

REVIEW

on the materials submitted for participation in a procedure for obtaining an academic position
“Professor”

in professional field 5.3 “Communication and Computer Engineering”,
subject “Basic Programming” at the Department “Computer Science and Engineering”,
Faculty of Computer Sciences and Automation, Technical University of Varna
Announced in SG № 4/13.01.2023

Applicant: **Assoc. Prof. Dr. Eng. Prof. Milena Nikolova Mileva–Karova**

Reviewer: **Prof. Dr. Milena Kirilova Lazarova–Mitseva**

1. General regulation and biographic data

This review is prepared in my capacity as a member of the Scientific Jury, appointed by Order of the Rector of the Technical University–Varna (№ 240/11.04.2023) based on a decision of the Faculty Council of the Faculty Computer Sciences and Automation (Protocol №15/27.03.2023) as well as protocol of the first meeting of the Scientific Jury from 25.04.2023.

Assoc. Prof. Dr. Eng. Milena Nikolova Mileva–Karova graduated in 1984 from VMEI–Varna with a Master of Science degree in Radio Engineering. She started her professional activity as head of “Club Computer”, where she was also a lecturer in “Computer Fundamentals” and “Programming Languages” in the period 1985–1989. From 1989 till 2014 she was working as an assistant, a senior assistant and an assistant professor at the Department Computer Science and Engineering of the Faculty of Computer Sciences and Automation at the TU–Varna. In 2006 she received a PhD degree after successfully defending her PhD thesis “Research and implementation of genetic algorithms for solving a class of problems” in the specialty “Computer systems, complexes and networks” in the professional field 5.3. Communication and computer engineering. Since 2014 she is an Associate Professor at the Department Computer Science and Engineering of Faculty of Computer Sciences and Automation at the TU–Varna. She is also a Deputy Dean for Research and Staff Development at Faculty of Computer Sciences and Automation since 2019. She is fluent in English, Russian and French.

2. General description of the presented materials

The only applicant for participation in the current procedure for obtaining an academic position “Professor” Assoc. Prof. Dr. Milena Mileva–Karova has provided all the required documents, references and evidences according to the Act on the Academic Staff Development in the Republic of Bulgaria and the Regulations governing the application of the Act.

The applicant has submitted for review 42 scientific papers, 1 textbook and a list of 15 research and educational projects that she has led and has participated. The publications submitted for the competition for obtaining the academic position “Professor” are not included in the list of publications on the applicant’s PhD thesis and the list of publications for obtaining the academic position “Associate Professor”.

Ten of the scientific publications that are published in journals and conference proceedings, referenced and indexed in Scopus, are submitted for participation in the current procedure for obtaining an academic position “Professor” as equivalent to a monograph and has a common topic “Intelligent methods and algorithms for information recognition, prediction, classification and encryption”. All 10 papers are written in English. Two of the papers are published in international scientific journals [B.4.1, B.4.2] (the latter with SJR=0.215) and 8 papers are published in scientific conferences proceedings, 7 of which are held in Bulgaria [B.4.3, B.4.4, B.4.5,

B.4.7, B.4.8, B.4.9, B.4.10] and 1 conference held abroad [B.4.6]. Two of the publications are also indexed in the WoS Core Collection [B.4.3, B.4.6].

