Appendix 12c

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	Assistant Prof.	Doctor	Plamen	Vasilev	Vasilev	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5.	Technical Sciences
code	name

Professional area:

5.2	Electrical engineering, electronics, automation
code	name

Scientific specialty:

Automated systems for information processing and control

The competition has been announced:

68	13.08.2024	Dept. of Industrial Automation	Chemical and System Engineering
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	Doctor	Idilia	Alexandrova	Batchkova	UCTM
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Assistant Prof.	Doctor	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.
No missing documents!

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.

The candidate participates in the competition with 10 publications, referenced and indexed in SCOPUS, equivalent to a monographic work, carrying 155 points under indicator group B. With these publications, the candidate has not participated in previous procedures and they are not included in determining the points under indicator D, which amount to 18, carry 209 points and cover the minimum requirements for this group of indicators, which is evident from the comparative table presented below. The total number of points from citations (group D) amounts to 60, i.e. these are the points from 6 citations in publications, referenced and indexed in SCOPUS of 3 of the publications submitted for the competition (with numbers 4, 6 and 5 from the list of publications from group B). The candidate has also submitted additional noted citations - a total of 42, of which 26 in publications, referenced and indexed in SCOPUS. They are rated at 302 points.

Group of indicators	Content	Assoc. Professor	Assist. Prof. Vasilev
А	Indicator 1	50	50
Б	Indicator 2	-	-
В	Indicator 3 or 4	100	155
Г	Sum of indicators from 5 to 11	200	209
Д	Sum of indicators from 12 to 15	50	60 +302
Е	Sum of indicators from 16 to the end	-	20

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	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	**X**
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 research activities of Assistant Prof. Dr. Plamen Vasilev cover thematic areas, the successful development of which is crucial for the progress of the “Industry 4.0” initiative and digital transformation. The top 10 technologies include: Big Data & Analytics, Autonomous Robots, Simulation/Digital Twins, Horizontal/Vertical Systems, Industrial Internet of Things (IIoT), Cybersecurity, Cloud Computing, Additive Technologies, Artificial Intelligence, Augmented Reality. Dr. Plamen Vasilev's research covers 60% of the key technologies for “Industry 4.0”, which is undoubtedly a sign of the relevance of the research.

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.

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.

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 main objectives of the research activity presented by the candidate are related to: 1. Modern approaches to the design and development of Manufacturing execution systems (MES) Manufacturing Operations Management Systems (MOM). 2. Formalization of the stages of design and development of information systems. 3. Design and development of supervisory systems for control and data collection and visualization 4. Design and development of mobile applications for virtual and augmented reality and their integration with information systems for various purposes 5. Modern approaches to system integration 6. Production automation 7. Cyber-physical systems 8. Mathematical modeling and optimization of technological processes 9. Robotics

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.
1. An approach to design and development of systems for Manufacturing execution systems (MES), based on the reference models offered in the IEC 62264 standard 2. MDD approach, based on UML, for formalizing the stages of design and development of information systems. 3. Supervisory control methods 4. Methods for communication between devices and systems with different communication capabilities based on standard protocols 5. Method for design and development of mobile applications for virtual and augmented reality and their integration with information systems for different purposes 6. Methods for finding optimal control of operating modes of complex interconnected objects and installations and studying the effect of the proposed solutions in specific examples 7. Approaches to the implementation of cyber-physical capabilities of assets without built-in intelligence 8. Mathematical modeling of complex multi-connected industrial objects

9. Development of robotic, wireless devices with proposed application in minimally invasive surgery.

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	**X**
C) They are of scientific and / or applied interest	12 points	
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.

I. In the field of design and development of MES/MOM systems, I note the following main contributions:

1. An approach is proposed to solve the problem of uneven scheduling of small batches in a woodworking enterprise at progressive electricity prices after exceeding previously requested batches. The problem is reduced to solving a multi-criteria optimization problem using the knapsack method. The use of an “elastic” knapsack is proposed, in which order planning continues as long as the progressive electricity price is acceptable. [I.(9)]
2. A concept for the development of MES/MOM systems in the light of the “Industry 4.0” paradigm is developed. [II. (8)]
3. For the purpose of optimal maintenance planning, the following two standards have been harmonized: ANSI/ASHRAE/ACCA Standard 180-2008 “Standard Practices for Inspection and Maintenance of Building Ventilation, Heating, and Air Conditioning Equipment” and the IEC 62264 standard. [II. (9)]
4. An augmented reality application ARMOR has been developed, based on the IEC 62264 “Operation Definition” model, the “Unity” development platform, and the Vuforia SDK development environment. ARMOR communication with the MOM4 MES/MOM system has been implemented. [II. (10)]
5. An existing architecture based on the IEC 62264 production capability model has been streamlined to take into account the multidimensional nature of production schedules, the interconnections between production capacities, and their continuous change. [II.(13)]
6. For the purpose of developing an MES/MOM system, UML models and diagrams of electron beam welding processes based on the IEC 62264 standard have been developed [II.(14)]

II. In the field of formalization of the design and development stages:

7. A model driven approach using UML has been developed for:
   - design of the architecture of the software system of a multifunctional operator station [I.(5)];
   - description of production resources in the field of electron beam welding [I.(8)];
   - modeling of planning processes according to the IEC 62264 standard, taking into account the specifics of a woodworking SME. Use cases in the planning process have been described using UML diagrams and as a result a model has been proposed, described by a diagram of activities for the phasing of scheduling of production orders [II.(15), II.(16)].

