

## OPINION

regarding the competition for the academic position of "associate professor" in the professional field 5.1 Mechanical Engineering, scientific specialty "Robots and Manipulators" (Electronic Control and Power Supply Systems in Service Robotics), announced in the State Gazette, No. 61/29.07.2025, for the needs of the Institute of Robotics "St. Ap. and Ev. Matey" at the Bulgarian Academy of Sciences, section "RIMIS", laboratory "NRAIL", with candidate Chief Assistant Professor Dr. Eng. Yassen Kirov Paunski.

Member of the scientific jury: Prof. Dr. Eng. Anatoly Trifonov Alexandrov (according to Order No. 117/29.09.2025 of the Director of IR - BAS).

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

Chief Assistant Prof. Dr. Yassen Paunski participates in the competition for the academic position of "associate professor" with 24 scientific works, including one monograph (B3), nine scientific publications (G7.1 – G7.9) in publications referenced and indexed in world-renowned scientific information databases (Scopus), and 14 scientific publications (G8.1 – G8.14) in non-referenced peer-reviewed journals or in edited collective volumes.

The publications can be classified as follows:

- By place of publication: reports in proceedings of international scientific conferences abroad – 3 [G7.4, G7.5, G7.8]; articles in foreign magazines and journals – 4 [G7.7, G7.9, G8.9, G8.10]; articles in national magazines – 14 [G7.1; G7.2; G8.1-G8.8; G8.11-G8.14]; reports in proceedings of international scientific conferences in Bulgaria – 2 [G7.3, G7.6].

- By language: in English – 19 [G7.1 – G7.9, G8.1 – G8.3, G8.8 - G8.14]; in Bulgarian – 4 [G8.4 – G8.7].

- By number of co-authors: solo – 1 [G7.1]; with one co-author – 5 [G7.6, G7.9, G8.1, G8.2, G8.3]; with two co-authors – 1 item [G8.4]; with three or more co-authors – 16 items [G7.2 - G7.5, G7.7, G7.8, G8.5 – G8.14]. In 5 of the publications, Dr. Yassen Paunski is the first among the co-authors and is the author of the published monograph.

Chief Assistant Prof. Dr. Yassen Paunski meets and, according to specific indicators, exceeds the minimum national requirements. He defended his dissertation on the topic: "Research, modeling, and implementation of a class of microprocessor systems based on modern RISC architectures for controlling mobile service robots," professional field 5.2 Electrical Engineering, Electronics and Automation, scientific specialty "Robots and Manipulators", diploma No. 001060/15.08.2018 (indicator A – 50 points). He has submitted a habilitation thesis – a monograph on the topic: "Power supply and drive systems for mobile robots" (ISBN: 978-619-93266-1-9) (indicator B.3 – 100 points), 23 scientific publications (indicator D – 211.4 points), of which nine scientific publications in editions referenced and indexed in world-renowned scientific information databases (Scopus) (indicator D7 - 125.7 points), 14 scientific publications in non-referenced peer-reviewed journals or in edited collective volumes (indicator D8 - 85.7 points), seven citations (indicator E - 70 points).

The candidate has a high level of scientific and implementation activity, according to the submitted report on scientific research activity, Chief Assistant Prof. Dr. Yassen Paunski has participated in 14 contracts, with the total financial value of 5 of the projects amounting to BGN 168,439. He has an h-index of 5.

### 2. Assessment of the candidate's activity

During the period 1996-2001, Yassen Paunski obtained a higher education degree from Sofia University "St. Kliment Ohridski", a Master's degree, majoring in Engineering Physics



specializing in Medical Physics, and in 2018, a Doctor of Science degree from the Institute of Robotics at the Bulgarian Academy of Sciences.

Yasen Paunski has worked as a physicist in the Nonlinear Optics Laboratory at Sofia University "St. Kliment Ohridski", as an electronics engineer at MDM-97 Ltd., and as technical director and partner at Pixeye Ltd. Since 2017, he has been a chief assistant and head of the Electronics Department at the National Laboratory of Robotics and Artificial Intelligence at the Institute of Robotics at the Bulgarian Academy of Sciences.

Chief Assistant Prof. Dr. Yasen Kirov Paunski taught a course on "Microelectronics and Robotics" for 10th-grade students at the "Professional High School of Computer Programming and Innovation" in Burgas in 2025. He has participated in various public events (lectures, seminars, TV shows) related to service robotics and the training of specialists in the field.

Dr. Paunski is a member and co-founder of the Bulgarian Robotics Forum and head of the robotics club established at Pixeye Ltd. in Sofia (2007-2010). He won a gold medal at the 2008 International Autumn Fair in Plovdiv for the PIXEYE IP series of video surveillance cameras. The above information provides a basis for assessing the work of the Chief Assistant. Prof. Dr. Paunski is very good.