The remaining 32 publications beyond the papers submitted as equivalent to a monograph can be classified as follows: 2 papers are presented at international scientific conferences held in Bulgaria and indexed in Scopus [Г.7.1, Г.7.2] (publication [Г.7.2] is also indexed in WoS Core Collection) and 30 papers are published in non-refereed journals and edited collective volumes with scientific peer review, 4 of them published in scientific journals abroad [Г.8.6, Г.8.8, Г.8.15, Г.8.23], 14 papers published in national scientific journals [Г.8.4, Г.8.5, Г.8.9, Г.8.10, Г.8.11, Г.8.13, Г.8.14, Г.8.21, Г.8.22, Г.8.24, Г.8.27, Г.8.28, Г.8.29, Г.8.30], 6 papers presented at international scientific conferences held abroad [Г.8.1, Г.8.3, Г.8.7, Г.8.18, Г.8.20, Г.8.25] and 6 papers presented at scientific conferences with international participation held in Bulgaria [Г.8.2, Г.8.12, Г.8.16, Г.8.17, Г.8.19, Г.8.26]. Eight of the publications are written in Bulgarian [Г.8.4, Г.8.12, Г.8.14, Г.8.21, Г.8.22, Г.8.27, Г.8.29, Г.8.30] and the other 22 papers are written in English. Two of the papers are self-authored [Г.8.10, Г.8.28], the rest are co-authored: 15 papers with one co-author [Г.7.1, Г.7.2, Г.8.9, Г.8.12, Г.8.13, Г.8.14, Г.8.16, Г.8.18, Г.8.19, Г.8.20, Г.8.21, Г.8.22, Г.8.26, Г.8.29, Г.8.30], 6 papers with two co-authors [Г.8.4, Г.8.5, Г.8.8, Г.8.15, Г.8.24, Г.8.27], and the other 9 papers with three or more co-authors. The applicant is the first author in 14 publications out of a total of 30 co-authored publications. A copyright distribution protocols are not provided for the co-authored publications that's why equal distribution among all co-authors is accepted.

Regarding the fulfilment of the minimum required points by groups of indicators for obtaining an academic position "Professor" in professional field 5.3 "Communication and Computer Engineering", the submitted materials of the applicant can be summarized as follows:

– For the group of indicators A:

- Indicator 1 – submitted Autoreferate of a PhD thesis defended at the Specialized Scientific Council of Electronic and Computing Engineering of the High Attestation Commission.

The total number of points for the group of indicators A is 50 (the minimum requirement for obtaining an academic position "Professor" is 50).

– For the group of indicators B:

- Indicator 4 – submitted 10 research papers as equivalent to a monograph that are published in journals and conference proceedings referenced and indexed in Scopus [B.4.1 ÷ B.4.10].

The total number of points for the group of indicators B is 230 (the minimum requirement for obtaining an academic position "Professor" is 100).

– For the group of indicators Г:

- Indicator 7 – submitted 2 research papers published in journals and edited collective volumes that are referenced and indexed in Scopus: [Г.7.1, Г.7.2]. The total number of points for indicator Г7 is 40;
- Indicator 8 – submitted 30 research papers in non-refereed peer-reviewed journals or in edited collective volumes: [Г.8.1 ÷ Г.8.30]. The total number of points for indicator Г8 is 248.2.

The total number of points for the group of indicators Г is 288.2 (the minimum requirement for obtaining an academic position "Professor" is 200).

– For the group of indicators Д: submitted applicant's reference for citations of her research papers according to which:

- Indicator 12 – 5 of the applicant’s research papers have a total of 20 citations, all of them in publications in scientific editions referenced and indexed in Scopus and WoS. The total number of points for indicator Д12 is 200.

The total number of points for the group of indicators Д is 200 (the minimum requirement for obtaining an academic position “Professor” is 100).

– For the group of indicators E: according to the submitted documents for the participation of the applicant in research projects and supervised PhD students:

- Indicator 17 – the applicant was a scientific supervisor of two PhD students successfully defended their PhD thesis and awarded a PhD degree. The total number of points for indicator E17 is 80.
- Indicator 18 – the applicant participated in 7 national research and educational projects. The total number of points for indicator E18 is 70.
- Indicator 19 – the applicant participated in one international research project. The total number of points for indicator E19 is 20.
- Indicator 20 – the applicant was a leader of 7 national research projects. The total number of points for indicator E20 is 140.
- Indicator 24 – submitted one textbook [E.24.1]. The total number of points for indicator E24 is 5.

The total number of points for the group of indicators E is 315 (the minimum requirement for obtaining an academic position “professor” is 150).

– For the group of indicators Ж:

- Indicator 29 – submitted references for the number of lectures given at the TU–Varna for the last three years. The total number of points for indicator Ж29 is 622.

The total number of points for indicator Ж is 622 (the minimum requirement for obtaining an academic position “Professor” is 120).

All the materials submitted for participation in the procedure by Assoc. Prof. Dr. Milena Mileva-Karova correspond to the professional field of the competition in terms of volume, structure, and content. All the criteria defined as minimum required points for the groups of indicators for obtaining an academic position “Professor” are fulfilled and some of them are even significantly exceeded.

