18.05.2024г.

ТЕХНИЧЕСКИ УНИВЕРСИТЕТ
Център за развитие на академичния състав
ВАРНА

# STATEMENT

for procedure for occupation of the academic position **"Professor"**

Professional Field: 5.2. Electrical Engineering, Electronics and Automation.
Scientific Specialty: Control of Technological Processes.
Published in SG : No. 14 from 16.02.2024

Candidate: **Assoc. Prof. Nikola Nikolov, PhD**

Member of the Scientific Jury: Prof. Michail Petrov, PhD

## 1. General characteristics of the candidate's scientific research and applied scientific activities

The candidate participates in the announced competition with a list of a total of 30 scientific works. There are 21 scientific publications and papers, which are referenced and indexed in world scientific data bases SCOPUS and Web of Science, and 9 scientific publications in non-referenced editions with scientific reviewing or in edited collective volumes. In the total number of works, he has a participation in a book that was published in the USA. It is evident of the scientific articles and papers submitted for the participation in the competition. 27 are in English and 3 are in Bulgarian. The candidate has 2 individual publications, in 10 publications the candidate is the first author, in 9 publications the candidate is the second author and in 5 publications he is the third author.

There are grouped 10 scientific publications, equivalent to a monograph work, which are in editions, referenced and indexed in world-scientific databases.

It is evident a reference list certifying the fulfillment of the minimum national requirements by the Regulations of the Law for the Development of the Academic Staff in Bulgaria and also the minimum requirements by the Regulations for the Terms and Conditions in Holding of Academic Positions of the Technical University Varna for occupying the academic position "professor". The reference list shows that the requirements for all groups of indicators have been overfilled: group A - 50 points; group B - 183 points; group Г - 245 points; group Д - 180 points; group E - 270 points; group Ж – 600 points (Total 1528 points, with 860 required).

The analysis of the presented materials shows that the requirements are covered according to the Law for the Development of the Academic Staff in Bulgaria, as well as the Regulations for Terms and Conditions in Holding of Academic Positions of the Technical University Varna.

## 2. Evaluation of teaching capabilities and activities of the candidate

Assoc. Prof. Nikolov has over 35 years of teaching experience at the Technical University of Varna, Department of Industrial Automation of the Faculty of Computer Sciences and Automation, consequently as assistant professor, senior assistant professor, chief assistant professor and associate professor. He has been an associate professor since 2013 and with a scientific degree PhD since 2009. A detailed reference list in the documentation for the competition is attached about the lectures given by Assoc. Prof. Nikolov during the last 3 years. According to the attached list, a horarium of lectures is evident in the teaching of several academic courses in the specialty "Industrial Automation": "Control of Technological Processes ", "Automated Electrical Drives", "Logical Control Systems", "Design of Automation Systems" etc.

From the attached reference list, it is evident that the applicant for the last 8 years has supervised 3 scientific or educational projects, he has participated as a researcher in 3 national scientific projects financed under European programs, as well as he has participated in internal scientific projects for TU-Varna. He has attracted funds for an infrastructure project supervised by him. He is the head of the Department of Industrial Automation from 2016 to the present.

In general, I assess positively the teaching capabilities and activities of the candidate and consider that, in terms of quality and content, it meets the objectives of the competition.

**3. General scientific and applied scientific contributions**

The candidate's scientific works obtain many important scientific, scientific-applied and applied contributions in terms of their significance and number. They correspond to the scientific specialty of the competition and include the development of modern control methods of process control, and in particular in the field of: Algorithms of Adaptive Observation, Control Systems, Communication Networks in Control Systems, Engineering Practices in See Facilities, etc.

I accept the candidate's pretensions for contributions in the 10 scientific works included as equivalent to a monographic work (section B.4.) on the topic "Control and Management of Technological Processes and Devices", as follows:

Scientific contributions:

- It has been developed an algorithm for modal control (SMC) of SISO linear stationary discrete systems, which calculates the elements of the feedback vector for a SISO system with a modal discrete state controller, so that the poles of the closed system simultaneously to satisfy the requirements for degree of stability, degree of fluctuation of the transient responses in the discrete system and also are not multiples. [B.4.1.].

Scientific-applied contributions:

- They have been developed adaptive structures of linear discrete control systems with algorithms for modal control of SISO objects with different interpretations of the modal controller [B.4.2., B.4.3., B.4.4.].

- It is proposed a methodology for measuring the attenuation and phase shift of the electromagnetic wave when measuring moisture and thickness of bulk materials from an agro-industrial complex. [B.4.6., B.4.7., B.4.8.].

Applied contributions:

- It was developed a technological scheme and an control algorithm of a combined local system for joint purification of drinking water from iron and arsenic with limitation of the level of harmful substances in rinse water. [B.4.5.]

- They are made resource tests on a roller mill and vertical washing machines; the experimental data are processed and they are proposed measures for technical monitoring and diagnostics of the equipment. [B.4.9.]

