R E V I E W

of the materials for participation in a competition for academic position
"Associate professor" in the field of higher education - 5. Technical sciences,
professional field 5.3. Communication and computer engineering,
scientific specialty - "Computer systems, complexes and networks"

by Prof. Eng. Seferin Todorov Mirtchev, D.Sc.
to the academic position of "professor", in a professional field
5.3. Communication and computer engineering
at the Technical University - Sofia

In the competition for associate professor, announced in the State Gazette, issue
45/28.05.2021 for the needs of the section "Communication systems and services" at the
Institute of Information and Communication Technologies - BAS, one candidate
participates - Chief Assist. Ekaterina Angelova Ocetova – Dudin, PhD from the Department
of Information Technology at the Higher School of Telecommunications and Posts, Sofia.

I. Brief biographical data of the applicant

Dr. Ekaterina Ocetova-Dudin was born in 1969. In 1992, she graduated with a master's
degree from the Technical University of Sofia, majoring in Radio and Television
Engineering. In 1994, she completed a one-year specialization in VPI "Neofit Rilski",
Blagoevgrad and for many years worked as a teacher of Informatics in town of Samokov. In
1997, she completed a one-year specialization in "Out of school activities, functions, social
aspects" at Sofia University "St. Kliment Ohridski". Since 2005, she has been working at
the Higher School "College of Telecommunications and Posts" (HSCTP), Sofia as a chief
specialist in distance learning, since 2010 she has been an assistant, and since 2015 a chief
assistant. She has taught a large number of disciplines in the professional field of
Communication and computer engineering at HSKTP (since 2015 it has been transformed
into HSTP).

She defended his dissertation on "Modeling and simulation of rare events in the
handover of broadband cellular radio networks" in the doctoral program "Communication
networks and systems" in 2015 at the University of Ruse "Angel Kanchev".

II. Characteristics of the scientific and applied production of the candidate

A total of 34 scientific works were submitted for review:
• 10 scientific publications (habilitation work), 4 of them are indexed in Scopus, 4 are
indexed in Scopus and WoS and 2 are indexed only in WoS. 4 of them are with SJR;
• 2 scientific publications indexed in Scopus;
• 21 scientific publications in journals and conferences with scientific review;
• 1 textbook.

The candidate's publications are distributed as follows: 2 articles in international
journals and 10 conference papers that are indexed in Scopus and/or WoS, 11 journal
articles, 4 conference papers and 6 papers in scientific conference proceedings of
universities with scientific reviewing. Of the 33 presented publications, 3 are independent
and in 9 of them the candidate is in first place, 21 are published in English and 12 - in
Bulgarian. The candidate is a co-author of 1 published textbook. All presented scientific
works are in the scientific field of Communication networks and systems.

A total of 22 citations are presented, of which 16 are in indexed in Scopus or WoS
publications, 4 are in publications abroad and 2 are in publications in Bulgaria.

The citations of the publications of Dr. Ekaterina Ocetova-Dudin show that she is known to the scientific community in the country and abroad with the results of her research work. The scientometrics data of the candidate exceed the minimum number of points by indicators for professional fields of IICT at BAS, which are higher than the minimum national requirements, which is shown in the table.

Group of indicators	Minimum national requirements "Associate Professor"	Chief Assist. Ekaterina Ocetova-Dudin, PhD
А	50 т.	50 т.
Б	-	
В	100 т.	151.07 т.
Г	220 т.	227.36 т.
Д	60 т.	172 т.
Е	20 т.	110 т.

The above written shows that with the presented scientific publications, citations, published textbook and participation in research projects, the candidate Dr. Ekaterina Ocetova-Dudin fully covers the requirements for holding the academic position of "Associate Professor" in the professional field 5.3. Communication and computer engineering.

III. Overview of the content and results in the presented works

The scientific papers presented for review are summarized in 4 directions:
1. Sensor computer systems;
2. Computer methods for simulation and analysis;
3. Remote data exchange;
4. Protection of computer and communication networks and systems.

The first direction includes 5 publications (B4.7, B4.8, B4.9, G8.5 and G8.6). They have developed a computer system for laser projection for industrial applications and proposed a gesture control approach to a computer using a Kinect sensor.

