

OPINION

by Assoc. Prof. Stanimir Yordanov Yordanov, PhD, Eng., Technical University of Gabrovo on the materials submitted for participation in the competition for the academic position of **Professor** in **Field of Higher Education:** 5. Technical Sciences
Professional Field: 5.3. Communication and Computer Engineering
Specialty: “Automated Systems for Information Processing and Control”

In the competition for the academic position of Professor, announced in the State Gazette, Issue No. 61 of 03.07.2026, and on the website of the Technical University of Gabrovo (TU-Gabrovo), for the needs of the Department of Computer Systems and Technologies (CST) at the Faculty of Electrical Engineering and Electronics, the sole candidate is Assoc. Prof. Dr. Eng. Rosen Stefanov Ivanov.

1. Overview of the Content and Results of the Submitted Works

The scientific works submitted for participation in the competition are different from those with which Assoc. Prof. Rosen Ivanov, PhD, Eng. acquired the academic position of Associate Professor and the educational and scientific degree of Doctor. His scientific output includes 35 scientific publications, 1 monograph, and 6 books, textbooks, and teaching manuals.

The works clearly outline a recognizable scientific research line focused on the development of intelligent information and communication systems. Several interconnected areas stand out, including intelligent localization and navigation, mobile and distributed systems, the Internet of Things, smart spaces, cloud technologies, and applications of artificial intelligence. A positive aspect is the consistent development of this research area, from the early developments in mobile and remote systems to more complex solutions for localization, navigation, IoT, and intelligent services.

1.1. Intelligent Localization and Navigation

Research on localization and navigation in both outdoor and indoor environments occupies a leading position in the scientific output. It includes both the development of algorithms and the construction of models and practical solutions.

Particular attention deserves the RSTS algorithm for simplifying GPS trajectories in real time. The achieved reduction in the number of points by more than 90%, while preserving the shape of the route, demonstrates the good efficiency of the developed approach. Its evaluation in comparison with the Douglas–Peucker algorithm further substantiates the obtained results.

The research has been extended to indoor navigation, where BIM-based models, algorithms for finding K shortest paths and avoiding obstacles, as well as approaches to BLE localization, microlocalization, and automatic beacon selection have been developed and investigated.

This research line has been summarized and further developed in the independent monograph “Methods and Algorithms for Intelligent Localization and Navigation in Indoor and Outdoor Environments”, 260 pages, University Publishing House “Vasil Aprilov”, 2026. The monograph systematizes the results in the fields of GPS processing, BIM-based navigation, routing, BLE localization, and intelligent navigation systems and represents a natural synthesis of this part of the research activities.

1.2. IoT, Smart Spaces, and Personalized Services

A significant part of the research is also devoted to developments related to the Internet of Things and smart spaces. Geofencing, context-dependent information delivery, mobile applications, cloud services, and microservice architectures have been investigated.

A representative example is the ExhibitXplorer system, which integrates geofencing, artificial intelligence, and a microservice architecture for the personalized provision of information in a museum environment. The results of the experimental study demonstrate positive user acceptance of the personalized content. This result is indicative of the candidate’s effort to combine technological developments with their real-world application and experimental evaluation.

1.3. Mobile, Distributed, and Cloud Systems

A number of publications address architectures and applications of mobile, distributed, and cloud systems. The developments cover geofencing, mobile applications, cloud-based data storage and exchange, and microservice architectures. Here, a natural evolution can be observed from the development of individual mobile applications to integrated distributed solutions in which mobile devices, cloud infrastructure, and IoT components function as elements of a unified information system.

1.4. IoT Applications in Healthcare

Another research area concerns IoT applications in healthcare. Developments for automated monitoring of medication intake and health indicators are presented. Among them is a system for monitoring pregnant women, based on ESP32 and a set of sensors, in which data are transmitted to a cloud system and visualized through a web interface.

These developments demonstrate an effort to apply modern information technologies to the solution of specific practical tasks of social significance.

1.5. Remote Control and Monitoring Systems

The submitted scientific output also includes results from an earlier stage of the candidate's research activity related to remote control and monitoring of technological processes. A representative example is the Internet-programmable controller based on the BECK SC12 System on Chip, developed for mobile and remote control and tested in a real environment at the Technical University of Gabrovo.

In summary, the submitted works outline a consistent and developing scientific research theme. A characteristic feature is the transition from specific software and technical solutions to the development of algorithms, models, and integrated intelligent systems. A significant strength of the scientific output is the combination of theoretical and algorithmic results with practical implementations and experimental verification, which gives the research both scientific and clearly expressed applied scientific value.

