articles in national journals - **10**;
- Papers in proceedings at international scientific conferences abroad - **12**;
- Papers in proceedings at international scientific conferences in Bulgaria - **12**;
- Articles in collections of Springer – **5**.

In the language in which they are written:

- In English - **41**;
- In Bulgarian - **7**;

By number of co-authors:

- Without co-authors - **7**;
- With one co-author – **14** (the candidate is the first author);
- With two or more co-authors – **27** (the candidate is the first author in 1 publication).

The documents of the candidate present materials for his participation in 25 scientific and educational projects for the period after the competition for Senior researcher II degree (2004). In 11 of the projects with Bulgarian funding he was a member of the team. He has also participated in 8 international projects. He was the Project manager of 6 projects. Four of the national projects are funded by the Research Fund, 1 - by the National Innovation Fund and 1 - by the Operational Program "Development of the Competitiveness of the Bulgarian Economy". Seven of the international projects are European funded (FP7, Erasmus and COST Action), and 1 project is with the Israeli Academy. Assoc. Prof. Kiril Alexiev has managed projects funded by the Operational Program "Development of the Competitiveness of the Bulgarian Economy" and the Operational Program "Innovation and Competitiveness".

In terms of scientific and scientific-applied activities, the candidate performs, and in most of the indicators significantly exceeds the minimum requirements for holding the academic position of "professor".

2. Assessment of the pedagogical preparation and activity of the candidate

Assoc. Prof. Kiril Alexiev conducted in 2006 a short lecture course for graduating students majoring in "Communication Engineering" at the Technical University of Sofia on "Modern protocols for the transmission of multimedia content." In 2008 he presented a 32-hour lecture course "Sensors. Sensor networks. Sensor Information Processing" of students at the Technical University of Gabrovo. From 2015 to 2018 he conducted classes (lectures and exercises) in the discipline "Information Technology" of students from the Higher School of Telecommunications and Posts - Sofia, and in 2017/2018 - a lecture course on "Administration of web servers".

In implementation of Erasmus+ projects from 2015 to 2018, Assoc. Prof. Alexiev lectured at the University of Pavia (Italy). He has also conducted short-term lecture courses for doctoral students.

From 2008 to the present, he has supervised 6 graduates from Sofia University, Technical University - Sofia and the Higher School of Telecommunications and Posts.

I believe that the candidate has significant teaching and pedagogical activities for scientist working in the structures of BAS.

3. Main scientific and scientific-applied contributions

The publications presented by Assoc. Prof. Kiril Alexiev, equivalent to a monograph, include developments, research and contributions in the field of "Methods and algorithms for processing sensor signals and data". These publications include 5 articles in journals (1 with Impact factor and 4 with Impact rank), 2 papers in proceedings at international conferences and 5 articles in collections of Springer publishing house, which have Impact rank.

In the publications presented by Assoc. Prof. Kiril Alexiev, the following scientific and scientific-applied contributions can be summarized:

Scientific contributions

- A new multiscale signal decomposition based on self-similarity without pre-selection of an orthogonal basis is proposed, containing the time and frequency characteristics of the signal.
- New approaches have been proposed for signal encoding and estimation of its nonlinearity.
- A method has been developed for detecting point underground targets in images obtained by ground penetrating radar based on the Hough transform.
- A method for detecting prostate cancer using image fusion of a normal ultrasound image with Doppler image has been proposed.
- An approach has been developed for 3D scenes restoration based on several obtained images.
- A generalized model of sensor node and sensor network is proposed.

Scientific-applied contributions

- An algorithm has been proposed to increase the accuracy of the eyetracker using accelerometer and gyroscope data.
- An algorithm for non-destructive testing of roller and ball bearings based on the combined information of 18 microphones and one camera is proposed.
- A scheme for forming the beam of an acoustic grating lobes with a lower level and obtaining an acoustic map of the antenna grating is proposed.
- An algorithm has been developed to recover telemetry information received from

satellites by preserving the texture of the damaged / lost signal.

- An algorithm for detecting events in ECG signals has been developed.
- A supercomputer algorithmic implementation of a face detection and recognition system is proposed.
- A scheme for determining the covariance matrix in the Kalman filter with a system of fuzzy rules and ESN network is proposed.

4. Significance of contributions to science and practice

The main directions of the scientific and scientific-applied activity of Assoc. Prof. Kiril Alexiev are related to signal and image processing. This processing is applied to data from single and multiple sensors. This is a very challenging scientific field, the results of which are widely used in practice. This determines the significance of the results of his work for science and practice.

The documents for the competition contain information about 208 citations of 32 publications of the candidate. They do not repeat the citations for associate professor and there are no auto-citations. The majority of citations are from foreign authors in prestigious international journals and scientific conferences. From a reference made in Scopus, Assoc. Prof. Kiril Alexiev has an h-index of 7. All this is a confirmation that he is well known among the scientific community in Bulgaria and abroad and his publications arouse interest and recognition.

Assoc. Prof. Kiril Alexiev has been an associate professor since 2004 and head of a section since 2005 at IICT at BAS. For four years he was Chair of the Bulgarian section of the IEEE, and is currently Vice Chair. From 2005 to 2010 he was Vice Chair of the Union of Automation and Informatics. He is the editor of the journal "Automation and Informatics" and scientific secretary of the journal "Information Technologies and Control". Assoc. Prof. Kiril Alexiev was the main organizer, member of the program and organizing committees of more than 60 scientific conferences and seminars. He has been a reviewer in 19 scientific journals for Springer, Elsevier and MDPI and at many scientific conferences. He is a reviewer of the National Science Fund of Italy and the Bulgarian National Science Fund.

It should be noted that the quantitative indicators of the criteria for holding the academic position "Professor" are met by the candidate, and many of them significantly exceed the minimum requirements regulated in the Regulations of the Council of Ministers for applications of the Act for the development of the academic staff in the Republic of Bulgaria, the Regulations for the development of the academic staff of BAS, and the Regulations for the specific conditions for awarding scientific degrees and occupying academic positions in IICT-BAS.

5. Critical remarks and recommendations

I have no critical remarks and recommendations to the candidate.

CONCLUSION

Based on the analysis of the presented materials for the competition, the significance of the scientific works and the scientific and scientific-applied contributions contained in them, I consider that Assoc. Prof. Kiril Alexiev fully meets the requirements of the Act for the development of the academic staff in the Republic of Bulgaria, the Regulations of the Council of Ministers for its applications, the Regulations for the development of the academic staff of BAS, and the Regulations for the specific conditions for awarding scientific degrees and occupying academic positions in IICT-BAS. He fulfills all the indicators, and according to

some of them significantly exceeds the minimum requirements for holding the academic position of "Professor".

On the basis of all this, I give a high evaluation of the candidate and would like to propose Assoc. Prof. Dr. Eng. Kiril Metodiev Alexiev to take the academic position of "Professor" in the professional field 5.2 Electrical Engineering, Electronics and Automation, specialty "Automated Systems for information processing and control".

27.10.2021 г.

Member of the scientific jury:

/Prof. Toshko Nenov, PhD/