The second direction includes 14 publications (from B4.1 to B4.6, B4.10, D7.1, D8.1, D8.4, D8.9, D8.10, D8.14 and D8.17). They have developed programs for simulation of random processes in telecommunications networks through the approach rare events, created a software platform for simulation of various scenarios and educational modules in the field of teletraffic engineering and shown the application of approximation methods in the synthesis of technical devices in the communication technique.

The third direction includes 7 publications (D7.2, D8.3, D8.7, D8.8, D8.12, D8.18 and D8.21). They have developed a concept for remote data exchange with application in medicine, for remotely trained students and for business users of courier services.

The fourth direction includes 7 publications (D8.2, D8.11, D8.13, D8.15, D8.16, D8.19, D8.20). They have proposed a method for protection of web-based applications, presented solutions for protection of wireless computer networks and described an architectural model of a management system for communication network.

IV. General characteristics of the candidate's activity

Dr. Ekaterina Ocetova-Dudin is participated in 8 university research projects, in 1 educational project at the Ministry of Education and Science and in 1 research project at the National Science Foundation.

She is worked at the College of Telecommunications and Posts, Sofia as a chief specialist in distance learning for 5 years and as an assistant and chief assistant for 11 years

mainly at the Department of Information technologies in Higher school of telecommunications and posts. During her teaching career as an assistant and chief assistant she is given lectures and exercises in various disciplines - Software technologies on the Internet; Telecommunication networks and protocols; Operating systems; Software platforms and applications; Database; Database management system; Programming; Radio systems; Technical informatics; Measurement in radio communications. She is a co-author of a manual for laboratory exercises in the discipline - Programming.

I know the candidate from her participation in Telecom and Electronica conferences. My impressions are that the candidate is responsible and competent in his field. She has very good computer literacy and uses English, which helps her in research and teaching activities.

V. Main contributions in the scientific and scientific-applied activity of the candidate

I categorize the contributions of the materials submitted for review for participation in the competition as "scientific-applied" and "applied" as follows:

- *Scientific-applied contributions and new results in the 10 scientific publications (habilitation work) in editions that are indexed in world-famous databases with scientific information Scopus and/or WoS:*

1. A three-level priority scheme for connection transfer in broadband wireless networks in heterogeneous traffic is proposed, which is described by a two-dimensional Markov chain. A program for simulation through the approach - rare events is developed and results for the blocking probability in the proposed scheme are presented in tabular form.

2. A scheme of the different standards for wireless cellular networks is presented and a priority scheme with three levels for connection transfer in heterogeneous traffic is selected. A simulation program is developed and the parameters for the quality of service is evaluated.

3. A two-level priority scheme for channel transfer in wireless networks is proposed. A program for simulation through the approach - rare events is developed and the probability of overflow of the transfer queue and the probability that all channels of the base station are byse is evaluated.

4. A program for simulation study of the connection transfer in a teletraffic system with three priorities in multimedia traffic is developed and results for the quality of service are presented in graphical form.

5. Part of the conceptual model of an educational platform is presented, which provides various scenarios and cases with educational modules, providing accessibility and experimental clarity of educational content.

6. Scenarios for teletraffic models for 5G mobile networks are presented, a simulation model with two streams and two dynamic priorities is developed and results for the blocked service requests are presented.

7. Software for export of CAD data in a format supported by laser projectors used in the clothing industry is developed and experimental results are presented.

8. In the paper the design, implementation and testing of a three-channel laser diode driver, intended for multimedia laser projectors, which achieves high efficiency and sensitivity of inputs is presented.

9. A computer system for laser design is proposed in order to increase the flexibility and productivity of modern production processes, specialized software programs are designed, the operation of multimedia laser projectors in industrial conditions is analysed and problematic aspects of future industrial use are identified.

10. A model for theoretical analysis of the diffraction efficiency of a high-efficiency surface relief grating formed in the PAZO azopolymer in a selected spectral range using the GSolver instrument is presented and graphical results of the analysis are presented.

