



EVALUATION STATEMENT

6.14.16.09.2021

By Assoc. Prof. Georgi Valentinov Hristov, PhD
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on the materials submitted for participation in the public competition for the academic position "Associate Professor" in the professional field 5.3 "Communication and Computer technologies", Specialty "Computer systems, complexes and networks", announced in issue 45/28.05.2021 of the Bulgarian National State Gazette for the needs of the “Communication Systems and Services” Department of the Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences

1. Compliance with legal requirements

The competition was announced in the Bulgarian National State Gazette, issue 45 from 28.05.2021, for the needs of the "Communication Systems and Services" Department at IICT-BAS. The only candidate is Ch. Assistant Professor Dr. Ekaterina Angelova Ocetova-Dudin. As a member of the Evaluation Committee, appointed with order №178-1 from 16.07.2021 of the Director of IICT-BAS on the grounds of Art. 4, para. 2 of the Law for Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and by decision of the Scientific Council of IICT (Minutes № 6 of 23.06.2021), I have received a complete set of documents, which are corresponding to the requirements for the competition for the academic position "Associate Professor". According to the requirements presented within the “Regulations for specific conditions for acquisition of scientific degrees and for holding of academic positions in IICT- BAS”, the candidates for the academic position "Associate Professor" in the scientific field "Technical Sciences" and in the professional field 5.3 “Communication and computer technologies” must have scientometric indicators that exceed the following minimal requirements: for the Б group of indicators – 100 points and minimum 10 publications that are referenced and indexed in Scopus or WoS; for the Г group of indicators – 220 points; for the Д group of indicators – 60 points; for the Е group of indicators – 20 points.

The points that are calculated by the candidate for all indicators, which I accept are as follows: for the Б group of indicators – 151.07 points and 10 publications that are referenced and indexed in Scopus or WoS; for the Г group of indicators – 227.36 points; for the Д group of indicators – 172 points; for the Е group of indicators – 110 points. The candidate covers the formal requirements of the Regulations and is conforming the quantitative criteria of all groups of indicators.

2. Brief biographical data about the candidate

Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova-Dudin has graduated in 1992 from the Technical University - Sofia with a professional qualification Engineer in Electronics and Automation, majoring in radio and television technology. In March 2015 she defended her PhD dissertation at the University of Ruse "Angel Kanchev" on the topic "Modelling and simulation of rare events in the handover of broadband cellular radio networks", in the professional field



5.3 “Communication and computer technologies”. From 2000 to 2005 she was informatics teacher in the Professional High School “K. Fotinov” in the town of Samokov. At the end of 2005 she was elected as staff member of the College of Telecommunications and Posts in Sofia, initially holding the position of Chief Specialist for Distance Learning, where her main activities were focused on the development and integration of an e-learning centre and the implementation of a software for the ranking of the candidate students. In 2009 she was appointed on the position of Assistant Professor at the College of Telecommunications and Posts in Sofia and since 2015 she was appointed as Senior Assist. Professor at the same HEI.

3. Original scientific, applied and practical contributions

For participation in the competition Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova-Dudin has presented 34 scientific works and their distribution according to the reference for implementation of the minimum requirements of the IICT is as follows: 12 scientific publications that are referenced and indexed in world-renowned scientific databases (Web of Science and/or Scopus) with four of these publications having SJR rank, while the h-index of the applicant in Scopus is found to be 2; 11 scientific publications in unreferenced peer-reviewed scientific journals, with the publications being available on the Internet through the Google Scholar, Index Copernicus, EBSCO, ResearchGate and other databases with two of these scientific publications known to have ASJR and Impact Factor. The contributions of the candidate can be systematized in the following main areas: Sensor computer systems, Computer simulation methods, Remote data exchange and Protection of computer and communication networks and systems.

a. Scientific contributions

The scientific contributions of Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova – Dudin can be systematized as follows:

- An advanced algorithm for simulation study of the probabilities of occurrence of rare events and evaluation of QoS parameters in IPv6 based network architectures has been developed and implemented by applying the method for accelerated simulation RESTART (iterative simulation experiments after reaching specific thresholds), combined with the relative error LRE. The probabilities of blockages in Pareto/Geo/1/N type teletraffic system have been determined [2.4].
- The compression cosine approximation method is applied to approximations of ideal functions with rectangular contours. Using double modulation of the argument, a trigonometric polynomial of fourth degree is derived, which approximates the ideal function with high accuracy. The parameter determining the slope of the S-shaped curve compressing the cosine oscillations is derived. Analytical dependences have been derived [2.14].

b. Applied contributions

The applied contributions of Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova - Dudin, can be summarized as follows:



- A simulation platform (applying the RESTART/LRE method for accelerated simulation) has been proposed to evaluate the efficiency of signal transmission in various traffic models of the fifth-generation networks. An assessment of the impact of the input parameters on the probabilities of errors has been made. The basic requirements towards the fifth-generation networks have been justified [1.6].

- An approach based on UML and Use Case diagram in the field of the human-machine interface has been proposed, allowing the user to control a computer through gestures and using a Kinect sensor. Applications for managing music, photos, "YouTube", maps and movies have been developed [2.5, 2.6].

- An assessment on the probabilistic parameters of the Quality of Service in the study of rare events has been made, which is based on the method of accelerated simulation Importance Sampling [1.1, 1.3, 2.10]. A simulation algorithm and a simulation software implemented in PHP have been developed. The study results have been presented [1.2, 1.4].