2. General Characteristics of the Candidate's Activities

The professional activity of Assoc. Prof. Dr. Eng. Rosen Ivanov is characterized by long-term development in the field of computer and information technologies and by a consistent expansion of his research interests.

The quantitative indicators are significant: 35 scientific publications, 24 single-author publications, 6 publications with an impact factor, 1 publication with SJR, 1 monograph, 6 books, textbooks and teaching manuals, 161 known citations, one successfully defended doctoral student, and participation in/management of 5 projects or contracts, according to the submitted scientometric report.

Particularly significant is the high proportion of single-author publications—24 out of 35—which makes it possible to clearly identify the candidate's individual scientific contribution.

2.1. Teaching and Educational Activity

The teaching and educational activity is closely related to the candidate's scientific specialization.

Five textbooks/books related to the subject area of the competition and one teaching manual have been submitted. They include:

- “Network Programming” – 432 pages;
- “JavaScript – Introduction to Programming” – 200 pages;
- “Knowledge Extraction from Data” – 274 pages;
- “Programming for Mobile Devices”;
- “Programming for Distributed Systems” – 224 pages;
- “Non-Relational Databases: Laboratory Exercises Guide” – 176 pages.

The content of the educational literature covers major contemporary areas of computer technologies—programming, networking technologies, mobile systems, distributed systems, data processing, and non-relational databases.

The candidate has also participated in the training of doctoral students, with one successfully defended doctoral student reported in the submitted documentation. An important positive aspect is the consistency between teaching and research activities—the content of the educational literature is directly related to the research areas in which the candidate develops publications and practical systems.

2.2. Scientific and Applied Scientific Activity

The candidate's scientific activity is characterized by:

- a significant number of single-author publications;
- publications in internationally indexed journals and proceedings;
- an independent monograph;
- sustained development of a scientific research theme;
- experimental verification of the developed methods;
- participation in research projects.

The publications include research papers in the *Journal of Network and Computer Applications*, ACM and IEEE publications and conferences, as well as the publication on ExhibitXplorer in the *ISPRS International Journal of Geo-Information*.

The project activities include developments related to cloud-based monitoring of medication intake, an intelligent medication dispenser, IoT-based services for personalized content delivery, and research on architectures for autonomous management in the Internet of the future. An additional indicator of the candidate's scientific activity is his participation as a reviewer for a number of international scientific journals, including IEEE publications, *IEEE Internet of Things Journal*, *IEEE Sensors*, *Journal of Network and Computer Applications*, and others.

2.3. Implementation and Technology Transfer Activity

The practical orientation of the scientific activity is evident in the development of specific prototypes, software systems, and experimental implementations.

An example is the Internet-programmable controller for remote control and monitoring of technological processes, developed and tested in a real environment.

Applied significance can also be attributed to developments in BLE localization, intelligent navigation, mobile geofencing, museum information services, health monitoring, cloud-based medication tracking, and IoT services. No patent

or utility model activity is reported in the submitted documentation. Therefore, the implementation activity should primarily be considered in terms of the realization and experimental validation of the developed systems and prototypes.

3. Contributions – Scientific, Applied Scientific, and Applied. Significance of the Contributions to Science and Practice

Based on the submitted works and the author's report, the candidate's contributions can be systematized as follows.

3.1. Scientific Contributions

1. Algorithm for Real-Time Simplification of GPS Trajectories

An RSTS algorithm for processing GPS trajectories has been developed, allowing a significant reduction in the number of points while preserving the shape of the route. Experimental results demonstrate a reduction of more than 90%. The scientific value of the result lies in combining spatial data reduction with the possibility of real-time processing.

2. Methods for Intelligent Indoor Localization

Methods for localization using BLE beacons have been developed and investigated, including automatic beacon selection and microlocalization in large public buildings.

3. Methods for Intelligent Routing

Algorithms have been developed for finding K shortest paths in multi-storey and multi-building complexes and for obstacle avoidance.

4. Intelligent and Context-Dependent Information Delivery

Approaches have been developed for combining geofencing, IoT, microservice architecture, and artificial intelligence for the personalized delivery of information.

3.2. Applied Scientific Contributions

The following may be classified as applied scientific contributions:

- development of methods for accessible navigation;
- BIM-based modeling for indoor navigation;
- BLE-based localization;
- development of IoT services for smart spaces;
- development of cloud and microservice architectures;
- IoT applications in health monitoring;
- personalized information delivery through AI.

These developments represent a transition between algorithmic scientific results and specific information systems.

3.3. Applied Contributions

The applied results are related to the implementation and testing of specific systems.

