

REVIEW

by Prof. Evelina Nikolova Pencheva, D.Sc. (Mathematics), "Todor Kableshev" University of Transport of the materials submitted for the competition for the academic position of "Professor" at the Technical University of Gabrovo

Higher Education Area: 5. Technical Sciences

Professional Field: 5.3 Communication and Computer Engineering

Specialty: Automated Information Processing and Control Systems

Assoc. Prof. Rosen Stefanov Ivanov, PhD, Eng. is participating as a candidate in the competition for the position of Professor, announced in the State Gazette (Issue No. 61 of July 3, 2026) and on the website of the Technical University of Gabrovo, to meet the staffing needs of the Computer Systems and Technologies Department within the Faculty of Electrical Engineering and Electronics.

1. Brief biographical details

The sole candidate in the competition, Rosen Stefanov Ivanov, holds a Master's degree in Electronic Engineering and Microelectronics from the Technical University of Gabrovo (1990). He defended his doctoral dissertation, titled "Methods and Algorithms for Improving the Noise Immunity of Distributed Speech Recognition Systems," at the Technical University of Sofia in 2001. He was appointed as an Associate Professor in 2005 (Act No. 117 / 19.04.2005) and currently holds this position.

2. General description of the submitted materials

All documents required by the procedure have been submitted for participation in the competition, including: copies of educational qualification degrees; a certificate of the academic rank of "Associate Professor"; a curriculum vitae; a list of scientific works for the competition; copies of all scientific works; a list of citations and reviews; information on impact factor and quartile; an author's summary; a habilitation summary; summaries of works by thematic area; publication abstracts; a declaration of authenticity; a report on participation in and supervision of research projects; a report on a supervised PhD student who successfully defended her thesis; and a report on compliance with minimum requirements (national and defined by TU-Gabrovo).

For this competition, the candidate submits the following:

- under Indicator Group A.1: Dissertation for the award of the educational and scientific degree of "Doctor"
- under Indicator Group C.4: 12 sole-authored publications indexed in Scopus and Web of Science, 6 of which are in journals with impact factor;
- under Indicator Group D.5: a published monograph (not submitted as the primary habilitation thesis) titled "Methods and Algorithms for Intelligent Localization and Navigation in Indoor and Outdoor Environments" (2026);
- under Indicator Group D.7: six publications indexed in Scopus and Web of Science—one of which appeared in a journal with an impact rank—comprising five co-authored with one other person and one co-authored with two others;

- under Indicator Group D.8: 17 publications in peer-reviewed, non-indexed journals or edited collective volumes—comprising 12 single-authored works, four co-authored with one other person, and one co-authored with three others;
- under Indicator Group E12: six publications with a total of 127 citations;
- under Indicator Group E13: 34 reviews for journals with an impact factor;
- under Indicator Group F.17: supervision of one PhD student who successfully defended her thesis;
- under Indicator Group F.18: participation in five national scientific and educational-scientific projects;
- under Indicator Group F.20: leadership of five institutional research projects;
- under Indicator Group F.23: five textbooks covering subjects taught by the candidate, all of which are single-authored;
- under Indicator Group F.24: a published university study guide.

Table 1 shows the compliance of the candidate, Assoc. Prof. Dr. Eng. Rosen Ivanov, with the minimal national requirements for the academic position of "Professor."

Table 1. Compliance of the candidate with the minimal national requirements for the academic position of "Professor"

Indicator Groups	Indicator	Minimal national requirements	Achieved by the candidate
A	A.1	50	50
B	B.2	-	-
C	C4	100	720
D	D.5, D.7, D.8	200	428.33
E	E.12, E.13	100	1610
F	F.17, F.18, F.20, F.23, F.24	150	410

3. Impact of the candidate's scientific publications on the scientific community (known citations)

As to June 13, 2026, a total of 127 citations have been recorded for 6 of the publications included in the candidate's application, along with 34 reviews for journals with an impact factor; this significantly exceeds the minimal requirements (totaling 1,610 points). All citations originate from publications indexed in Scopus and/or Web of Science.

