

Opinion

by Prof. Radoslav Yoshinov PhD.

on the dissertation for the acquisition of educational and scientific degree "**Doctor**" with author **Mag. Eng. Ivaylo Todorov Andonov** on the topic **DISTRIBUTED CONVEYOR SYSTEM MANAGEMENT** under the scientific guidance of Assc. No. Dr. Eng. Dr.S.C. Simeon Emilov Tsvetanov in the professional field 4.6 "Informatics and Computer Science", Doctoral Program "Computer Science – Distributed Systems"

1. Actuality of the dissertation work

In the context of the Internet of Everything (IOE) paradigm involving people, data, things and processes, radical change is needed by optimising management processes in all areas and in particular conveyor systems. The conveyor system is also managed by changing the tempo, e.g. increasing the speed of submission and transport of packages in the conveyor belt. The dissertation attempts analysis by taking into account information about the management process and the maintained distance between packages in the conveyor through appropriate sensors. Simulation and programming models have been made in a specialized FlexSim environment. I appreciate positively the themes and the research done in the dissertation work.

2. Degree of knowledge of the state of the problem and general characteristic of work

The dissertation sought to develop a solution to improve the efficiency of conveyor systems by applying new distributed management methods.

The dissertation work is structured in 4 chapters, introduction, contributions, list of publications made, literature used.

Chapter One set out the general staging of the task at hand. The subject matter, purpose and tasks of the dissertation, as well as the methodology of work, as well as the specifics of the management of conveyor systems are considered. Five tasks are also defined.

Chapter Two proposed a solution for distributed management of conveyor systems, with individual zones being regarded as software agents, in which the behavior of which is set to improve the global characteristics of the whole system.

Chapter Three shows the Annex in the individual components of the system and their integration.

Chapter Four describes the testing of the functioning of the system by means of experimental studies

The dissertation work is set out in 100 pages and contains 76 figures. It includes an introduction, a list of figures in the text, 4 chapters, a conclusion, a list of scientific and applied contributions, a list of 4 publications of the author (1 of them on his own) related to the thesis presented, a list of the literature used from 51 literary sources, a declaration of originality.

This proves that the PhD student has sufficient knowledge in the subject of the studies carried out.

3. Compliance with the proposed research methodology and the objectives and tasks of the dissertation work

The subject of the dissertation study are methods and means of management of conveyor systems. The purpose of the dissertation is to develop a solution to improve the efficiency of conveyor systems by applying new distributed management methods.

The PhD student has formulated 5 research tasks through the solution of which to achieve the goal.

The selected methods correspond to the main purpose and tasks set for solving by the PhD student.

4. Characterisation of the nature and assessment of the reliability of the material on which the dissertation contributions are based

The methods and models that are created and used correspond to the target task. For some, results of their application have been obtained, while simulations have been presented for others.

I have not noticed any errors in either the specific or the conceptual models.

5. Contributions of the dissertation work

Contributions are described in the **Contributions chapter**.

The more substantial results obtained in the dissertation work are summarized in author's reports for four scientific and applied contributions:

The author's claims for scientific and applied contributions are:

Research and analysis of the methods and means of management of conveyor systems has been carried out;

A solution has been proposed to improve the efficiency of conveyor systems by applying a new distributed management method;

New methods improving the operation of the subsystems for measurement, power supply and communication have been proposed and implemented;

Modeling and computer simulation of the proposed distributed management method has been carried out;

A prototype of a conveyor system has been designed and implemented to validate the working capacity of the method;

Test scenarios have been developed to verify and evaluate the effectiveness of the method, confirming the level of improvement in reliability and performance achieved.

I accept scientific and applied contributions (2,3,4) as well as applied contributions (5,6). I don't accept so verbalized contribution 1.

6. Degree of personal participation of the dissertant in contributions

For the personal participation of the PhD student, I judge by the audience activity of the PhD student reflected in the materials published under the dissertation, and I do not question it.

7. Assessment of publications under the dissertation work

On the subject of the dissertation work are made 4 publications – 3 with co-authors and 1 independent. Three are in English, the independent one is in Bulgarian. They are published in the period 2018-2020 (two in international conferences of IEEE and two in magazines). I did not notice any citations provided. A patent certificate related to a working mechanism of a conveyor system – roll was also presented.

8. Compliance of the author with the requirements for its preparation and adequacy of reflection of the basics and contributions of the dissertation work

The submitted draft author's certificate is in accordance with the rules for the preparation of the authors of the dissertation papers, specified on the website of the SU. It reflects the results achieved, as well as the contributions of the author.

9. Opinions, recommendations and notes

Although the dissertation work is exposed very concisely, this implies sufficient in-depth knowledge, the ability to interpret and formulate strategies for the effective development of the field.

In the dissertation work there is no comparison of the results that prove usefulness, which makes the conclusions and claims of the author declarative.

There are technical errors in the submitted material – for example, the pages in article 1 have been exchanged, as well as many others.

I recommend that the PhD student start active audience activity in scientific journals with impact factor.

Conclusion

The content and contributions of the dissertation work of Mag. Eng. Ivaylo Todorov Andonov meet the requirements of the Law on development of the academic staff of the Republic of Bulgaria, the Regulations for its application and the Rules of Procedure for acquiring scientific degrees at Sofia University. There is a sufficient number of scientific and applied and applied contributions. I accept the personal participation of the doctoral student in the development and the received contributions. This gives me reason to recommend to the Honorable Scientific Jury to award a Mag. Eng. Ivaylo Todorov Andonov the educational and scientific degree "Doctor" in professional field 4.6 "Informatics and Computer Science", Doctoral Program "Computer Science – Distributed Systems".

Signature:

/Prof. Dr. R. Yoshinov/

Sofia, 03.05.2021