- A variant to control the thrusters of a remotely operated underwater vehicle ROV using a discrete modal state controller has been developed. [B.4.10.]

In general, the contributions in the remaining 20 scientific works outside the monographic set (sections Г.7. and Г.8.) can be summarized in the following groups:

Scientific contributions:

- An adaptive observation algorithm with reduced computational complexity for the initial parameter estimation of SISO linear stationary discrete systems based on the method of least squares is developed. [Г.7.7.].

Scientific-applied contributions:

- New variants of recursive and non-recursive algorithms have been developed for adaptive observation of SISO linear stationary discrete systems, based on the least squares method and method of instrumental variables. A recursive evaluation library has been created. [Г.7.3., Г.7.10., Г.7.4., Г.7.11.]

- New schematic solutions of control systems have been developed: adaptive two-position control system; nonlinear SISO system with a fuzzy controller based on the Takagi-Sugeno mechanism; a system with a Smith predictor as a state controller; control systems with state controllers based on PLCs. [Г.7.8., Г.8.2., Г.8.7., Г.8.8., Г.8.9.].

- In the field of communication networks in control systems, a lightweight underwater network architecture (LUNA) has been developed for remote control communication of a tethered underwater ROV vehicle. [Г.7.9.].

- Engineering solutions have been developed in control of various marine resources (biological objects): identification of parameters of biological objects in the von Bertalanffy equation; models for describing the length-weight relationship of biological objects; a normal distribution in experimentally taken frequency samples from two types of biological objects has been proven and investigated. [Г.7.5., Г.7.6., Г.8.3., Г.8.4.].

Applied Contributions:

- It has been developed a schematic solution of a two-position SISO object control system adapting to disturbances. [Г.7.8.]

- Variants of control systems with state regulators based on PLCs are proposed. [Г.8.7., Г.8.9.]

- It is proposed a block diagram of a stock control system of a biological object under conditions of uncertainty using a protective approach. [Г.8.5., Г.7.1., Г.7.2.]

- It is developed a MATLAB-based stand-alone application, specifically designed for the purpose of the fish stock assessment procedure. [Г.8.6.]

In general, the indicated contributions, are the applicant's personal work, certified by a declaration of originality and a declaration of plagiarism.

The total number of citations of the candidate's scientific works is 18. They are distributed as follows: citations or reviews in scientific publications, referenced and indexed in world-scientific databases or in monographs and collective works - 15; citations in monographs and collective volumes with scientific reviews – 1; citations or reviews in non-indexed journals - 2.

**4. Significance of the contributions to science and practice.**

The presented publications of the candidate Assoc. Prof. Nikolov are specifically aimed at modern process control methods. A major part of the research is related to solving tasks for synthesis, numerical modeling, simulation, analysis and visualization of new classes of control systems. The main goal is to bring these systems into the class of control systems with adaptive features.

The main part of the scientific and scientific-applied research reflected in the publications was initiated by the needs of practice and is directly aimed at the control of technological processes. The collection of publications united as a monograph set represents a comprehensive study in which a complete approach to „Control and Management of Technological Processes and Devices" has been developed, in which have been obtained original results.

Assoc. Prof. Nikolov has taught a large number of lecture courses in the field of professional field. He has supervised 4 PhD students, one of whom has been defended, two have been awarded with the right to defend and one is in the process of training.

It should be noted that the quantitative and qualitative indicators of the criteria for occupying the academic position "Professor" have been exceeded by the candidate. In general,

with his scientific production and contributions, the candidate is popular among the scientific community at home and abroad.

**5. Critical notes and recommendations**

I have no significant critical comments on the scientific works submitted by the candidate.

The proposed reference list for the contributions in the works of Assoc. Prof. Nikolov has been expanded to a certain extent. A shorter systematization and summarization is possible on the basis of the attached substantive abstracts of the publications. In this case, this is a natural result, considering the topic of the candidate's scientific publications and the teamwork of the developments. This note is essentially of a recommendatory nature and do not affect the results achieved by the candidate in his scientific and scientific-applied activities.

**CONCLUSION**

I would like to give a positive assessment to the materials submitted by the candidate. I believe that they satisfy the requirements of the the Law for the Development of the Academic Staff, the Regulations for its implementation, the Regulations of TU Varna for the terms and conditions for occupying the academic position of professor. I evaluate the scientific and scientific-applied contributions in the candidate's scientific works as significant for the scientific-research practice and the educational process. Therefore, I find it reasonable to propose Assoc. Prof. Eng. Nikola Nikolov, PhD for the academic position of "Professor" in the professional field 5.2. Electrical Engineering, Electronics and Automation (specialty Control of Technological Processes).

Заличена информация
по Регламент (ЕС)
2016/679

Date,
15.06.2024

**SCIENTIFIC JURY M**

/Prof. Dr. Michail Petrov/