

## OPINION

by **Dr. Vladimir Vassilev Monov**,

**professor at the Institute of Information and Communication Technologies - BAS**

on a dissertation for obtaining the educational and scientific degree

**"doctor"**

field of higher education: 4. *"Natural sciences, mathematics and informatics"*

professional direction: 4.6. *"Informatics and Computer Science"*

doctoral program: *"Informatics"*

### **Author:**

M.Sc. Christian Nedelchev Milev

**Title:** "Intelligent Personal Tour Guide"

**Scientific supervisor:** Prof. Dr. Asya Stoyanova-Doycheva, "Paisii Hilendarski" University of Plovdiv

### **1. General description of the procedure and the presented materials**

By order No. ПД-21-906 dated 26/04/2024 of the Rector of Plovdiv University "Paisii Hilendarski", I have been appointed as a member of the Scientific Jury for the defense of the dissertation. With the decision of the Scientific Jury from a meeting held online in the period 29.04.2024–30.04.2024, my participation in the work of the Scientific Jury was determined by preparation of an opinion on the dissertation.

The set of materials presented by M.Sc. Christian Nedelchev Milev is in accordance with Article 36 (1) of the Regulations for the Development of the Academic Staff of the PU and includes the following documents:

- request to the Rector of the PU to disclose the procedure for defense of a dissertation work;
- CV in European format;
- protocol from the Departmental Council of the "Computer Systems" department for preliminary discussion of the dissertation work;
- dissertation work;
- abstract in Bulgarian and English;
- list of scientific publications on the topic of the dissertation;
- copies of scientific publications on the topic of the dissertation;
- declaration of originality and authenticity of the attached documents;
- certificate of fulfillment of the minimum national requirements for obtaining the educational and scientific degree "doctor"
- opinion of the doctoral student's supervisor.

The attached documents comply with the regulatory requirements set by the ZRASRB and the Regulations for its implementation for the acquisition of the educational and scientific degree "Doctor".

## **2. Relevance of the dissertation topic**

The dissertation is dedicated to the development of an intelligent tourist assistant providing personalized services for the attractive presentation and promotion of cultural heritage tourist sites. The use of modern information technologies in this area provides opportunities for the creation and implementation of innovative technological solutions that go beyond traditional tourist services and contribute to the development of modern cultural tourism. The dissertation topic is in accordance with the perspectives laid down in the Strategy for the Development of Cultural Tourism in Bulgaria and is distinguished by its current and significant character, as well as its potential for scientific and scientific-applied contributions.

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

The introduction and the first chapter of the dissertation contain a detailed overview and study of the existing approaches in the construction of intelligent tourism platforms. A comparative analysis of developments related to the dissertation research was made, including: *Recommending systems in tourism*, *Interactive tourist guides*, *Tourist systems using agents*, *E-tourism*. The presented material in this part of the dissertation shows in-depth knowledge of the matter and the current problems in the researched area, on the basis of which the goals and tasks of the dissertation work are reasonably formulated.

## **4. Characterization and evaluation of the dissertation work and contributions.**

The dissertation has a volume of 112 pages and consists of an Introduction, 3 chapters and a Conclusion. A list of figures in the text is presented, containing 31 figures. The list of bibliographic sources includes 126 titles, including sources from Bulgarian and foreign authors, as well as Internet sites. The list of publications on the dissertation topic contains 4 titles. According to the requirements, a Declaration of originality of the obtained results is attached to the dissertation.

The individual chapters of the dissertation are developed in detail and systematically and contain the conclusions made in a synthesized form. The analytical overview in Chapter 1 served as a substantive basis for developing the author's solutions in the next chapters of the dissertation. In Chapter 2, a three-layer service-oriented architecture of a tourist guide (TG) is proposed, whose functional capabilities are realized in the environment of a virtual physical space (ViPS). Based on the proposed architecture, in Chapter 3 a prototype of a TG mobile application is developed, using a database and a network of ontologies to represent the cultural-historical objects. In the final part of the dissertation, the obtained results are summarized and the contributions are listed, and various possibilities for continuing the dissertation research are also outlined. Overall, the dissertation reflects the author's extensive research work and convincingly presents the results obtained.

I accept and positively evaluate the results noted in the dissertation and the abstract. In my opinion they can be determined as contributions of a scientific and scientific-applied nature as follows:

- An intelligent tourist guide architecture has been developed as a cyber-physical space according to the reference architecture of ViPS;
- Intelligent services are defined in the architecture of the tourist guide: generation of a tourist route, recognition of folk costumes;
- A prototype of the presentation layer of the tourist guide was developed;
- A mobile application has been developed for the functionalities of the tourist guide;
- An application was developed for generating questionnaires and compiling personalized user profiles;

The listed contributions are particularly connected and fully meet the set goals and objectives of the dissertation work. The relationship between the tasks set, their development in the structure of the dissertation, the results obtained and the publications made is correctly reflected in Table 1 on page 98.

### **5. Assessment of the publications and personal contribution of the doctoral student**

4 co-authored publications on the dissertation topic are presented, 3 of which are in editions indexed in the Scopus database. The publications reflect essential parts and main results of the conducted research and meet the requirements for acquiring the educational and scientific degree "doctor".

Acquaintance with the dissertation and the publications on the dissertation topic gives me grounds to consider that the dissertation work and the contributions to it are the personal work of the doctoral student. I am not aware of any plagiarism.

### **6. Abstract**

The abstract has a volume of 32 pages in Bulgarian and English and meets the requirements for its formatting. Its content corresponds to the content of the dissertation and accurately presents the main results of the dissertation work.

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

The dissertation contains directions for future research work, which essentially represent a logical continuation and development of the dissertation contributions and results. They are related to the development of additional personalization functions, more precise algorithms for generating tourist routes, use of augmented and virtual reality, etc.

Regarding the publication activity of the doctoral student, it could be noted that all the publications on the dissertation work are co-authored, which shows the built-in capabilities for teamwork. My recommendation to the author is to continue the research activity in accordance with the outlined guidelines for future work, as well as to prepare and publish independent publications in prestigious international editions.

## CONCLUSION

The dissertation contains scientific and scientific-applied results, which represent an original contribution to science and meet all the requirements of ZRASRB, the Regulations for its implementation and the relevant regulations of Plovdiv University "Paisiy Hilendarski". Doctoral student Christian Nedelchev Milev possesses in-depth theoretical knowledge and professional skills in the scientific specialty "Informatics", demonstrating qualities and skills for conducting scientific research.

I confidently give my positive assessment of the presented dissertation work and the results and contributions obtained in it. I propose to the Honorable Scientific Jury to grant the educational and scientific degree "doctor" to M.Sc. Christian Nedelchev Milev in the field of higher education: 4. "Natural sciences, mathematics and informatics", professional direction 4.6. "Informatics and Computer Science", Doctoral Program "Informatics"

20.05. 2024.

**Opinion prepared by: .....**

/Prof. Dr. Vladimir Monov/