The candidate's total citation count is 509. The Scopus H-index is 9. The high citation rate of the candidate's works demonstrates that his research activity holds significant influence, visibility, and authority within the relevant scientific field. The substantial number of citations testifies to the fact that his contributions serve as a key indicator of the quality and relevance of his research.

Table 2 shows the extent to which the candidate for the academic position of "Professor" meets the minimal requirements of TU-Gabrovo regarding research and teaching activities.

Table 2. Compliance of the candidate with the minimal requirements of TU-Gabrovo for the academic position of "Professor"

Content	Minimal national requirements	Achieved by the candidate
Total number of publications	30, of which at least 5 are as sole author and 3 have an Impact Factor (WoS)	35, of which 24 are independent and 6 have an Impact Factor (WoS)
Number of known citations by other authors and reviewers	20	161
Published textbooks/books	2	5
Published teaching aids	-	1
Number of PhD students who have successfully defended their theses	1	1
Management of projects and/or contracts involving external funding	3	5

4. Overview of the content and results in the submitted works

The candidate's research spans three areas.

4.1 Outdoor navigation and positioning systems

The research in this area focuses on the development of outdoor navigation and positioning systems, particularly for resource-constrained mobile platforms and for visually impaired users. One of the initial contributions in this field is the integration of GPS with mobile networks, enabling automatic vehicle tracking, remote speed control, and voice notifications. This lays the groundwork for developing a Java-based mobile application for the visually impaired, featuring support for an external Bluetooth GPS receiver, Bulgarian-language voice control, and an emergency SOS mode. The application employs a voice guidance algorithm that uses a Kalman filter to reduce GPS data errors and dynamically adjusts routes. Parallel studies introduce a real-time trajectory simplification algorithm that adapts to movement speed and reduces the number of GPS points by factor of 15. A later version of this method—the real-time trajectory simplification algorithm—compresses data files by more than 30 times while automatically identifying critical points along the path, enabling direct navigation without the need for prior route conversion.

4.2 Indoor Navigation and Positioning Systems

The research focuses on developing accessible indoor navigation and positioning systems specifically designed to facilitate the mobility of visually impaired individuals. A new, lightweight navigation system utilizing NFC and RFID technologies has been developed; it provides voice guidance in Bulgarian, helping users build mental maps of their surroundings. This context-aware navigation system employs 4D building modeling, rich semantic data, and multi-parameter route planning to

enable automatic path recalculation. To improve upon traditional graph-based models, a three-stage strategy (ranging from general to detailed levels) has been implemented, incorporating Building Information Modeling (BIM) to manage detailed route finding and avoid both static and dynamic obstacles. Within this framework, an algorithm based on a hierarchical directed multigraph successfully identifies "K-shortest" paths in multi-story buildings faster and with lower memory usage than Yen's algorithm. An algorithm for micro-localization in large public buildings has also been developed, combining BLE beacons, NFC tags, and BIM data to achieve positioning error of less than 1.5 meters. An adaptive signal preprocessing algorithm has been developed, enabling sub-meter accuracy even with low-power devices, alongside a fuzzy logic algorithm to optimize the cost-accuracy ratio when selecting beacons. A comprehensive solution for optimal sensor placement has been proposed; it divides spaces into zones and accounts for static obstacles to ensure effective positioning.

4.3 Context-aware, IoT-based, and personalized systems and services

The research focuses on developing intelligent systems that utilize IoT, geofencing, microservices, and artificial intelligence technologies, with applications in museums, healthcare, and human-environment interaction. Key achievements include the creation of a mobile service featuring NFC functionality and a contactless tactile interface—highly rated by visually impaired users—as well as the refinement of methods for delivering personalized content in museum settings. Distributed and cloud architecture principles have been applied in healthcare through a real-time medication intake monitoring web service that checks for drug incompatibilities using RESTful services and a NoSQL database. This approach was further developed into a pregnancy monitoring system that employs microservices, a message broker, and a wireless sensor network to analyze physiological data and notify medical staff of high-risk symptoms. The system is based on an energy-efficient hardware platform (IoT) built around the ESP32 microcontroller, which enters deep-sleep mode between periodic data transmissions to the cloud for visualization purposes.

