Review

Assistant Professor Dr. Velin Stoyanov Andonov
in the competition for academic position "Associate Professor"
in the professional field 4.6 "Informatics and Computer Science"
specialty "Informatics (Information modeling and service networks)"

Reviewer: Prof. Stefka Stoyanova Fidanova

By Order No 190 of 06.10.2020 of the Director of the Institute of Mathematics and Informatics at the BAS, Academician Veselin Drenski on the grounds of Art. 4, para. 2 of the law and the decision of the Scientific Council of IMI-BAS (Minutes No. 9 of 25.09.2020). I was appointed a member of the scientific jury under the procedure for the academic position of "Associate Professor" in the professional field 4.6 "Informatics and Computer Science", scientific specialty "Informatics" (Information modeling and service networks), announced for the needs of section "Information Modeling"in the State Gazette no. 70/07.08.2020. As a member of the Scientific Jury I have received all the documents attached to the application to the Director of IMI-BAS of the only candidate for the competition, Assistant Professor Dr. Velin Stoyanov Andonov.

According to the Law on the Development of the Academic Staff in the Republic of Bulgaria, the regulations for its implementation and the specific requirements introduced in the regulations of IMI-BAS, applicants must meet the following requirements:

1. Have acquired a doctorate degree in education and science;
2. Have held the academic position of "Associate Professor" at the same or another higher education institution or scientific organization for at least two academic years;
3. Have submitted published monographs or equivalent publications in specialized scientific editions which do not repeat the ones submitted for the acquisition of the educational and scientific degree "Doctor", the scientific degree "Doctor of Sciences" and for the occupation of the academic position "Associate Professor";
4. Have presented other original scientific works, publications, inventions and other scientific and applied scientific works which are evaluated in aggregate;
5. Meet the national minimum requirements;
6. Not to have plagiarism proven by statutory order in scientific works.

Assistant Professor Dr. Velin Stoyanov Andonov educational and scientific degree "Doctor" (diploma No 000547 issued it 30.03.2015 from Bulgarian Academy of Sciences) on the basis of a defended dissertation.

For Group B requirements, Velin Andonov submitted 8 publications, 5 of them with an impact rank and 3 in the global indexing and referral system, without an impact factor or impact rank, the total number points is 136 for required 100.

For Group G indicators, a total of 14 publications are presented, 1 of them with Impact Factor 0.27 and is in Q4, 9 with Impact Rank, 4 in the World Indexing and Referencing System, without Impact Factor or Impact Rank, and one book chapter. The total number of points is 252 for required 220.

Dr. Velin Andonov submitted 28 citations by other authors. 21 of them are with impact factor or impact rang and 7 are visible in WoS / SCOPUS. The total number of points is 147 with a required 70 under indicator D. He has other 27 citations in dissertations and articles published in conference volumes, which are not included in the concurs materials.

Dr. Velin Andonov participated in two projects, funded by the national scientific fund and one funded by the Ministry of Education and Science. The total number of points is 30 with the required 20 under indicator E.

Assistent Professor Velin Andonov fulfills and, by some indicators, significantly exceeds the national requirements, as well as the specific requirements of BAS and IMI for the academic position of "Associate Professor".

Publications of Dr. Velin Andonov are mainly in the field of generalized nets and their application for modeling various processes and systems. Part of the publications are strongly theoretical. They are aimed at expanding the theory of generalized nets and defining new extensions. The rest are in the field of application of generalized nets for modeling various processes. One of the developed applications is in the recently popular field of modeling in telemedicine. Models of human body systems as well as service systems have been made. Another part of the publications is focused on modeling of telecommunication systems. Other models have been developed in which, in addition to generalized nets, intuitionistic fuzzy systems and index matrices have been applied.

The main contributions to his research can be summarized as follows:

- Contributions to the theory of the GNs
- GNs models in telemedicine/telecare; GNs models of the human body; GNs models of service systems
- Modeling of telecommunication systems
- Other contributions

The first contribution can be classified as scientific, and the other three as scientific-applied.