3. Overall characteristic of the applicant's research and scientific activity

The research publications presented by Assoc. Prof. Dr. Milena Mileva–Karova for participation in the procedure as well as her participation in scientific projects demonstrate her intensive scientific activities that fully correspond to the professional field and the specialty of the current procedure for obtaining an academic position “Professor”. The applicant's scientific and scientific-applied activities are aimed at solving research and applied problems in the following research fields: (1) “Intelligent methods and algorithms for information recognition, prediction, classification and encryption” (publications [B.4 .1 ÷ B.4.10]); (2) “Software applications in the field of data encryption and protection” (publications [Г.8.3, Г.8.6, Г.8.10, Г.8.11, Г.8.13, Г.8.19, Г.8.27, Г.8.28, Г.8.30]); (3) “Project management and information security” (publications [Г.8.9, Г.8.10, Г.8.14, Г.8.16, Г.8.18, Г.8.21, Г.8.28, Г.8.29]); (4) “Software applications for robot control” (publications [Г.8.1, Г.8.2, Г.8.5, Г.8.7, Г.8.22, Г.8.23]); (5) “Innovative solutions with genetic algorithms and machine learning” (publications [Г.8.8, Г.8.12, Г.8.15, Г.8.17, Г.8.25, Г.8.26]); (6) “Software applications to support the training in the courses “Basic Programming”, “Language Processors” and “Compilers and Interpreters”” (publications [Г.7.1, Г.7.2, Г.8.20]).

Along with her active scientific and applied activities in the above research fields reflected in her publications, Assoc. Prof. Dr. Milena Mileva–Karova was a leader of 7 research projects funded by the state budget of TU–Varna and participated in a total of 8 research and educational projects, including one international project co-funded by the European Institute of Innovation and Technology and 7 national projects, 3 of them funded by OP “Science and Education for Smart Growth”, 2 project funded by OP “Innovation and Competitiveness” and 2 projects funded by the state budget of TU–Varna.

Assoc. Prof. Dr. Milena Mileva–Karova is a member of the Varna Scientific and Technical Unions (VSTU) since 2010 and a member of the Union of Automation and Informatics “John Atanasov” since 2015. She was a reviewer of a proposal for State Educational Requirements for acquisition of qualification in the profession “System Programmer” of the National Agency for Vocational Education and Training. She is also reviewer for Journal Advances in Science, Technology and Engineering Systems (ASTESJ). She has been a member of the technical program committee of “Computing Conference’2021”, “Computing Conference’2022”, “Computing Conference’2023” and a member of the program committee of IX Balkan Conference on Informatics (BCI’2019).

The applicant’s research and scientific activities as revealed in her research papers as well as her participation in scientific projects, international conference program committees and international scientific organizations allows a highly positive assessment to be given to her scientific and scientific-applied activities.

4. Evaluation of the applicant's pedagogical training and activities

Assoc. Prof. Dr. Milena Mileva–Karova has pedagogical experience as a lecturer in the Department of Computer Science and Engineering at the TU–Varna since 1989. In 1983 she received a diploma in “Pedagogy” from VMEI–Varna. In the period 1996–2015 she was a lecturer in informatics and information technology at the Faros School of Foreign Language Education and Computer Literacy in Varna. Since 2020 she is also a lecturer in teacher retraining courses at the TU–Varna. According to the documents presented for the participation in the current procedure the applicant’s pedagogical activities comprises conducting lectures, seminars and laboratory exercises, supervising course work and course projects for bachelor and master students in a significant number of disciplines at the TU–Varna, all of them directly related to the specialty of the competition. She is a co-author of one published textbook and an author of a lab study guide prepared for publishing. A reference is also provided for 12 syllabuses developed independently by the applicant since 2017, 8 of them for bachelor's degree courses and 4 for master's degree courses included in the curricula for the specialties “Software and Internet Technologies”, “Computer Systems and Technologies”, “Computer Networks and Communications”, “Information and Communication Technologies”, “Cybersecurity”, “Artificial Intelligence”, “Artificial Intelligence Systems” taught at the TU–Varna. In the period 2014–2022 she has been a guest lecturer during several Erasmus mobilities at 5 international universities: University of Iceland, Iceland; Universidad Politecnica de Cartagena, Spain; Szechenyi Istvan University, Gyor, Hungary; Polytechnic Institute of Coimbra, Portugal; Universite du Cote d’Óppal, France.