### **3. Main scientific-applied contributions**

I accept the contributions formulated in the presented works. They are of a scientific-applied nature, focusing on proving significant new aspects of existing scientific problems using new means, and obtaining confirmatory facts in the field of electronic control and power supply systems for service robotics.

#### **3.1. Contributions in the habilitation thesis – monograph**

- Contributions in the field of educational and applied service robotics

A new educational specialty in robotics has been created. A state educational standard (SES) and teaching documentation (curriculum, syllabus, examination program) have been developed for Bulgaria's first major in "Robot Programming," which prepares future engineers and programmers capable of working with new-generation robotic systems.

- Contributions in the field of power supply and drive systems for mobile robots

The application of hydrogen fuel cells and lithium-ion batteries as power sources for service robots has been examined. The following are proposed: an innovative power supply system for service robots based on a hydrogen fuel cell, which allows for increased operating time without the need for frequent recharging; an integrated power management system for mobile service robots with lithium-ion batteries, built on a modular principle, which ensures reliable and efficient operation.

#### **3.2. Contributions in publications, other than those equivalent to a habilitation thesis**

- Contributions in the field of educational and applied service robotics

- A series of educational service robots, "Bebot & Maxibot," has been designed and developed for use in education and social pedagogy. They are built based on an open-access modular architecture, which allows the design and control systems to be adapted to specific needs. The robots have a built-in interface for program control (G7.4, G7.8, G7.9, G8.1, G8.10, and G8.12).

- The "Spartak" transport and logistics robot has been designed and implemented, featuring innovative architecture and high adaptability. The robot uses four-wheel drive (4WD) with hub motors. The operating system provides an open environment for development and functionality expansion. The robot is designed to transport loads of up to 100 kg, combining flexibility, autonomy, and the ability to integrate into intelligent logistics systems (G7.3).



- A cyber-physical system has been created to support the education of children, including those with special educational needs. It improves teacher-student communication by using the robot as an intermediary in the educational process. The developed system can also be applied in the field of social services (G7.5, G7.8, G8.2, G8.7, G8.9 - G8.11, G8.14).

- A system for controlling mobile service robots with low latency has been developed, ensuring effective operation in remote and hard-to-reach conditions using latest-generation mobile networks (4G and 5G) and high-speed wireless standards (Wi-Fi). A method for evaluating the speed and time delay of the communication channel using the Robot Operating System (ROS) has been created (G7.3, G8.4 - G8.6).

- Contributions in the field of power supply and drive systems for mobile robots

- Power management in mobile service robots based on lithium-ion batteries has been designed and implemented. The control system ensures safe and reliable battery operation in various operating modes and allows real-time monitoring of the robot's energy consumption and optimization of its efficiency (G7.6, G8.3, and G8.13).

- A power supply system for service robots based on hydrogen fuel cells has been implemented. It offers a sustainable and reliable energy supply, enabling robots to be environmentally friendly, autonomous, and have a long operating time without the need for frequent recharging (G7.1, G7.2).

- Contributions in the field of medical robotics and biophysical research

- Unique scientific equipment has been designed and developed – a tribometer for measuring tiny friction forces (of the order of mN) between moving surfaces. The device enables the study of the characteristics of various contact lenses and moisturizing preparations used in ophthalmology (G7.7).

- A control system has been developed for an innovative elbow orthosis based on electromyography (EMG) signals from the active muscles of the arm. An algorithm for signal filtering has been created, and a control panel has been built. The elbow orthosis has been submitted for patenting (G8.8).

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

The significance of the candidate's contributions is assessed based on the citations listed in the competition documents. A list of 7 citations in scientific publications, referenced and indexed in world-renowned scientific information databases, is presented, with publication G8.9 cited 3 times. That leads me to conclude that Chief Assistant Prof. Dr. Yassen Paunski is a well-known author and has published in significant scientific forums in the field of competition.

#### **5. Critical comments and recommendations**

I found no significant omissions in the works of Chief Assistant Prof. Dr. Yassen Paunski. I believe that contributions can be summarized. I recommend preparing publications with IF, independent publications, and conducting a teaching process.

#### **CONCLUSION**

In conclusion, I can give a positive assessment of the overall scientific research and pedagogical activity of Chief Assistant Prof. Dr. Yassen Paunski, who fully meets the requirements for the academic position of "associate professor." Sufficient and significant scientific and applied contributions have been made.

Based on my review of the scientific works presented, their significance, and the scientific-applied contributions they contain, I find it reasonable to propose that Chief Assistant Prof. Dr. Yassen Kirov Paunski to occupy the academic position of "associate professor" in professional field

5.1 Mechanical Engineering, scientific specialty "Robots and Manipulators" (Electronic Control and Power Supply Systems in Service Robotics).

Date: 15.10.2025 г.

Member of the Scientific Jury:  
/Prof. A. Aleksandrov/