- *Scientific-applied, applied contributions and new results in the 23 publications presented for the competition in different scientific fields outside the 10 substitutes for the habilitation thesis. These contributions coincide and complement the above:*

11. Methods for mobility management in modern mobile networks are proposed;

12. An analysis of remote conducting of laboratory exercises by using software for online communication and available laboratory equipment is presented;

13. The security tools in ZigBee networks and the mechanisms of possible attacks in them are analysed;

14. The protocols for routing in wireless mesh networks are studied;

15. An approach to computer control by gestures using the Kinect sensor is proposed and various control applications are developed;

16. A communication strategy and basic functionalities for distance learning, based on the Moodle platform are developed;

17. An approximation with a double modulating function is proposed, which is applicable in the synthesis of selective devices in the communication technique;

18. A method for protection of web-based applications from hacker attacks and vulnerabilities, based on the ModSecurity module is proposed;

19. The main factors determining the choice of a specific courier service provider by individual and business users are evaluated;

20. A three-layer model of a system for reliable management of communication networks is presented;

21. The state and prospects for development of the mobile internet market in our country are analysed;

22. An architectural model of a software system for management and data collection is presented and a security and protection approach is proposed;

23. The main vulnerabilities in the fifth generation mobile networks are analysed;

24. A method for diagnostic assessment of the condition of the cardiovascular system based on remote recording of a pulsegram, which is applicable in patients recovering from COVID-19 is proposed.

I generally accept the information presented by the candidate in the reference for original scientific, scientific-applied and applied contributions. Her research and results can be assessed as enriching existing knowledge in the study of sensor computer systems, development of computer simulation methods, application of remote data exchange in medicine and education and protection of computer and communication networks and systems.

The researches, conclusions and contributions from the scientific production of the candidate have been tested in international scientific journals and forums, indexed in Scopus or in Web of Science, which is a guarantee for the significance of the achieved results and contributions.

The publication activity of the candidate shows her in-depth knowledge in the field of modern computer and communication networks and systems and undoubtedly his merits for the obtained results and contributions. The candidate is a well-built specialist.

VI. Critical notes and recommendations.

I have no significant critical remarks to the materials of the competition and in particular to the scientific works of Dr. Ekaterina Ocetova-Dudin.

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I recommend the candidate in the future publications to describe more fully the state of the researched problem in the literature, to formulate more precisely the contributions and the new results and to formulate them more thoroughly. He needs to write more independent publications in the future.

To illustrate the above, I will cite publication B4.6, which has seven co-authors. In it are generated two input streams - one is described with a discrete distribution - geometrically, and the other with a continuous - Pareto, which requires a comment, which is missing. The tables in it set the arrival intensities for one stream numerically, without recording the unit of measurement, and for the second only its type is recorded - Pareto.

It is desirable to use Bulgarian terms, when writing in Bulgarian – "fully connected network" instead of mesh network, "large queue" instead of heavy queue, etc.

I point out a false statement "Erlang's distribution law describes a system with long-term dependence" to be taken into account in future work.

VII. Conclusion.

The candidate in the competition - Dr. Ekaterina Ocetova-Dudin - is presented a significant number of scientific papers published after receiving the ONS "Doctor". In the works of the candidate, there are original scientific-applied and applied contributions. The candidate in the competition fulfils the minimum national requirements for holding the academic position of "Associate Professor". I reviewed all the publications submitted for review and found that in all of them there are new results. I find no reason to doubt the presence of plagiarism in the scientific papers submitted for the competition, which is confirmed by their publicity, the specific approach and the new results obtained.

The documents and materials submitted by Dr. Ekaterina Ocetova-Dudin meet the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria (RASRB), the Regulations for its implementation and the Regulations for the specific conditions for obtaining scientific degrees and for holding academic positions in IICT. After being acquainted with the materials and scientific works presented in the competition, with the analysis of their significance and with the scientific-applied and applied contributions contained in them, I give a positive assessment and recommend to the Institute of Information and Communication Technologies at BAS to elect Chief Assist. Ekaterina Angelova Ocetova-Dudin, PhD in the academic position of "Associate Professor" in the professional field 5.3 "Communication and Computer Engineering", specialty - "Computer Systems, Complexes and Networks".

September 15, 2021

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