

## REVIEW

on a dissertation work for obtaining an educational and scientific degree "Doctor"

**Author:** Rosen Simeonov Petrov

**Thesis:** "Information and communication technologies for smart homes"

**Field:** 5. Technical sciences

**Direction:** 5.2. „Electrotechnics, Electronics and Automation“

**Member of the scientific jury:** Prof. Ph.D. Todor Dimitrov Neshkov, Technical University – Sofia

The dissertation work has a volume of 109 pages, divided into 4 chapters and a conclusion. 70 literature references are cited, including internet addresses. In connection with the dissertation, 6 publications were presented with the participation of the doctoral student. One of them is from foreign country, 5 are at conferences in Bulgaria. No citations are given to publications with the participation of the doctoral student. No intellectual property protection documents have been presented.

### **1.Relevance of the problem developed in the dissertation work in scientific and scientific-applied attitude**

The dissertation work is in a perspective and current area of information and communication technologies for smart homes.

There are many publications and research on this topic around the world, as well as various solutions, but in our country and in practice they are rare. All this determines the topicality of the research in scientific and applied attitude.

### **2.Degree of knowledge of the state of the problem and the literary material and creative interpretation of the literary material**

A detailed overview of types of modern methods, tools and technologies for research in the area of information and communication technologies for smart homes has been made.

In the work are cited 70 references, the author have 6 co-authorship publications. The analysis shows that the author has studied and thoroughly knows the situation and problems in this area. The conclusions of the review and analysis are

appropriately systematized. The aim and tasks of the dissertation are presented correctly.

Six contributions are presented:

1. An overview, critical analysis and systematization of methods and tools for integrating intelligent technologies in the creation of smart buildings has been made.
2. Existing problems are discussed and solutions for the construction of smart homes are proposed.
3. Innovative solutions for improvement and integration of smart technologies for residential buildings are proposed.
4. An innovative model for creating a smart home equipped with intelligent technologies has been developed.
5. An experimental development of a single-family house with built-in intelligent control systems has been made.
6. Innovative solutions have been invested in experimental development for energy efficiency and multifunctional intelligent information and communication technologies.

### **3. Accordance of the chosen research methodology and the set goal and tasks with the achieved contributions**

In the dissertation work theoretically researched and practically developed an approach for solving the set task, as the obtained results demonstrate that these methods can be successfully used to obtain new results in the research of real products, with better quality of the results and without damages of the object. The conclusions from the review and analysis are well systematized, and the purpose and tasks of the dissertation are presented reasonably and motivated. It can be concluded that the author has chosen and applied an appropriate research methodology according to the set goals and objectives.

### **4. Characteristics and evaluation of the dissertation work**

The dissertation makes a good impression with in-depth knowledge of the problems, the use of appropriate approaches to describe physical phenomena and

processes in various methods for testing types of efficiency, the formulation of original algorithms and tools to improve the quality of results. Extensive experimental material on the results of the application is presented and there is a coincidence between the theoretical precondition and the results of the experiments.

The introduction, the Literary Review, the review of factors influencing information and communication technologies for smart homes is in the volume of 37 pages. The description of existing methods and tools for group management is 39 pages. Both chapters are made with great precision and detail, which shows a thorough knowledge of the matter by the author. I appreciate positive the study of European and American experience on the subject. The tasks of the doctoral program are formulated after critical analysis and systematization of methods and tools for research and improvement of the existing efficiency.

I appreciate positive the credibility of the research and the contributions achieved.

### **5. Scientific and scientific-applied contributions of the dissertation work**

I accept the contributions formulated by the author, which are whit scientifically applied and applied character. Some consolidation and refinement could be done. The orientation of the research towards realizations for specific users makes a good impression.

A comparative analysis of existing methods, approaches and tools for identifying the main factors influencing the area of information and communication technologies for smart homes are made.

The mentioned scientific and applied contributions are in the field of information and communication technologies for smart homes.

Applied contributions can be attributed to the groups: proving with new means of significant new aspects of already existing scientific fields, problems, theories, hypotheses; creating new classifications, methods, constructions, technologies and obtaining confirmatory facts, constructions and methods and enriching the existing knowledge with practical application.

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The contributions to the dissertation are mainly of a scientific-applied nature and are as follows:

1. After a detailed review, a critical analysis and systematization of methods and tools for integrating intelligent technologies in the creation of smart buildings.

2. Existing problems and solutions concerning the construction of smart homes are discussed.

3. The impact of buildings on climate and the contribution of intelligent technologies to combating climate change are studied.

4. An innovative model for creating a smart home equipped with intelligent technologies has been proposed.

5. An experimental development of a single-family house with built-in intelligent control systems in the field of information and communication technologies for smart homes has been made.

6. Innovative solutions for energy efficiency and multifunctional intelligent information and communication technologies are invested in the experimental development

7. The results are analyzed and tested in the company "MARTMAX" Ltd.

#### **6. Evaluation of the degree of personal participation of the doctoral student in the contributions**

The dissertation and its contributions are the personal work of the doctoral student. I have direct impressions of the good work of the doctoral student and the depth of entering this new and interdisciplinary field.

#### **7. Evaluation of the publications on the dissertation**

In connection with the dissertation 6 publications were made. It can be concluded that the results have become known to the scientific community. The publications well reflect and promote the work done and the results obtained.

#### **8. Significance of the results of the dissertation in science and practice**

Applied methodologies, research and developed solutions can be used for testing in the development and optimization of various technologies to improve energy

efficiency in construction. They are a good precondition for expanding the work on the topic with other similar types of methods and for the commercialization of scientific results.

#### **9. Evaluation of accordance of the abstract with the requirements for its formation**

The abstract meets the requirements for its design, corresponds to the content of the dissertation and presents exactly the main achievements in the dissertation.

The previously submitted copy lacked a translation of the author's abstract into English.

#### **10. Opinions, recommendations and remarks**

The dissertation is characterized by thoroughness, precision, striving to study the interdisciplinary problem from different points of view and finding a working practical solution. The researched area is up-to-date with perspectives for further development.

I had remarks and recommendations to the dissertation, communicated personally and most of them were taken into account.

As a recommendation for future work, it would be good to focus more own publications in prestigious international journals, as well as the protection of intellectual property.

### **CONCLUSION**

The author has made an in-depth review and analysis of the problem and has proposed solutions in a new and promising area. All the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the regulations for its application, as well as the specific requirements for obtaining scientific degrees in IICT-BAS in terms of scope, volume and quality of the dissertation are met. On these grounds, I appreciate positive the work and offer to the master eng. Rosen Simeonov Petrov to be awarded the educational and scientific degree "Doctor" in field 5. Technical sciences, direction: 5.2. Electrical engineering, electronics and automation.

23.03.2022.

Sofia

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