

## OPINION

by Eng. Dimitar Mihaylov Tokmakov, PhD

Professor at the ECIT department, Faculty of Physics and Technology,

University of Plovdiv "Paisii Hilendarski"

on the dissertation for the award of the educational and scientific degree "PhD"

by: field of higher education: *5 Technical sciences*

Professional field : *5.3. Communication and computer engineering*

Doctoral programme: "*Automation of areas of the intangible sphere (medicine, education, science, administration, etc.)*"

**Author: Veselin Zdravkov Mengov**

**Topic: "System for remote access to training resources in the field of telecommunication and information systems"**

**Scientific supervisor: Assoc. Prof. Sotir Sotirov - Paisii Hilendarski University of Plovdiv**

### **1. General presentation of the procedure and the PhD student**

By Order No. RD-21-2152 of 23.11. 2023 of the Rector of Plovdiv University "Paisii Hilendarski" (PU) , I have been appointed as a member of the scientific jury for the procedure for the defense of a dissertation thesis on "Remote access system to training resources in the field of telecommunication and information systems" for the acquisition of the educational and scientific degree "Doctor" in the field of higher education 5. Technical sciences, professional field, 5.3. Communication and computer engineering, doctoral programme Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.).

The author of the dissertation is Veselin Zdravkov Mengov - a PhD student in full-time studies at the Department of ECIT with scientific supervisor Assoc. Prof. Dr. Sotir Ivanov Sotirov from Plovdiv University "Paisii Hilendarski".

The set of paper materials submitted by Veselin Zdravkov Mengov, is in accordance with Article 36 (1) of the Regulations for the Development of the Academic Staff of PU and includes the following documents: Application to the Rector of PU for the opening of the dissertation procedure; CV in European format; minutes of the departmental council related to the reporting of the readiness for the opening of the procedure and the preliminary discussion of the dissertation; dissertation; abstract; list of scientific publications on the topic of the dissertation; copies of

scientific publications; declaration of the authenticity and reliability of the attached documents; statement of compliance with the minimum national requirements. The doctoral candidate has attached 6 copies of his publications on the subject of the dissertation.

All necessary and required documents and materials have been submitted, in accordance with Article 36 (1) of the Regulations for the Development of the Academic Staff University of Plovdiv Paisii Hilendarski and the Law on Academic Staff Development of Plovdiv University. All of them have been prepared diligently and correctly.

Vesselin Mengov has completed his secondary education at the Technical School of Electrotechnics and Electronics in the town of Plovdiv in 1998. He completed his higher education in 2010 at Paisii Hilendarski University - Plovdiv, with a degree in Computer Science - Bachelor of Science. From 2014 to 2015, Vesselin Mengov graduated in Software Technologies, Master's degree at Paisii Hilendarski University of Plovdiv.

From 2007 to 2022, he worked as a system administrator in software and computer network support at the Agrarian University - Plovdiv. From 2022, he was appointed as Assistant Professor of Communication and Computer Engineering in the Department, ECIT, of the Faculty of Computer Science, Paisii Hilendarski University of Plovdiv.

I know Veselin Mengov personally, as my good impressions about his qualification in the field of information technology are acquired during his training as a PhD student in the Department of ECIT, as well as from the results he has achieved in teaching laboratory exercises with students from the Faculty of Physics and Technology of Paisii Hilendarski University in the disciplines "Computer Networks" and "Embedded Microprocessor Systems".

## **2. Topical relevance**

On the basis of the literature review and the analysis carried out, it can be seen that the development of new versions and systems for remote access to learning resources, as well as remote laboratories is a current and active direction in modern scientific research worldwide.

The tasks set in the dissertation are currently very relevant: Study and analysis of the existing systems for remote access to learning resources (systems for managing remote laboratories), as well as the requirements that they must meet; Formulation of the main characteristics and parameters of the system for remote access to learning resources to be used for the needs of students studying in the field of technical sciences; Design and development of a system providing

remote access to a series of o Conducting experiments with students and faculty to use the developed system. Analysis of the experimental results obtained;

### **3. Knowledge of the problem**

The reference list contains 99 publications. Most of the cited sources are articles in journals indexed in Scopus and Web of Science.

