REVIEW

of a dissertation for obtaining an educational and scientific degree "Doctor"
Author: mag. Eng. Rosen Simeonov Petrov
Topic: Information and communication technologies for smart homes
Field: 5. Technical sciences, Direction: 5.2. Electrical engineering, electronics and automation
Member of the Scientific Jury: Prof. DSc Eng. Ivo Malakov, Technical University - Sofia, Order. № 25 / 31.01.2022 of the Director of IICT

The dissertation presented for my opinion has a volume of 109 pages and is structured in 4 chapters, conclusion, contributions, list of publications on the dissertation, bibliography and declaration of originality. The bibliography includes 70 literature sources. In connection with the work are presented 6 pieces. scientific publications, one of which is in a journal and 5 pcs. are in conference proceedings. One of the publications is independent, and in the other three the doctoral student is in first place. No reference is given to the citations. A declaration was presented by MARTMAX Ltd. that the results of work are of interest to the company.

The work was developed at IICT - BAS under the scientific guidance of Prof. Dr. Dimitar Nedelchev Karastoyanov.

1. **Relevance of the problem developed in the dissertation in scientific and scientific-applied terms**

The dissertation is in a promising and current field of application of information and communication technologies in modern construction, which has been the subject of intensive research in recent years. These technologies are a key element of the complex smart home system and largely determine its efficiency.

The proposed approach to building a smart home, the developed model of a single-family house with built-in smart management systems, enrich and develop knowledge and methods for solving problems in this area, lead to improved quality of life of residents of these homes, and at the same time minimize operating costs and environmental impact.

All this determines the relevance and importance of research in scientific and applied terms.

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

An overview and analysis of modern methods, tools and technologies for building a smart home has been made. The evolution and prospects for the development of intelligent buildings and homes are considered. Particular attention is paid to building automation systems, including programming and monitoring platforms and the environment; communication networks; communication standards in building automation systems; internet technologies and their applications for building automation systems.

I believe that the candidate is well acquainted with the current situation in the field.

3. Correspondence of the chosen research methodology and the set goal and tasks with the achieved contributions

In the dissertation work an approach for building a smart home is developed and tested by integrating three approaches: an approach based on the operation of the building; a service-based approach that the building can offer and system-based services. From the presented research and development it can be concluded that the chosen research methodology is adequate to the set goal and objectives of the dissertation, which fully correspond to the achieved results and contributions.

4. Characteristics and evaluation of the dissertation

The dissertation demonstrates good knowledge of the problems, use of appropriate methods for development and research. An analysis of modern technologies for building a smart home has been made, and solutions have been proposed in order to improve the comfort of the occupants and reduce costs. A model of a smart home management system has been proposed, which includes innovative solutions for the integration of smart technologies for residential buildings and is in line with the requirements for reduced environmental pollution, use of energy independent sources, rainwater and wastewater utilization. An analysis has been made and the energy efficiency of the developed model has been proven on the basis of a comparison of energy costs in the presence and absence of a management system.

I have a positive evaluation of the results of the developments and their research.

5. Scientific and scientific-applied contributions of the dissertation

The candidate has submitted a report with contributions that are scientifically and practically applied. I consider these contributions to be sufficient, but they need to be systematized, edited and refined.

The received scientific-applied and pure-applied contributions can be referred to the groups: proving with new means of essential new aspects of already existing scientific fields, problems, theories, hypotheses; creation of new methods, constructions, technologies and obtaining of confirmatory facts, as well as enrichment of the existing knowledge with practical application.

6. Assessment of the degree of personal participation of the dissertation in the contributions

The dissertation and its contributions are the personal work of the doctoral student under the competent guidance of his supervisor.

7. Evaluation of the publications on the dissertation

In connection with the dissertation 6 publications were made, of which 1 independent. I have no information about citations or use of dissertation results in practice.

The presented publications on the dissertation work sufficiently fully and accurately reflect significant aspects of its content and promote the work done.

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

The results of the dissertation can be used in the design of modern "smart" homes with built-in intelligent control systems. They are a good prerequisite for expanding the work on the topic after the successful defense of the dissertation. A good attestation for the dissertation work is the declaration presented by MARTMAX Ltd. that the results of the work are of interest to the company and will be used in its activities.

9. Opinions, recommendations and remarks

The research area is current and promising. I have no significant remarks with which to challenge the main scientific and applied contributions of the candidate.

Notes and recommendations:

- There are unresolved editorial, terminological and technical errors.
- Not all literature sources are cited in the text; in many cases there is a discrepancy between the sources used and cited; the bibliographic reference is not prepared according to the current standards, etc.
- It is recommended that the goal and tasks be formulated after an analysis of the existing situation.
- The work would have benefited if the cost-effectiveness of the development had been assessed and the payback period had been set.
- I recommend the candidate to look for opportunities to implement the results in practice.

CONCLUSION

Based on my acquaintance with the dissertation and the materials on it, the fulfilled educational goal of the doctoral dissertation, the topicality and significance of the achieved scientific and applied contributions, I give a POSITIVE assessment of the dissertation. All the requirements of the ZRASRB, 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 propose to Mag. 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, scientific specialty Application of the principles and methods of cybernetics in various fields of science.

Sofia, March 22, 2022

На основание
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