

REVIEW

to occupy the academic position:

"Professor"	
"Associate Professor"	X
	one of the academic positions indicated shall be marked with the sign "X"

Candidates to occupy the position:

1	Chief assistant	PhD	Plamen	Vasilev	Vasilev	HTMU
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5	Technical sciences
code	name

Professional area:

5.2	Electrical engineering, electronics and automation
code	name

Scientific specialty:

Automated Systems for Information Processing and Control
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The competition has been announced:

68	13.08.2024	Production Automation	Faculty of Chemistry and Systems Engineering
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	DSc	Krasimira	Petrova	Stoilova	Institute of Information and Communication Technologies – Bulgarian Academy of Sciences
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Chief Assistant	PhD	Plamen	Vasilev	Vasilev
academic position	scientific degree	name	middle name	last name

1.1. Completion of the provided documents:

A) The competition documents are in full compliance with the Regulations	3 points	X
B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

Missing documents and violated requirements must be described if response C is marked.

Ch. Assistant Professor Plamen Vassilev submitted all the necessary documents according to Art. 44. (1) of the Regulations of the HTMU.

1.2. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.

Ch. Assistant Professor Plamen Vassilev meets the minimum requirements according to the Regulations for the Acquisition of Scientific Degrees and the Occupancy of Academic Positions at HTMU (RASDOAP).

Plamen Vassilev fulfills the requirement of:

- Art. 43(2) item 1 of RASDOAP to hold the scientific degree "doctor". Diploma for "Doctor" from 14.10.2016 is presented;
- art. 43(2) item 2 of RASDOAP to have experience as a chief assistant for at least 3 years. He has been working in the "Production Automation" department of HTMU as a chief assistant since 11.05.2017.
- art. 43(2) item 3 of RASDOAP, having submitted 10 publications in specialized scientific publications, which do not repeat those submitted for the acquisition of the educational and scientific degree "doctor";
- Art. 43(2) item 4 of RASDOAP, having submitted a list of published university textbooks;
- art. 43(2) item 5 of RASDOAP, having presented a list of lecture courses taught in the last five academic years;
- Art. 43(2) Item 6 of the RASDOAP as meeting the minimum requirements under Art. 5, paragraph 9.
- art. 43(2) item 7 of the RASDOAP, as no plagiarism in scientific works has been proven according to the law.

The total number of points of the candidate according to the indicators for occupying the academic position "associate professor" is 494.

1.3. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	7 points	X
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
The candidate works on current problems for designing automation systems, robots with application in surgery. It applies modern communication, information and Internet standards in the design and development of systems for operational management of production, in the system integration of systems, in cyber-physical systems, in mobile applications for real and augmented reality.
Models and a method for the integration of high and low pressure nitric acid productions have been established, I.(1). The method is patented, which proves the originality and primacy of the research results.

1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	X
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.
In all publications submitted for the competition, an excellent knowledge of the state of the researched problems is demonstrated.

1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	X

D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

The research is focused on various real productions, systems and applications, which I appreciate positively.

1.6. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	4 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified.

The purpose of research is modern approaches in the design and development of production management systems; of supervisory management systems; mobile applications for virtual and augmented reality and their integration with information systems; production automation. All researches are related to real management objects, which determines their significance for practice.

1.7. Methods of research:

A) Adequate to research and set scientific objectives and /or applications	8 points	X
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with the sign "X"

Methods must be specified. The type of methods used is justified.

Different research methods have been applied depending on the management objects. In complex management systems, decomposition methods have been applied in the production of nitric acid (II.(3)). Modern methods and standards for communication protocols (I.(2), I.(7)) and clustering (I.(2)) have been applied in the information systems. In the design of the architecture of a multifunctional platform-independent operating station intended for surgery, methods of image processing, image recognition, interspatial localization of various types of information (I.(3), (I.(4))), integration of multiple subsystems in the complex system (I.(3)). The system is further developed with a mobile application

for virtual and augmented reality, which allows doctors to improve the diagnosis and surgery of patients (I.(6)).

Optimization methods have been applied to a hydraulic multi-reservoir system with cross connections (I.(7)); in the wood processing industry (I.(9)); an optimization task with 153 input parameters for the management of a nitric acid production plant in Agropolychem AD, Devnya (II.(4)).

For the formalization of the design stages of information systems, UML diagrams are applied (I.(3), I.(8), I.(9), I.(10), II.(12), II.(13), II.(14), II.(15), II.(16)). Modern technologies are applied in the design of operational management systems, as part of them are the Object Linking and Embedding (OLE) technology, OPC (OLE for Process Control), Distributed Component Object Model (DCOM), OLE Automation, ActiveX, the IEC/EN standard 62264, the RAMI 4.0 standard, etc.