Among them are:

- an Internet-programmable controller for control and monitoring;
- GPS navigation systems;
- BLE localization systems;
- mobile applications for geofencing;
- ExhibitXplorer;
- health monitoring systems;
- cloud services for medication tracking.

It is particularly important that some of the results do not remain at the level of conceptual models but have been implemented as prototypes and subjected to experimental verification.

3.4. Significance of the Contributions

The combination of the results demonstrates a scientific research line that connects localization and navigation with mobile technologies, IoT, cloud systems, and artificial intelligence.

The scientific significance is determined by the development and investigation of algorithms and methods for spatial data processing, localization, and routing.

The applied scientific significance is expressed in the transformation of these methods into specific information systems.

The practical significance is related to their potential application in accessible navigation, smart spaces, cultural heritage, health monitoring, and remote control.

4. Assessment of the Candidate's Individual Contribution

The assessment of the candidate's individual contribution is particularly well substantiated by the ratio between single-author and co-authored publications.

Of the total of 35 scientific publications, 24 are single-author publications.

This makes it possible to directly assess the candidate's individual contribution to a significant part of the scientific output.

The individual contribution is most clearly identifiable in:

- the RSTS algorithm;
- research on GPS-based navigation;
- BLE localization methods;
- routing algorithms;
- developments in intelligent navigation;
- the independent monograph.

The monograph is an entirely independent work. According to the author's report, the contribution includes the overall concept and the development of methods and algorithms for GPS processing, BIM-based modeling, finding K shortest paths, obstacle avoidance, and BLE localization.

In the co-authored publications, the submitted documentation specifies the candidate's contribution. For example, in the publication on a mobile application for creating and exporting geofences, his contribution includes defining the requirements for the application, the approach to exporting to MongoDB/GeoJSON, and the development of a database of historical landmarks.

On this basis, the candidate's individual contribution can be defined as clearly identifiable, significant, and essential to the main scientific results presented in the competition.

5. Critical Remarks and Recommendations

The submitted scientific output is significant in terms of both volume and content. Nevertheless, several recommendations can be formulated for future scientific work.

First, the thematic scope of the research is broad. In the future, it would be appropriate to integrate the individual areas even more closely around several long-term scientific themes.

Second, for some of the applied scientific developments, it would be useful to expand the experimental studies with larger datasets and longer-term testing in real operational environments.

Third, further research into the integration of IoT, edge computing, artificial intelligence, cloud technologies, and intelligent localization into unified cyber-physical systems appears promising.

These remarks are recommendations for the development of future scientific work and do not call into question the scientific value of the results presented.

6. Personal Impressions

I have known Assoc. Prof. Dr. Eng. Rosen Stefanov Ivanov since 1993 and, for more than three decades, have had the opportunity to observe his professional development and establishment as a specialist, teacher, and scientist.

Over the years, I have known him as an exceptionally reliable, responsible, and consistent professional who can be relied upon when solving complex technical and professional tasks. He is distinguished by a high level of professional culture, integrity, and respect for colleagues and partners.

A particularly characteristic feature of his professional profile is the combination of profound theoretical knowledge with exceptionally well-developed practical skills. He is a specialist who not only analyzes technical problems in depth but is also capable of finding workable and effective solutions. In professional circles, he is known not only as a scientist and teacher but also as an exceptionally good programmer with proven practical competence.

My long-standing acquaintance with him gives me reason to emphasize his sustained professional development and his ability to follow and master new areas in computer and information technologies. In his work, scientific training and practical skills complement each other naturally and are reflected in real developments and solutions.

Assoc. Prof. Ivanov enjoys professional respect both in academic and scientific circles and among specialists in industry. In my opinion, this is the result of his long-term consistent work, high level of competence, and proven practical skills.

Based on my long-standing acquaintance with the candidate, I consider him an established specialist with a high level of professional and academic culture, exceptional technical competence, integrity, and proven practical skills. The materials submitted for the competition fully correspond to the impressions I have formed of him over the years.

Conclusion

The submitted materials demonstrate an independently developed scientific research theme, original algorithmic and methodological results, applied scientific developments, and practical implementations. The candidate also demonstrates the necessary academic maturity through the combination of research activity, teaching, doctoral training, development of educational literature, participation in research projects, and reviewing scientific publications.

Taking the above into consideration, I propose that Assoc. Prof. Rosen Stefanov Ivanov, PhD, Eng. be elected **Professor** in:

Field of Higher Education: 5. "Technical Sciences"

Professional Field: "Communication and Computer Engineering"

Specialty: "Automated Systems for Information Processing and Control"

15.10.2026

Member of the Jury:

/Assoc. Prof. S. Yordanov/