

## REVIEW

on the competition for the academic position of "Associate Professor" in the section "Sensors and Measurement Technologies in Robotics and Mechatronics" of the Institute of Robotics in the professional field 5.2. "Electrical Engineering, Electronics and Automation", scientific specialty "Elements and Devices of Automation and Computing". The competition was announced in the "State Gazette", issue 51 of 05.06.2026.

candidate: Svetoslav Atanasov Noykov, M.Sc. Ph.D.

Reviewer: Prof. Dr. Eng. Nikola Vichev Kolev, Doctor of Sciences, member of the jury, according to Order No. 105/07.08.2026 of the Director of the Institute of Robotics at the Bulgarian Academy of Sciences.

### 1. General information and biographical data

The candidate for the competition, Dr. Svetoslav Atanasov Noykov, was born in 1965 and graduated from the Master's course at the Tula Polytechnic Institute in Russia in 1995. Since then, he has worked in institutes of the Bulgarian Academy of Sciences, reorganized over time, and has been engaged in scientific research. In 2004, Eng. Noykov defended a dissertation on the topic "Hardware and software tools for processing sensory information when studying the environment using a class of mobile robots" and received the educational and scientific degree "Doctor". His total work experience in the specialty is 30 years, and he qualified in the field of robotics. From the author's report on the fulfillment of the minimum requirements for the candidate in the competition, I found that Dr. Noykov has collected 698.7 points with a required minimum of 400 points, according to the Regulations of the Bulgarian Academy of Sciences. The candidate has registered 8 inventions and 22 citations of his publications and author's certificates for inventions. Dr. Noykov is the only candidate and has submitted his documents for the competition within the legal deadline.

### 2. General description of the submitted materials

The candidate in the competition for the academic position of "associate professor" Dr. Noykov has submitted the following materials: an application to the Director of the Institute; a CV; copies of the diploma for the educational and scientific degree of "doctor", a list of 10 systematized publications with the qualities of a monographic work, lists of scientific works in specialized scientific publications; separate copies of the scientific publications for participation in the competition; an author's reference for citations of his works; an author's reference for scientific and applied scientific contributions, a reference for compliance of the candidate's materials with the minimum requirements for candidates for the academic position of "associate professor", according to the Appendix of the PURZAD of the Bulgarian Academy of Sciences.

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

The candidate in the competition Svetoslav Noykov has worked in the field of robotics throughout his working life, engaging in service, development and research activities. For participation in the competition, he has submitted for review 37 scientific papers outside the publications on the dissertation and 8 certificates of invention. In 2 of the scientific papers, Dr. Noykov is the sole author, and in 8 – the first author, which is a reason to assume that he is at the heart of the developments. The achieved results and scientific contributions in these publications as a participant in scientific projects are the result of the work of Dr. Noykov in the research projects implemented in institutes of the Bulgarian Academy of Sciences with the active participation of the candidate in the competition. The ten publications on the topic "Magnetometric systems with scanning effect" include, created by a team with the participation of Dr. Noykov, 2 D and 3D magnetometers based on the Hall effect, for registering more than one component of the magnetic field. The goal of creating magnetometers with a high degree of minimization of the dimensions of the sensors and high resolution of the readings at precise angular displacements has been achieved. The Hall effect sensors and systems created by Dr. Noykov and his team enrich the application of the Hall effect with a variety of solutions Improving accuracy and functionality is essential for increasing the efficiency of robotic systems and is an element of the candidate's research activity in the competition. The development and application of robotic magnetometers determine their increasingly widespread participation in instrument-making and play a key role in the improvement of robots for precise displacements. Thus, Dr. Noykov has fulfilled the requirement of Art. 29(1), item 3 of the Regulations, by presenting 10 publications equivalent to a monographic work, indexed in the global Scopus and WoS evaluation systems. In his remaining works and in the eight inventions, solutions are proposed for ensuring autonomous operation of mobile service robots under battery power when using technologies in special education and in practice. A place is allocated in the publications for assessing the ability of autonomous transport and for assessing the transport capabilities when creating robots for two-axis and three-axis movement. The results of these scientific works, in addition to those with the qualities of a monograph, and from the inventions, are in the field of studying magnetic materials and in the use of planar magnetotransistors and three-contact planar Hall sensors. The candidate in the competition relies in his research program on the development of new types of sensors for pressure, light and chemical compositions, including a silicon double Hall element with orthogonal activation and with compensation for temperature drift. In new developments, a linear dependence of the Hall potential on the magnetic field of the boundary surface of the Hall element has been established. He offers solutions for creating new algorithms for metamorphic robotic systems (called multi-agent systems) with diverse applications, including - building lattice maps and new architectures of information-control systems for laboratory autonomous robots. Dr. Noykov and his team have developed a new mobile robot LAMOR and have

also created an information-control system for intelligent control of an autonomous robot with the ability to precisely control the trajectory of movement. The control of three-wheeled robots and a complex of robots for performing navigation tasks is proposed, as well as a robot with a scanning ultrasonic rangefinder. Dr. Noykov proposes to use odometry in mobile robotics, which would reduce systematic errors in the movement of robotic systems with differential drive. This area of application also includes developments for estimating the relative position of a complex of robots using a precise rangefinder and in controlling a stepper motor. Developments are also proposed to support the construction of innovative learning environments using three-axis magnetometers for 3D measurement of magnetic fields. A significant contribution of the candidate to the competition are also the recognized inventions that cover the creation.