1.8. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	
C) They are of scientific and / or applied interest	12 points	X
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with the sign "X"

Contributions must be specified. The type of results achieved must be justified.

The main research contributions relate to three main strands (to a large extent I and II overlap):

- I. Design and development of different types of complex systems (production, information, supervisory, communication, cyber-physical, robotic, mobile applications);
- II. Modern approaches to system integration.
- III. Optimal management of complex systems.

Contributions under direction I

An approach to implement a low-cost Ethernet fault-tolerant network resource management architecture is developed, I.(2). Purdue's model-based implementation of the Hierarchy Management and Functional Characteristics of Honeywell's Expression Process Knowledge System. The latter are commercially implemented with expensive Cisco switches, routers, and software, while I.(2) shows a low-cost solution to implement reliable and high-performance features of enterprise architectures.

A multi-functional platform-independent operating station architecture was developed using the open access Tcl/Tk scripting language, I.(3). This station is an essential element in the design of a control system, as it allows monitoring and control of technological processes. It is a complex system that integrates multiple subsystems and greatly facilitates the designer's work.

Basic principles and approaches of designing operating laparoscopic stations with real-time remote access with the addition of virtual reality for the purpose of simulation of real objects and the interaction between them are presented, I.(4). Aimed at surgery, the stations must provide the operator with complete management of the objects and opportunities for maximum information about the performed actions and their results; current results can be compared with previous results or these stations are means of intelligent control in order to provide multiple functionalities. In this regard, the design of the multifunctional operating station is formalized with UML models, I.(5). The studies from I.(3) - I.(5) are further developed with a mobile application for virtual and augmented reality, I.(6). This enables doctors to improve the diagnosis and surgery of patients. A robotic modular laparoscopic instrument designed for diagnostic and therapeutic procedures in laparoscopic surgery was developed, II.(17). This tool, built on a modular principle, forms a wireless radio network in which the

modules exchange operational information with each other in real time. Research on another group of robotic systems intended for medicine is a group of intelligent robotic devices for minimally invasive surgery presented in II.(18).

The candidate is very well acquainted with the modern standard IEC/EN BDS 62264, enabling the construction of an Operational Production Management System. This standard, accompanied by UML modeling, is applied to electron beam welding processes, I.(8), II.(14); when planning processes in a small woodworking enterprise I.(9), II.(15), II.(16); in the design of information systems with augmented reality II.(10) and information health system, aiming at the processing of big data with results to help the personal doctors in the Bulgarian health system, I.(10); improving an existing architecture to account for the multidimensional nature of production schedules, the interrelationships between production capacities and their continuous change, II.(13); intelligent systems for managing building facilities, II.(9), II.(11), II.(12); development of Operational Production Management Systems in the context of the Industry 4.0 paradigm and accompanying new technologies, II.(8).

Contributions to Modern Approaches to System Integration

The majority of the candidate's publications, in which he applied the IEC/EN 62264 standard to one degree or another, can be attributed to this direction. This standard provides the framework for integrating information from information systems in the various hierarchical levels of management by overcoming information incompatibility. The methods of transmitting the information between the systems of the different hierarchical levels are implemented through relevant communication protocols or through web services. Some of the examples of applying modern systems integration approaches by the applicant are given below.

Mathematical models formalizing the statics of absorption columns for the production of nitric acid have been created, I.(1). A method of integration between high and low pressure nitric acid productions was created, which was patented, implemented in Neochim, Dimitrovgrad and led to high environmental and economic effects.

A module has been developed for connection between a distributed control system MIK-5000 CE and MATLAB, II.(1). OPC Toolbox implements a hierarchical approach to communication with OPC servers. Using the functions of the OPC (OLE for Process Control) Toolbox, the OPC Data Access client object is created, which represents the connection between MATLAB and the OPC server. The ORS client options allow for control of the communication flow.

A methodology for the design of a distributed control system is proposed, with information connections made with an OPC server and CAN protocol, II.(6), and communication in the distributed system for Internet applications is presented in II.(7).

Contributions to Optimal Control of Complex Systems

A parametric stability analysis of a hydraulic multi-reservoir system with cross-connections was conducted to determine the structural design data with the ability to provide the full range of the main properties of the bench platform apparatus, I.(7).

A software product has been developed and implemented for the management of nitric acid production in Agropolychem AD - Devnya. The software product solves an optimization problem with input data of 153 parameters for the control of a nitric acid production plant by changing the assignments of 10 regulators, II.(3). As a result, the production cost was reduced by more than 2.8%.

Control parameters of distillation column regulators (for ethanol and water separation) were determined by means of the software product UniSim Design Suite and the control was simulated by means of certain control variables II.(4).

