

# STATEMENT REPORT

under the procedure for acquisition of the educational and scientific degree “Doctor”

by candidate **Kristin Ilieva Aleksandrova**

of the PhD Thesis entitled: “**Semantic Technologies in eHealth**

(Application of Machine Learning Technologies in  
Supporting Independent Living of the Elderly and  
Disadvantaged “

In the Scientific field: 4. Natural Sciences, Mathematics and Informatics

Professional field: 4.6. Informatics and Computer Sciences

in

Doctoral program “**Information Systems**” - **Knowledge-based Systems**

Department „**Computer Informatics**”,

Faculty of Mathematics and Informatics (FMI), Sofia University “St. Kl. Ohridski” (SU),

The statement report was prepared by: **Prof. Dr. Maria Petkova Hristova**, Todor Kableshev University of Transport, Sofia, as a member of the scientific jury, according to the Order № RD-38-199/26.04.2024 of the Rector of Sofia University.

## **1. General characteristics of the dissertation thesis and the presented materials**

The dissertation is presented in English and has a total length of 181 pages (the body of the dissertation is 157 pages). It consists of an introduction, three chapters, a conclusion, a bibliography (with 103 references and internet sources), a list of the scientific works on the dissertation and on papers presented at scientific conferences, a list of figures and tables in the work (66 figures and 12 tables), and three appendices.

All the documents presented in the dissertation defense kit are accurately and precisely prepared according to the requirements of the Regulations for the Application of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for the Conditions and Procedure for Acquisition of Scientific Degrees and Holding Academic Positions at the Sofia University “St. Kliment Ohridski”.

## **2. Short CV and personal impressions of the candidate**

Kristin Ilieva Aleksandrova has a Bachelor's degree in Computer Science and a Master's degree in Artificial Intelligence from the Faculty of Mathematics and Informatics of "St. Kliment Ohridski". From 2014 to 2017 she was a visiting assistant professor at the Faculty of

Mathematics and Computer Science. Since 2016 she has been working as Product Manager and Product Owner at SAP Labs Bulgaria Ltd. and since November 2022 until now she has been Product Manager at SAP SE - Walldorf, Germany. In 2020, she is enrolled as a part-time PhD student at the Department of Computer Informatics, FMI, PhD program.

I do not know the PhD student personally, but I attended as a guest the meeting for preliminary discussion of the dissertation and I am familiar with the work of Kristin Ilieva Alexandrova. I am impressed by the excellent presentation she made and the answers she gave to the questions asked.

### **3. Content analysis of the scientific and applied achievements of the candidate, contained in the presented PhD thesis and the publications to it, included in the procedure**

The dissertation is devoted to semantic technologies in eHealth with a main focus on the application of machine learning technologies to support independent living for the elderly and disadvantaged. This is undoubtedly a hot topic in the field of computer science, in particular knowledge-based systems.

The clearly defined aim of the dissertation, the well-reasoned and specifically formulated tasks to achieve the aim, the literature review, analysis and conclusions testify to a very good knowledge on the part of the doctoral candidate in the theoretical and applied aspects of the state-of-the-art in the problem area, the subject of the research. The methodology used to realize the aim of the dissertation is adequate and appropriately chosen. It contributes to the achievement of the main goal and the fulfillment of the set tasks of the research, which is proved by the presented results. The rules of good language and scientific style of writing research papers have been observed.

In the introduction of the dissertation, the history of the concept of Ambient Assisted Living (AAL) is discussed and the relevance of the topic is justified. A problem statement is made, three research questions and a hypothesis are formulated, and the purpose of the dissertation is defined. In chapter one, a prototype architecture of an OpenRemote-based AAL system is proposed and a simulation of the target scenario is performed. In chapter two, 15 requirements for the prototype system and its behaviour in compliance with the EU General Data Protection Regulation 2016/679 are derived. The third chapter solves the problem of exploiting the capabilities of neural networks for problem solving in the domain studied by the PhD student. The conclusion provides a detailed analysis and summary of the results

obtained in the thesis, which in my opinion are original and in line with the stated aim and objectives.

I accept the author's claims of scientific, scientific and applied contributions to the research area. They can be attributed to the categories of enrichment of existing scientific knowledge and scientific achievements in practice, as well as creation of new and modification of existing methods, approaches, models and algorithms for solving the problems set in the dissertation. I believe that the aim of the PhD has been achieved. The proposed perspectives and directions for the development of the topic are correctly presented and achievable.

#### **4. Approbation of results**

Kristin Alexandrova has presented three independent scientific publications, which is an excellent testimonial of her potential for successful research work. Two of the publications have been indexed in Scopus in an SJR publication and one is under review for a scientific journal. The PhD student has also presented papers in 4 scientific conferences. I believe that the results of the dissertation are well presented to the scientific community and that the dissertation and the original results obtained are the personal work of the PhD student.

The PhD student's scientific works meet the minimum national requirements (according to Article 2b, paragraphs 2 and 3 of the Law on Research and Development) and the additional requirements of St. Kliment Ohridski" for obtaining the educational and scientific degree "PhD" in the professional field 4.6. Doctoral degree in Ph. No plagiarism has been proven in the submitted dissertation and scientific works.

Part of the research was carried out by the PhD student within the Project BG05M20P001-1.002-0011 "Centre of competence MIRACle - Mechatronics, Innovation, Robotics, Automation, Clean technologies".

#### **5. Qualities of the abstract**

The abstract is in two versions - in Bulgarian and English, with a length of 45 pages and 26 titles of cited literature. It correctly reflects the content of the dissertation, the main points of the research, as well as the results achieved. It is structured correctly and complies with the requirements of the Regulations for the Implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations for the Conditions and Procedure for Acquisition of Scientific Degrees and Occupation of Academic Positions at Sofia University "St. Kliment Ohridski".

## **6. Critical notes and recommendations**

I have no critical remarks. I recommend the PhD student to continue the research, as the topic is of high applicability and broad prospects for development.

## **7. Conclusion**

Having read the dissertation and the accompanying scientific publications, and based on the analysis of their significance and the scientific, applied and scientific contributions contained therein, I confirm that the submitted dissertation and the scientific publications, as well as the quality and originality of the results and achievements presented therein, comply with the requirements of the RRBA, the Regulations for its implementation and the relevant Regulations of the St. Kliment Ohridski for the candidate to acquire the educational and scientific degree “Doctor” in 4.Natural Sciences, Mathematics and Informatics, professional field. 4.6 Informatics. and Computer Science. The candidate fulfils the minimum national requirements in the professional field and no plagiarism has been detected in the scientific works submitted for the competition.

I believe that the PhD student Kristin Alexandrova is an erudite young scientist, possesses in-depth theoretical knowledge of the specialty “Information Systems” - Knowledge-Based Systems and abilities for independent scientific research.

Based on the above, I strongly recommend the scientific jury to award Kristin Ilieva Aleksandrova the degree of Doctor of Education in the field of higher education. Natural Sciences, Mathematics and Informatics, professional field 4.6 Informatics and Computer Science.

25.05.2024

Prepared by: .....

(Prof. Dr. Maria Hristova)