8. Some guidelines for optimizing healthcare and improving patient care in Bulgaria using UML and the personnel model from the IEC 62264 standard are summarized and conceptually presented [I. (10)].

III. In the field of design and development of supervisory systems for control and data collection and visualization

9. A multifunctional, platform-independent operator station architecture has been proposed, based on the low-level programming language Tcl/Tk; [I. (3)]
10. A mobile application for virtual and augmented reality has been developed as an upgrade to the proposed operator station [I. (4)]
11. Integration between Distributed Control System (DCS) and Supervisory Control and Data Acquisition System (SCADA) MIK 5000Se with Matlab has been implemented, using the OPC DA communication protocol and Matlab OPC Toolbox. [II. (1)].
12. A training environment for modeling and control of technological objects at the UCTM has been developed using the UniSim Design Suite software product [II. (5)]

IV. In the field of design and development of mobile applications for virtual and augmented reality

13. A modified mobile application for virtual and augmented reality has been developed for the operator station for laparoscopic operations. A three-dimensional model of human organs (liver) has been added, which is visualized when receiving signals from the laparoscopic instrument. [I.(6)].
14. A mobile application for augmented reality has been developed to present information about the procedures for servicing and maintaining a given facility when identifying it based on the model for defining operations according to the IEC 62264 standard [II. (10)].

V. In the field of modern approaches to system integration

15. A low-cost, fault-tolerant, distributed network architecture has been implemented, based on best practices and recommendations for each hierarchical level. [I.(2)].
16. An integration between a distributed control system (DCS) and a supervisory control and data acquisition system (SCADA) MIK 5000Se with Matlab has been implemented, using the OPC DA communication protocol and Matlab OPC Toolbox. [II. (1)]
17. A comparative analysis of blade servers from different manufacturers has been made, and generalized selection criteria have been selected. [II. (2)]
18. A communication interface module has been implemented, allowing web communication, using traditional OPC technologies. [II. (7)]
19. A heterogeneous communication environment has been implemented for data transmission between devices supporting the CAN protocol to devices and systems supporting OPC communication. [II. (6)]

VI. Production Automation

20. Simulation models of a distillation column have been developed using the UniSim Design Suite software product. Static and dynamic modes of operation of the column have been studied, on the basis of which control variables have been selected and the process control has been simulated. [II. (3)]
21. A SETPOINT software product has been developed to solve an optimization problem in the control of a nitric acid production installation with input data for 153 variables, by changing the assignments of ten regulators. The software product has been implemented as part of the second level of nitric acid production control in Agropolychim AD – Devnya. [II. (4)]

VII. Cyber-physical systems

22. Based on a comparison of the RAMI4.0 and IEC/EN BDS 62264 standards, a solution for developing an administrative shell of I4.0 component models without built-in intelligence has been presented. [II. (11), II. (12)]

VIII. Mathematical modeling and optimization of technological processes

23. Mathematical models have been developed describing the statics of absorption columns for nitric acid production. [I. (1)]
24. A software package has been developed for simulating the behaviour of absorption columns in nitric acid production. [I. (1)]

25. New properties of interconnected objects have been defined, which characterize and evaluate the change in the behaviour of interconnected objects with cross-links. [I. (7)]

IX. In the field of robotic devices

26. Wireless robotic devices have been developed as part of a tool for minimally invasive and laparoscopic surgery, as follows:
    - a device that detects sudden negative changes in the heart rhythm and warns the personnel performing the procedure [II.(17)];
    - A robotic diagnostic device that records the reactions of tissue formations to mechanical force micro-impacts [II.(18)];
    - A robotic therapeutic device [II.(18)];
    - A robotic device for wireless monitoring of tissue formations [II.(18)].

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.

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.

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.
1. The competition documents lack information about the candidate's participation in research and educational projects and their management, although the candidate has participated and is participating in and has managed such projects. Although there is no mandatory minimum for the indicators from group E, it is desirable for the candidate to fill in the value of each of them in good faith. 2. I recommend that when citing standards, the use of the abbreviation BDS be avoided, as is the case with the IEC 62264 standard. International standards are accepted by BDS with a translation only on the title page of the standard.

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**
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"

To be filled in if requested by the reviewer
Based on the assessment of the candidate's research and teaching activities, the relevance and significance of the contributions in the submitted works, leading to a total score of 93 points, I consider it reasonable to propose to the Honorable Jury of the announced competition (SG No. 68 of 13.08.2024) to submit a report to the Faculty Council of the Faculty of Chemical and Systems Engineering, Assistant Professor Dr. Plamen Vasilev Vasilev to take up the academic position of ASSOCIATE PROFESSOR at UCTM-Sofia in the professional field 5.2. "Electrical Engineering, Electronics and Automation", in the scientific specialty "Automated Systems for Information Processing and Control (by Industries)".

18.11.2024	The review was written by:	
date		signature