Assoc. Prof. Dr. Milena Mileva–Karova is a supervisor of four PhD students in the Department of Computer Science and Engineering, 2 of them successfully awarded a PhD degree and the other two in a process of PhD degree training. Her active work with graduate and undergraduate students also makes an excellent impression. Since 2014 she has been a diploma thesis supervisor of 105 successfully graduated students, including 74 bachelor students, 4 foreign bachelor students and 27 master students. As a scientific supervisor at the Continuing Education Centre at the TU–Varna since 2020 she has been a chairperson of state examination committees and committees for conducting examination procedures for acquisition of professional qualification

degrees by teachers as well as a scientific supervisor at the Centre for Training and Retraining at the TU–Varna. Assoc. Prof. Dr. Milena Mileva–Karova is also a scientific leader of the Student Club “Creative Code” at the TU–Varna and has been participating together with students and PhD students in several International Students Workshops. In October 2022 she was a member of the scientific jury of the student hackathon M-CODELAB co-organized by the company “Methodia” and the TU–Varna with a topic “Smart technologies for cleaning and conservation of the marine ecosystem”.

All of the above allows the pedagogical preparation and teaching experience of Assoc. Prof. Dr. Milena Mileva–Karova to be evaluated as excellent and relevant for the academic position „Professor”, revealing her as established lecturer with great experience and contribution in organizing and conducting academic and research activities at the TU–Varna with a respectable potential to prepare, organize and provide training using her research experience in the educational process of both undergraduate, graduate and PhD students.

5. Main scientific and applied research contributions of the applicant

I agree with the main scientific and applied research contributions of the applicant as stated by her in the author's reference. The scientific and applied research contributions of Assoc. Prof. Dr. Milena Mileva–Karova can be summarized as follows:

- Contributions in the publications equivalent to a monograph
 - scientific contributions:
 - A conceptual design of a cryptocurrency price prediction system using a neural network is proposed [B.4.2];
 - A StyleGan model of an extended neural network for logo generation is proposed and implemented [B.4.5];
 - scientific-applied contributions:
 - An algorithm for transforming mobile robot two-dimensional coordinates into a three-dimensional coordinate system is proposed [B.4.1];
 - A modified algorithm for text classification with increased accuracy is proposed based on comparative analysis of the accuracy and speed performance of different methods and algorithms for text classification in English and Bulgarian [B.4.3, B.4.4, B.4.6];
 - An approach for secret key recognition with increased robustness for information encryption using kNN and SVM machine learning algorithms is proposed [B.4.7, B.4.9];
 - An algorithm for fitting data in a homogeneous environment is synthesized and implemented that provides suitable input data for machine learning algorithms [B.4.7, B.8.13];
 - An algorithm for iris parameter recognition is synthesized and implemented [B.4.8];
 - A model for estimating the charge of lithium-ion batteries using machine learning is proposed [B.4.10].
- Contributions in the publications other than the equivalent to a monograph
 - scientific contributions:
 - Approaches and software solutions are proposed for formation and transmission of symmetric and asymmetric key for information encryption [Г.8.13, Г.8.19, Г.8.10, Г.8.28, Г.8.30];
 - A conceptual description approach for building a software project is proposed [Г.8.21];