5. General overview of the candidate's activities

5.1. Educational and pedagogical activities (work with students and doctoral candidates)

The candidate has demonstrated intensive and diverse teaching experience that fully meets and exceeds the requirements for the academic position of "Professor."

The candidate served as an academic supervisor for a doctoral student who successfully defended her thesis—Dr. Eng. Viktoriya Tsvetanova Valkova—in the field of higher education 5. Technical Sciences, professional field 5.3 Communication and Computer Engineering, within the doctoral program "Automated Information Processing and Control Systems" at the Department of Computer Systems and Technologies. The topic of the defended dissertation is "Development and Investigation of a Service for Delivering Personalized Content to Open-Air Museum Visitors."

He has delivered lecture courses to students and authored textbooks for the following subjects:

- "Network Programming"
- "JavaScript – Introduction to Programming"
- "Knowledge Discovery from Data"

- "Mobile Device Programming"
- "Distributed Systems Programming"

He has conducted laboratory sessions and authored a manual on "Non-relational Databases," which has been published in electronic format.

The lecture courses cover key and modern areas of computer science, such as mobile programming, distributed systems, and knowledge discovery. This demonstrates a high level of expertise and the currency of the candidate's teaching capabilities. The textbooks written for the five lecture courses and the electronic manual for laboratory exercises on non-relational databases provide a solid methodological foundation for students. Combining lectures with practical exercises and electronic resources facilitates student access to modern technological solutions (such as NoSQL databases and JavaScript).

5.2. Scientific and applied research activities

Participation in and leadership of research projects are key scientific indicators for appointment to the academic position of "Professor" in Bulgaria, in accordance with the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB). The candidate has participated in four national research or educational projects funded by TU-Gabrovo and one research project funded by the Scientific Research Fund of the Ministry of Education and Science. He has led five research projects funded by TU-Gabrovo.

The described profile—participation in five projects (institutional and national) and leadership of five institutional projects—demonstrates significant administrative and research experience.

Leading university projects demonstrates leadership qualities and the ability to manage teams, plan budgets, allocate tasks, manage schedules, and take responsibility for final reports. The successful management of five such projects indicates consistency and a sustained commitment to the priorities of TU-Gabrovo.

The participation in five research projects (at both institutional and national levels) balances the candidate's profile by demonstrating the ability to work within larger teams and in highly competitive environments. These activities attest to the fact that the candidate is a valued expert in their field and capable of successful collaboration with other leading researchers. Participation in a project funded by the National Science Fund serves as a testament to the high quality and relevance of the candidate's research, while also expanding his network of contacts and visibility within the scientific community.

6. Contributions (scientific, scientific-applied, and applied)

Scientific and scientific-applied contributions

- Innovative assistive interfaces: A mobile service with NFC functionality and a contactless tactile interface has been developed, contributing to the field of Human-Computer Interaction by introducing new ways for visually impaired individuals to interact with the physical environment.
- Context-aware, personalized content delivery: Methodologies for dynamic and personalized content delivery in the cultural heritage and museum sectors have been enhanced through the use of geofencing and IoT technologies.

- Architectural integration in healthcare IoT systems: Architectural frameworks have been created that successfully link microservices, message brokers, and wireless sensor networks (WSNs) to enable real-time physiological data analysis and the generation of predictive medical alerts.
- Energy-efficient edge computing models: A scheduling model has been formulated for deep-sleep modes and periodic cloud data transmission for ESP32-based edge devices, optimizing the balance between continuous health monitoring and low energy consumption.

Applied Contributions

- Validated Assistive Technology: Created and tested in a real environment, it is a mobile service that has received high ratings for usability from visually impaired people, proving its practical utility and accessibility.
- Personalization systems in museums: Intelligent systems have been implemented in museum environments to increase visitor engagement by providing content based on the user's location and individual preferences.
- Real-time Medication Safety Tool: A working web service has been developed using a RESTful API and a NoSQL database to verify drug compatibility and prevent adverse drug interactions in real-time.
- Proactive Maternal Health Monitoring System: A functional pregnancy tracking system has been created that integrates low-cost IoT hardware (ESP32) with a cloud-based visualization dashboard, providing medical staff with early warnings about risky symptoms.