- A (.NET-based) software platform for simulation of various scenarios and modules of educational content in the teletraffic engineering has been developed. The platform was used for the training of students at the University of Ruse and at the College of Telecommunications and Posts in Sofia for the purpose of accessibility and experimental clarity of the learning content [1.5].

- The double modulation function in the compressed cosine approximation method was used to estimate the approximation error in the synthesis of one-dimensional digital filters [2.9]. Simulation dependences have been derived.

- A concept for remote data exchange has been developed for recording the health status of patients for consultations, monitoring of the physiological indicators of the body, for distance learning, training and management of a medical care system. A method for diagnostic assessment of the condition of the cardiovascular system (CVS) was proposed, which is based on the remote recording and the subsequent processing of a pulsegram that was taken from the finger of the patient using the photoplethysmographic method. The proposed methodology for remote monitoring of the state of the cardiovascular system is relevant to the treatment of patients that are recovering from COVID-19 [2.21].

- A method for protection of web-based applications from hacker attacks and vulnerabilities in the server operating system, based on the ModSecurity module, has been proposed. Real solutions for protection against different types of HTTP, DoS, DDoS and SQL injection attacks have been described [2.11, 2.13, 2.15].

c. Practical contributions

The practical contributions of Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova - Dudin, can be summarized as follows:

- A laser diode driver has been developed as part of a multimedia laser projector system, which can control the laser beam intensity of red, green and blue laser diodes [1.8]. In addition to its basic functionality, the driver controls the fan, the emergency stop and the operation status indication. The main contribution is in the design of the functional blocks of the driver and the respective functional groups.



- A software for the generation of high-quality laser projections has been developed, which supports CAD data from various design systems. The Graphical User Interface (GUI) of the system was created in FreePascal. Experimental results have been presented, which are confirming the effectiveness of the software in the fashion industry (clothing production) [1.7].

- A complete laser projection system was designed, developed, implemented, tested and presented. An analysis on the efficiency of the multimedia laser projectors in a work environment was made and any problematic aspects of their use were identified in order to eliminate them in future developments. [1.9].

- A wireless network type selection approach, which is based on a comparative analysis of the IEEE 802.11, 802.16 and 802 standards, was proposed. The impact caused on the network throughput by the structure, the number of nodes, the connections between them, the number of channels in the base station and the handover queues were studied. A simulation on main network nodes in the second, third and fourth generation of networks was performed [1.2, 2.1].

- Algorithms and techniques for the implementation of Vertical and Horizontal Handoff in the third, the fourth and the fifth generation of mobile networks were described in order to provide the necessary quality of service to the mobile users that use ultra-high resolution (UHD) services [2.17].

- Methods for mobility management in the 5G, 6G and the Next Generation Wireless Networks were proposed. Handover type selection schemes were proposed [1.11].

- The communication strategy for the distance learning processes in the College of Telecommunications and Posts, which was based on the Moodle platform, was developed. Basic functionalities of the distance exchange used for e-learning and distance learning have been developed. Specific methodological aspects of the communication strategy were described [2.7, 2.8].

- Based on a comparative analysis on the use of the mobile internet in Europe and the world, the indicators included in the Mobile Connectivity Index [2.18] were analysed and discussed. The results of an analysis for the Republic of Bulgaria on each of the indicators included in the Index were presented. The main trends in the market development and the challenges faced by mobile internet providers were presented.

- Studies on the security of the transmitted data in the computer and the industrial networks have been conducted. The specifics have been synthesized and the security problems of the sensor networks based on the IEEE 802.15.4 protocol have been defined. The possible types of attacks and the mechanism for making the most effective decision in the design and operation of ZigBee networks have been studied. An approach to increase the level of security has been proposed [2.2].

- An architectural model of a communication network management system was described, in which the nodes are composed of an object and of a management application, while the connection is made using SNMP (Simple Network Management Protocol) [2.16]. An integrated approach and policies for effective protection have been proposed. The possibilities for combination of SCADA systems and hybrid mesh networks have been substantiated [2.3, 2.19].



4. Critical remarks and recommendations.

The presented materials are corresponding in terms of volume and quality to the requirements and are accompanied by a number of evidences - references, certificates, diplomas, etc. No significant deficiencies in the presented materials or in relation to the scientometric requirements have been detected or identified. Nevertheless, I have the following more significant remarks and recommendations:

- ***The candidate works in a relatively dynamic field, which is interesting from both scientific and applied points of view. Therefore, additional efforts should be made to put the results of the scientific activities into practice.***

- ***The candidate could focus more on publishing scientific publications in prestigious journals in Bulgaria and abroad.***

The presented notes and remarks are mainly recommendatory and in no way invalidate the applied or practical contributions or the overall scientific, applied and teaching activities of Ch. Assistant Dr. Ekaterina Angelova Ocetova - Dudin.

CONCLUSION

The candidate meets all requirements of LDASRB and the Rules for its implementation. The quantitative indicators of the Regulations of IICT-BAS for holding the academic position "Associate Professor" have been covered.

I give my positive vote for the appointment of Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova – Dudin on the academic position "Associate Professor".

I propose to the members of the Evaluation Committee to vote in favour for the awarding of the academic position "Associate Professor" in the professional field 5.3. "Communication and computer technologies", scientific field "Technical Sciences", in the "Communication Systems and Services" Department of IICT-BAS, to Ch. Assist. Prof. Dr. Ekaterina Angelova Ocetova - Dudin.

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Ruse, Bulgaria

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Member of the Evaluation Committee, PhD/