- A modified genetic algorithm for path finding in a robot motion environment and a hybrid algorithm for finding the shortest path in a maze using a DFS algorithm and genetic algorithm with appropriate settings are proposed [Г.8.22];
- scientific-applied contributions:
 - Risk management issues in information security management systems are analyzed and a concept for an information security management system is proposed [Г.8.9, Г.8.14, Г.8.16, Г.8.29];
 - A path planning algorithm for a mobile robot in a maze is proposed and implemented [Г.8.1, Г.8.2];
 - An algorithm for finding the shortest path in a maze by graph representation of the maze is proposed [Г.8.7];
 - An image processing algorithm to create a stylized representation of a maze and an algorithm for a mobile robot movement according to the position of a controlling mobile device are proposed [Г.8.5, Г.8.23];
 - A novel method for steganographic information embedding is proposed by using a template matrix for screening the original message embedded in an image [Г.8.11];
 - A genetic algorithm for acquiring the amplitude-phase distribution of an optical field is proposed [Г.8.12];
 - A genetic algorithm for software project management is synthesized and implemented [Г.8.17];
 - A genetic algorithm for improving optimal paths and reducing game time is proposed and implemented [Г.8.25];
 - A modified version of a nearest neighbor algorithm for handwritten digit recognition is proposed and implemented [Г.8.8, Г.8.15, Г.8.26];
- applied contributions:
 - An application for information encryption algorithms' benchmarking in terms of resources used is implemented [Г.8.3, Г.8.6, Г.8.27];
 - An employee management system for project design and development providing encrypted login protection is implemented [Г.8.10, Г.8.28];
 - A software system for electronic documents management and control is developed [Г.8.18];
 - A new model of a tool for editing and lexical analysis of HTML code is proposed [Г.7.1];
 - A tool for code rewriting in order to restructure a software system is presented [Г.8.20];
 - A syntactic analyzer for a learning compiler is proposed and implemented [Г.7.2, E.24.1].

The scientific and applied research contributions of the applicant can be referred to the categories of improvement of existing scientific knowledge and research contributions applicable in practice. Part of the contributions are related to proposal of new or modification of existing methodologies, approaches, models and algorithms while other contributions can be referred as new means to proof essential and new aspects of existing scientific problems and theories.

I assume equal participation of the candidate in the co-authored publications and considering the applicant is a first author in almost half of the co-authored research papers gives me a reason to assess the scientific contributions achieved as significant and her personal work in compliance with the requirements for obtaining the academic position "Professor". The significance and international recognition of the achieved contributions is also evident by number of citations of

her publications in scientific journals and edited collective volumes refereed and indexed in world-known databases of scientific information. Five of the candidate's publications have a total of 22 citations in scientific journals referenced and indexed in Scopus and WoS, all by foreign authors, and in addition one of her publications has a total of 24 citations, including 13 citations in publications indexed Scopus.

6. Importance of the research contributions of the applicant to the science and the practice

The scientific and applied research activities and contributions of the applicant satisfy the requirements of the Act on the Academic Staff Development in Republic of Bulgaria and the Regulations governing the application of the Act. Her research activities fall in the recent and important fields of study and cover hot scientific topics. The research contributions are important both for enrichment of the scientific theory as well as applicable to specific practical cases and in addition are also useful in the training of bachelor, master and PhD students. The results of the applicant's active scientific research have been presented at prestigious international forums and have received publicity through their inclusion in a number of international publications, including papers refereed and indexed in world-known databases of scientific information. The international recognition of the importance of the scientific contributions and results achieved is evident both from the publication of her research papers in respectable scientific journals indexed in world-known databases of scientific information as well as from the citations of her scientific works by foreign authors in papers published in significant scientific journals and editions refereed and indexed in Scopus and WoS.

7. Critical remarks and recommendations

I have no critical remarks on the documents submitted by the applicant for participation in the procedure for obtaining an academic position "Professor". The provided documents are sufficient to evaluate her research and pedagogical activities, they are well prepared and are accompanied by all the necessary references, certificates, evidences and other documents.

My recommendation to Assoc. Prof. Dr. Milena Mileva–Karova is to aim her future research work towards participation in international scientific projects and research teams.

8. Reviewer's personnel impressions

I have personally known Assoc. Prof. Dr. Milena Mileva–Karova for many years and I have excellent impressions of her academic and scientific activities. She is diligent and committed to all her teaching and research endeavors.

CONCLUSION

Based on the presented documents submitted by the applicant for participation in the procedure for obtaining an academic position "Professor", considering the scientific and applied research contributions achieved in her research publications, I find it reasonable to propose Assoc. Prof. Dr. Eng. Milena Nikolova Mileva–Karova to obtain the academic position "Professor" in professional field 5.3. Communication and Computer Engineering, subject "Basic Programming" at the Department "Computer Science and Engineering" in Faculty of Computer Sciences and Automation at the Technical University of Varna.

Заличена информация
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REVIEWER:

/ Prof. Dr. Milena Lazarova–Iviltseva /