7. Evaluation of the candidate's personal contribution

Based on the provided documents, the personal contribution of the candidate for professorship is extremely high, dominant and fully consistent with holding the academic position of "professor". The candidate is the first author in 31 of the total 35 publications (88.57%) and as the lead researcher has main credit for the concept, experiments and writing of the scientific papers. The greater part of the works (68.57%), namely 24 publications, were written entirely by himself only. The high percentage of independent works is an indisputable certificate that the candidate is an established scientist who can develop scientific directions independently.

The scientific production has very good visibility in the global scientific community. More than half of all publications, namely 18, are indexed in the most prestigious international databases, which guarantees strict anonymous reviews and high quality of materials. Six articles have impact factor, which means that the candidate publishes in authoritative international publications that determine the trends in the relevant scientific field. Fourteen publications have been published in foreign journals or scientific conferences, which proves that the candidate's research goes beyond the local context and is convertible at global level.

8. Critical remarks and recommendations

I have no significant critical remarks regarding the materials submitted for the competition. The candidate's scientific works are excellently structured, methodologically sound, and clearly demonstrate a significant contribution to the field. Consequently, the absence of remarks is a natural outcome of the high level of maturity and precision characterizing the candidate's research.

I recommend expanding the scope of research through active participation in and leadership of international scientific projects funded by European programs, which would enhance the institution's international visibility. I also encourage the candidate to focus on further practical application of research results to strengthen the link between science and business.

9. Personal impressions

I have known Assoc. Prof. Rosen Ivanov, PhD, Eng. for ten years. My most direct and in-depth impressions of his professional work were formed during our collaboration on the national research project "Research into Architectures, Models, and Methods for Autonomous Management in the Future Internet," funded by the National Science Fund of the Ministry of Education and Science. Within this project, Assoc. Prof. Ivanov played a pivotal role as a work package leader. Throughout our collaboration, he demonstrated an exceptionally high level of expertise, vision, and strategic thinking—qualities characteristic of a scholar of professorial rank. Throughout our collaboration, Assoc. Prof. Rosen Ivanov has proven to be an exceptionally reliable partner, demonstrating a strong sense of responsibility regarding deadlines, precision in scientific publications, and a readiness to provide expert support at every stage.

My personal observations give me every reason to state that Assoc. Prof. Rosen Ivanov, PhD, Eng. is not only an established scholar with internationally recognized contributions but also an authoritative leader capable of uniting research teams and generating innovative ideas. His presence within the academic staff elevates the standard of research activity at TU-Gabrovo.

10. Conclusion

An assessment of the materials submitted by the candidate demonstrates that Assoc. Prof. Rosen Stefanov Ivanov, PhD, Eng. fully meets all statutory, national, and TU-Gabrovo-specific requirements for the academic position of "Professor." Moreover, regarding a number of indicators, the results he has achieved exceed the minimal national requirements. The candidate possesses indisputable scientific standing. The submitted research works are distinguished by their high theoretical value and clear practical applicability. His scientific contributions are original in nature and have garnered significant international and national recognition, as evidenced by the high number of citations. The candidate's teaching activity is exceptionally intensive and highly professional. His authorship of teaching aids, development of new lecture courses, and successful supervision of doctoral and diploma students demonstrate his high caliber as a leading academic educator and mentor to young scholars.

In view of the foregoing, I propose that Assoc. Prof. Rosen Stefanov Ivanov, PhD, Eng. be appointed to the rank of Professor in Higher Education Area 5 (Technical Sciences), Professional Field 5.3 (Communication and Computer Engineering), specializing in "Automated Information Processing and Control Systems."

October 15, 2026

Reviewer: / /

Prof. Evelina Pencheva, DSc.