1. Contributions to the theory of the Gns

A new extension of the class of the ordinary GNs – Generalized Nets with Characteristics of the Arcs (GNCA) is defined. Proof has been made that this is a conservative extension of the standard class of generalized nets, i.e. the operation of such a network can be described by a standard generalized net. The proposed extension allows to define classes of reduced generalized nets with characteristics of arcs, and hence of generalized nets in which only arcs receive characteristics. A possible application of this class of networks in the modeling of transport nets, waterways, etc. is also given. A study was made on the optimization of a generalized net model. It is shown how by applying an inclusion relation the minimum number of transitions and positions can be reached.

2. GNs models

This contribution can be divided into three sub-contributions:

- **GN models of processes in telemedicine/telecare**

A model of a monitoring system for the elderly, people with chronic diseases and people with disabilities has been proposed. It works with sensors that are activated when an event occurs. The information from the sensors is sent to a medical center. The proposed generalized network model analyzes and processes the obtained data and decides on the need for the patient to be visited by a doctor. The model can be used for simulation of various situations and optimization of the medical staff in the respective medical center.

- **GN models of systems of the human body**

Generalized net models of the organs of the human body are proposed. These models can be connect and form model of individual system in the body or the whole body. These models can help understand the state of individual systems in the human body, their functioning and the presence of

pathology, the degree of risk and prognosis for the development of a disease.

- **GN models of service systems**

A systematic approach for modeling service systems is proposed. Models of basic service systems have been made, in particular of telecommunication systems. A model of a queuing system has been made. A model of a biometric access control system has been developed. A model of flexible production systems is also proposed. The model also includes transport units to the warehouse and measuring instruments.

3. Modeling of telecommunication systems

The models of telecommunication systems proposed by the candidate can be divided into three main types of models:

- **conceptual modeling of telecommunication systems**

Different approaches for conceptual modeling of complete telecommunication systems with service quality guarantees have been studied. Basic system assumptions are formulated that facilitate analytical modeling. A method for predicting the values of the parameters characterizing the perceived quality of service in the overall telecommunication system, including the users and the communication network, is proposed.

- **analytical modeling of telecommunication systems**

To obtain an analytical model, a conceptual model of a complete telecommunication system with a queue was used. A classification of the parameters has been made. Basic system assumptions are formulated that facilitate analytical modeling. The obtained analytical expressions for the parameters of the complete telecommunication system is a guarantee for the quality of service of the queuing system. An analytical expression for the traffic intensity is derived. It is shown that generalized networks are suitable for constructing analytical models of a complete communication system.

- **modeling of the quality of service of telecommunication systems.**

The problem of predicting and presenting the perceived quality of a complete telecommunication system is considered. For this purpose, an analytical model was used in which the parameters characterizing the behavior of users, as well as the technical characteristics of the network are considered known.

4. Other contributions

The applicant's other contributions can be summarized as other applications. An auxiliary method was applied in the intercriteria analysis using a three-dimensional index matrix. Formulas for calculating the degrees of correspondence between three criteria are proposed. A description is given with the help of generalized nets of a model of an expert system for a multi-criteria decision-making procedure. The model has been extended to include an intercriteria analysis of the criteria used by the experts. These criteria could change dynamically. With the help of meta-criteria for the closeness of the criteria, lists of "appropriate" and "inappropriate" criteria are obtained.

I have known the candidate since he was a doctoral student. I have excellent impressions of his work.

The materials presented by the candidate are complete and detailed. They contain the necessary information required by law. The contributions are presented concisely and summarized, with emphasis on the significant author's contribution.

CONCLUSION

According to the presented documents, the candidate Velin Andonov fulfills all the requirements of the law and the Regulations to it and the Regulations for the specific requirements for acquiring academic degrees and occupying academic positions at BAS and IMI-BAS. I give a positive conclusion for the selection of Velin Andonov in the competition for the academic position of "Associate Professor" in the professional field 4.6 "Informatics and Computer Science", scientific specialty "Informatics" (Information Modeling and service networks).

I propose that the Scientific Jury unanimously vote on a proposal to the Scientific Council of the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences to select Assist. Prof. Velin Andonov for the academic position "Associate Professor" in the professional field 4.6 "Informatics and Computer Science", scientific specialty "Informatics" (Information Modeling and service networks) .

06.11.2020