

STATEMENT

**on the materials submitted for participation in the competition
for occupying the academic position ‘Professor’
in professional field 5.3 „Communication and computer technology“
academic discipline „Programming Fundamentals“, announced in
SG, Issue 4 of 13/01/2023**

**Candidate: Assoc. Prof. Milena Nikolova Mileva-Karova, PhD
Member of the scientific jury: Prof. Georgi Nikolov Krastev, D.Sc**

1. General Characteristics of the Applicant’s Scientific and Applied Research

Assoc. Prof. Milena Nikolova Mileva-Karova has participated in the competition for the academic position of „Professor“ with 42 publications, including 10 scientific publications indexed in the Scopus database, which are equivalent to monographic works. Two of the remaining publications are also indexed in Scopus.

The publications in Scopus consist of 9 in international conferences in Bulgaria, 2 from conferences abroad, and 2 in foreign journals.

Out of the 30 publications in non-refereed journals and conferences, 4 are in foreign journals, 5 are publications in conferences abroad, 14 are publications in Bulgarian journals, and 7 are in international conferences in Bulgaria.

The 42 scientific publications are distributed as follows:

According to the language of publication:

- In English - 34 [V.4-1 to V.4-10; G.7-1 to G.7-2; G.8-1 to G.8-3; G.8-5 to G.8-11; G.8-13; G.8-15 to G.8-20; G.8-23 to G.8-26; G.8-28]
- In Bulgarian - 8 [G.8-4; G.8-12; G.8-14; G.8-21; G.8-22; G.8-27; G.8-29; G.8-30]

According to the type of publication:

- Scientific publications that are refereed and indexed in world-renowned databases: papers from international conferences - 10 [V.4-3 to V.4-10; G.7-1 to G.7-2]; papers in journals - 2 [V.4-1; V.4-2].
- Scientific publications in non-refereed publications: papers from international conferences - 12 [G.8-1 to G.8-3; G.8-7; G.8-12; G.8-16 to G.8-20; G.8-25 to G.8-26]; papers in journals - 18 [G.8-4 to G.8-6; G.8-8 to G.8-11; G.8-13 to G.8-15; G.8-21 to G.8-24; G.8-27 to G.8-30].

The scientific contributions of assoc. prof. Milena Karova have garnered recognition within the international scientific community, as evidenced by the inclusion of twenty citations from foreign sources, noted in the competition documents.

The materials of assoc. prof. eng. Milena Karova, PhD, presented in the competition, exceed the minimal national requirements for the area of high education 5. Technical sciences of the Rules for applying of the Law for development of the academic staff in Republic of Bulgaria (LDASRB)

2. Evaluation of the Applicant's Pedagogical Competence and Activities

Assoc. Prof. Milena Nikolova Mileva-Karova has been working as a lecturer in the Department of Computer Science and Technologies at TU-Varna since 1989. She has conducted lecture courses on various subjects, including "Fundamental Programming," "Office Programming," "C/C++ Programming," "Object-Oriented Programming in C++," "Parallel Algorithms and Systems," "Project Management," "Software Project Management," "Cryptography and Data Protection," "Dialogue Systems," "Artificial Intelligence," "Genetic Algorithms," "Design of Software Interfaces," and "Interfaces with Virtual 3D Reality" for students from different specialties.

She has mentored and supervised the research of four doctoral students – two of them have successfully defended their doctoral theses. Overall, the educational and pedagogical activities of Assoc. Prof. Milena Nikolova Mileva-Karova are diverse and substantial in content.

3. Key Scientific and Applied Research Contributions

The 10 publications presented as equivalent to a monograph (group B.4) are united under the title "Intelligent Methods and Algorithms for Information Recognition, Prediction, Classification, and Encryption". They are grouped based on their semantic contributions as follows:

- A conceptual design of a cryptocurrency price prediction system using a neural network. [B.4-2]
- A model of StyleGan/(generative adversarial network (GAN)) using an advanced neural network for logo generation has been proposed and implemented. [B.4-5]
- An algorithm for transforming two-dimensional coordinates of a mobile robot into a three-dimensional coordinate system has been suggested. [B.4-1]
- Based on a comparative analysis of the accuracy and performance of different methods and algorithms for text classification in Bulgarian and English, a modified text classification algorithm with improved accuracy has been proposed. [B.4-3, B.4-4, B.4-6]

- An approach for recognizing private encryption keys and enhancing their resilience using machine learning algorithms such as K-Nearest Neighbor (k-NN) and Support Vector Machine (SVM) has been proposed. [B.4-7, B.4-9]
- An algorithm for transforming data into a homogeneous type, ensuring suitable input data for machine learning algorithms, has been developed. [B.4-7, G.8-13]
- An algorithm for iris parameter recognition has been synthesized and implemented. [B.4-8]
- A model for estimating the charge of lithium-ion batteries using machine learning has been proposed. [B.4-10]

These contributions could be classified as scientific and scientifically applicable. Fundamentally contributing to the creation of new methods and systems.

The presented 32 publications, excluding that equivalent to monographic works (group G.7 and G.8), cover a broader scientific field and are categorized into 5 main thematic areas:

- Software applications in the field of encryption and data protection.
- Project management and information security.
- Software applications for robot controls.
- Innovative solutions using Genetic Algorithms and machine learning.
- Software applications to support the learning process in the disciplines of „Programming Fundamentals“, „Language Processors“ and „Compilers and Interpreters“.

I accept contributions related to the publications in their respective thematic areas as formulated.

4. Significance of Contributions to Science and Practice

I consider the contributions of Assoc. Prof. Milena Karova to be significant for science and applicable in practice, and I classify them as follows:

- Enrichment of knowledge and systems through the formulation and justification of theories and hypotheses in existing scientific fields.
- Creation of new classifications, algorithms, methods, technologies, and acquisition of corroborating evidence.

5. Critical Remarks and Recommendations

I have no remarks regarding the materials submitted for participation in the competition.

Conclusion

The scientific works that I have received to form an opinion for the competition, both in terms of quantity and quality, significantly exceed the scientometric

requirements outlined in the Law on the Development of Academic Staff in the Republic of Bulgaria (LDAARB) and the normative documents of the Technical University - Varna for obtaining the academic position of "Professor." Assoc. Prof. Milena Karova has conducted diverse and substantial educational, teaching, and research work. She has published articles and reports that have been extensively cited in reputable scientific publications and events.

In consideration of the above I would reasonably propose that Assoc. Prof. Milena Nikolova Mileva-Karova, PhD be selected for the academic position of Professor in Programming Fundamentals, professional field 5.3 „Communication and computer technology“ at the Technical University - Varna.

30.05. 2023

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