#### **4. Main scientific and applied scientific contributions**

I support the author's reference for the contributions by presenting the contributions of the candidate in the competition in a systematic manner:

1. A method for measuring the components of the magnetic field is proposed, in which the same sensor area is used, and on its basis a 3D magnetometer based on the Hall effect and operating on a scanning principle is developed. The magnetometer contains a sensor element and an interface electronic circuit for extracting and processing information, in which relevant sensor architectures are implemented [B4-1];
2. A class of 2D magnetometers with a scanning principle of operation, based on the Hall effect, has been created, in which measurement of the modulus and direction of the magnetic field vector lying in the sensor plane has been achieved, with high spatial resolution, accuracy and speed, as well as interface electronic circuits for magnetometers, whose functions include controlling the operation of microsensors and extracting and subsequent processing of the signals generated by them [B4-2, E26-3, E26-7];
3. A 3D magnetometer has been created, using the principle of sequential measurement of the three components of the magnetic field vector, containing a 6-contact sensor element based on the Hall effect and an interface electronic circuit for extracting and processing sensor information [B4-3, B4-7];
4. A multisensor for temperature and sequential measurement of the three orthogonal components of the magnetic field has been created. The sensor element contains seven contacts, four of which serve as outputs for sequential measurement of the magnetic field components [B4-6, B4-8];
5. A 2D magnetometer has been created for simultaneous measurement of two of the magnetic field components, in which an original concept for coupling two identical three-contact (3C) Hall microsensors with planar magnetic susceptibility, located at right angles and integrated into the same chip, has been applied [B4-5, B4-9, B4-10];

6. A working version of a system for local control of a three-wheeled mobile robot with differential drive has been created, the system being implemented in the laboratory mobile robot LAMOR and the conducted field experiments establish the operability of the system in shaping the behavior of the mobile robot LAMOR in a laboratory environment with obstacles [G8-1, G8-2, , G8-3, G8-4, G8-5, G8-6].
7. An algorithm for controlling the movement of a mobile robot when exploring environments including unknown objects has been developed, based on which the algorithm controls the robot along a pre-planned path [G8-2, G8-8, G8-9].
8. Modules have been created for the study of magnetic materials based on Hall sensors, in which a method for dynamic compensation of offset and noise for this type of sensors has been applied for the first time [G7-1, G7-2, G7-4, E26-2];
9. An interface electronic system has been developed for controlling Hall effect-based microsensors with a ring structure, as a result of processing the signals extracted from the microsensor, the full information about the magnetic field vector is obtained in explicit form [G8-18, E26-8].

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

The significance of the created models, devices and robotic systems is undeniable, because they offer complete technical developments, some of which have been implemented in practice in the implementation of scientific projects and contracts. The sensors and systems created by Dr. Noykov enrich the application of the Hall effect with diverse technical solutions with multidisciplinary applicability. The works of the candidate in the competition are prepared qualitatively, with an extensive literary justification, analytical part and conclusions.

#### **6. Critical notes and recommendations**

1. The author's reference for the contributions with scientific works and inventions is verbose.

#### **7. Personal impressions and opinion of the reviewer**

I do not know Dr. Noykov, but from the publications I was impressed by the in-depth knowledge of the processes that he has researched in order to prove his theses and achieve complete technical solutions. I positively assess the results of the candidate's developments, included in the scientific publications with which the candidate participates in the competition, as well as the knowledge and experience gained at the Institute of Robotics at the Bulgarian Academy of Sciences. I note that the candidate in the competition has no proven plagiarism in scientific works (Art. 24. para. 5 of the Law on the Protection of Scientific and Technological Resources of the Republic of Bulgaria). I have no common publications with Dr. Noykov and I am not a person related to him within the meaning of paragraph 1, item 5 of the Additional Provisions of the Law on the Protection of Scientific and Technological Resources of the Republic of Bulgaria.

## 8. CONCLUSION

Based on the familiarization with the materials presented by the candidate in the competition (biography, scientific papers, patents, participation in projects and contracts, their significance, the scientific and scientific-applied contributions contained therein), I find it reasonable to propose to the Scientific Jury to make a positive decision on the election of Dr. Svetoslav Atanasov Noykov as "Associate Professor", and to propose to the Scientific Council of the Institute of Robotics at the Bulgarian Academy of Sciences that he be elected to occupy the academic position of "Associate Professor" in the professional field 5.2. "Electrical Engineering, Electronics and Automation", scientific specialty "Elements and Devices of Automation and Computing" in the section "Sensors and Measurement Technologies in Robotics and Mechatronics" of the Institute of Robotics at the Bulgarian Academy of Sciences.

Sofia

05.09.2026

Reviewer: Prof. Dr. Eng. Nikola V. Kolev, 05

Doctor of Sciences