I highly appreciate the application of the candidate's scientific research in the process of training students in automation of technological processes at HTMU, I.(2), II.(3); training on distributed control systems with the integration of devices of different manufacturers in the "Production Automation" department at HTMU II.(6); in parametric analysis of a hydraulic multi-reservoir system with cross connections, I.(7); in the integration between a distributed control system and a supervisory control system MIK 5000 I, II.(1); in modeling the processes and control systems in an ethanol-water mixture rectification column, II.(5). An environment has been developed for training in modeling and management of technological objects in HTMU, II.(4), II.(5), II.(6), II.(7).

An approach to teaching laparoscopy to surgeons and medical students is presented, I.(6).

1.9. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	X
B) The candidate has at least an equal participation in most of the submitted papers	7 points	
C) The candidate has a secondary participation in most of the submitted papers	4 points	
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked.

Plamen Vasilev submitted 28 publications for the competition. Of these, 12 are indexed in SCOPUS. Of them, 5 are with SJR (I.(1), I.(2), I.(4), I.(7), I.(8)). One publication is to quartile Q2, I.(4) and 3 publications are to Q3 (I.(1), I.(2), I.(7)). There are 3 independent publications (2 of them are indexed in SCOPUS). Since no separation protocols have been submitted for joint publications with other authors, the candidate's participation in them is judged by the candidate's position in the team of authors.

From the first list of publications (10 indexed in prestigious databases), the candidate is first in 3 positions – I.(5), I.(8), I.(9); it is in second place in 1 publication – I.(4); it is in third place in 3 publications – I.(6), I.(7), I.(10).

From the second list of publications, 2 are in publications indexed in SCOPUS - II(10), II(13) and 16 are in non-refereed publications. Of these, the candidate has 1 independent publication II(1); first place in joint publications with other authors is in 8 positions –II(4), II(6), II(7), II(9), II(11), II(12), II(14), II (15); it is in second place in 3 publications – II(3), II(8), II(16); in third and further place is in the remaining 4 publications - II(2), II(5), II(17), II(18).

I believe that the candidate has equal participation in the works presented.

1.10. Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.

Ch. Assistant Professor Plamen Vasilev has participated in the preparation of study programs for the past five years and has been assigned lectures for the Bachelor's and Master's programs at the HTMU in the disciplines: Automation of technological processes, part I; Design of control systems; computer control systems; Biomedical measurements, technical devices and apparatus; Industrial control systems; Information and management systems; Industrial controllers and actuators; Industrial measurements and sensors; Programmable logic controllers; Design of information management systems; Cyber physical systems.

Under his leadership, for the last five years, 12 diploma theses have been developed and successfully defended for the acquisition of the Bachelor's and Master's educational degree.

1.11. Critical notes:

A) Lack of critical notes	8 points	
B) Critical notes of a technical nature	7 points	X
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	
D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

An inaccuracy was admitted in the naming of publications II.(3) – II.(5) in the file directory compared to the list of publications from Appendix 5a.

The publication list should note those with SJR and quartile, which is done only for I.(4); for the other 4 it is not reflected (I.(1), I.(2), I.(7), I.(8)).

The list of citations from Appendix 5b does not correspond to the numbering of the List of scientific works under the competition.

The list of citations should be prepared better:

- Cited publications should be numbered according to the list of publications;
- Points from citations of non-refereed publications according to indicators 13 and 14 of Appendix 1z are not applied, which determines a greater number of points from citations of the candidate.
- There are two self-citations from the List of citations (Appendix 5b) – for publications №16 and №31 (these citations as points the candidate did not include in Appendix 5b, but should not be allowed).

The remarks above are of a technical nature and do not detract from the candidate's achievements.

1.12. Conclusion

A) The evaluation of the candidate's activity is POSITIVE	This evaluation is assigned to a total number of at least 65 points	X 91 p.
B) The evaluation of the candidate's activity is NEGATIVE	This evaluation is assigned to a total number below 65 points	
		one of the answers given

		is marked with the sign "X"
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To be filled in if requested by the reviewer
<p>All the requirements of the Law on the Development of the Academic Staff, the Rules for its Implementation and the Rules for the Specific Conditions for Acquiring Scientific Degrees and Holding Academic Positions at HTMU-Sofia have been met. Based on the presented materials, scientific and applied contributions, as well as the complex evaluation of the other indicators of the competition, I give a positive assessment and I recommend to the Honorable Jury to propose to the Faculty Council of HTMU to elect the Assistant Professor PhD Plamen Vasilev on the academic position "docent" in professional direction 5.2 Electrical engineering, electronics and automation in the specialty "Automated systems for information processing and control" in the department "Automation of production".</p>

15.11.2024	The review was written by:	
date		signature