Most of the publications are in English. Most of the cited sources were published after 2005, which indicates the existence of a thorough analysis of the current state of the art. In the process of working on the dissertation, the PhD student evaluated and interpreted the literature creatively, using his own ideas in the development of the algorithms, software, hardware and overall systems tested.

### **4. Research methodology**

The development of the prototype and software implementation of the remote access management system for learning resources is the focus of the research. The stages through which the development of the system for remote access to training resources is described are as follows: 1) Selection of a software model (methodology) for the development of the system. This model is the framework that is used to structure, plan and control the process of software system development; 2) Formulation of the main characteristics and parameters of the system for remote access to real laboratory equipment based on the literature study; 3) Development of system prototype; 4) Selection of system software development technologies; 5) Selection of system software architecture; 6) Development of system user interface; 7) Development of system software functionality; 8) Development of system database;

Designed and developed a remote laboratory, with its laboratory hardware-software mock-ups in the field of telecommunications, which is successfully connected to the software module of the remote access system.

Two laboratory exercises have been developed for the remote laboratory: 1) A laboratory exercise to study amplitude modulation; and 2) A pulse-code modulation study using a remote laboratory. Manuals for the remote access system for both laboratory exercises are also provided.

### **5. Characteristics and evaluation of the thesis and contributions**

Chapter I presents an overview of the study and analysis of remote access learning resource systems.

Chapter II describes the design and development of a remote access learning resources system. Chapter III describes the design and development of the remote lab. Chapter IV presents a specially designed exercise for students, "Amplitude modulation research using remote lab". In Chapter V, a laboratory exercise for students is presented: 'Investigation of pulse-code modulation by remote laboratory'.

Chapter VI describes: "Evaluation of remote access system for learning resources".

In the Conclusion, the scientific and applied contributions of the thesis are framed, which I consider to be built on reliable material, since the Appendices and Chapter VI show very detailed tables with the results of the experiments performed.

## **6. Assessment of publications and personal contribution of the PhD student**

The main content, results and contributions of the dissertation are presented in six publications. All are written in English. In one of the publications Veselin Mengov is the only author and it is indexed by Scopus.

The other five publications presented at international conferences have been reviewed but are not indexed by Scopus or Web of Science.

I believe that the PhD student's publications on the dissertation reflect well the main contributions claimed. My assessment of the doctoral student's personal involvement in the dissertation research is that it is unquestionable.

## **7. Abstract**

The abstract has been prepared according to the requirements of the relevant regulations, and reflects the main results achieved in the dissertation.

## **8. Recommendations for future use of the dissertation contributions and results**

It would be good to apply the results obtained in this dissertation in new developed laboratory exercises in Telecommunications, so as to obtain a whole course, the effectiveness of which could be evaluated by the applied methodology.

## **CONCLUSION**

The dissertation of Vesselin Mengov contains scientific and applied results, which represent an original contribution to science and fully meets the requirements of the Law for the Development of the Academic Staff of the Republic of Bulgaria, the Regulations for its implementation and the Regulations for the Conditions and Procedure for the Acquisition of Scientific Degrees at Paisii Hilendarski University of Plovdiv. The attached abstract reflects the

essence of the research and correctly presents the contributions. The dissertation shows that Veselin Zdravkov Mengov possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.)", demonstrating qualities and skills for independent scientific research. Taking into account the merits, topicality, significance of submitted dissertation, I give it a positive evaluation and propose to the jury to award to Veselin Zdravkov Mengov the educational and scientific degree "DOCTOR" in scientific field 5 Technical sciences, 5.3. Communication and computer engineering, doctoral program "Automation of areas of the intangible sphere (medicine, education, science, administrative activity, etc.)".

23.01.2024

Prepared by:.....

/prof. Dr. Dimitar Tokmakov/