

STATEMENT

over dissertation for gaining educational and scientific degree “doctor”

Dissertation author : **eng. Stefan Borisov Karastanev**

Dissertation topic: „**Reengineering of industrial robots**“

Educational area: **5. “Technical sciences”**

Professional division: **5.2. „Electrical engineering, Electronic and Automation“**

Scientific discipline:: „**Automated systems for information processing and management**“

Supervisor: **prof. dr. eng. Dimitar Nedelchev Karastoyanov**

Jury member: Order № 233/30.9.2019 of the director of ИКТ- associate prof. dr. Krustyo Hinov

Dissertation structure

The dissertation has 258 pages and contains 6 chapters, references and author’s publications. The reference list contains 87 sources, and the publication list contains 7 publications. 16 contributions are formulated with scientifically-applied and application matter. A declaration for original results is enclosed.

The autoreferate contains 30 pages and resemble the desired goals, accomplished results and the basics for the scientifically-applied contributions. Авторефератът е в обем от 30 страници и отразява по същество поставените цели, получените резултати и основните научно-приложни приноси в дисертационния труд.

Overall dissertation characteristics

The theme of the dissertation is in the area of recycling out of working conditions industrial universal robots (IUR) by using them for other producing purposes. The goal and tasks are marked as subject for actual scientifically-applied researches, which without a doubt, is a prove for the actual matter of the dissertation subject, as well as the usefulness of the scientifically-applied results.

In Chapter 1 describes a summary, analysis and systematization of mechatronic robot systems. Robots for various industrial purposes and actions are presented. Chapter 2 contains research over mechanics, electronics and software of IUR. In Chapter 3 are proposed methodologies for investigation of IUR. Research and development of building modernized IUR are described in Chapter 4. Chapter 5 presents verification of the accomplished methodologies for reengineering. Optimisation and innovations over reengineering of industrial robots are presented in Chapter 6.

The list with publications has 7 publication including verified patent pending (5 authors). All of them correctly describe the accomplished dissertation results. The publications are in specific published works, and in national (3) and international (3) conferences. The patent is single-author (the doctorant) and is approved by the Patent Office of Republic of Bulgaria..

Scientifically-applied contributions of the dissertation

In the dissertation and the autoreferat are formulated 16 contributions with scientifically-applied and application character. Some of them are sub defined in addition to the results. Mainly they are described as follows:

- summary, analysis and systematisation of systems of mechanics, electronics and software of IUR;
- development of methodologies for research of mechanics, electronics and software of IUR;
- research and verification of the IUR reengineering results;
- optimisation of the simulation and offline programming of IUR;
- an innovative solution for wireless management console is proposed, protected by a patent;
- a concept is proposed for commercialization of the product that results from the reengineering.

A certificate for the innovative character and the practical application of the dissertation results is the approved patent: Karastanev S., Wireless management console.

Opinion, recommendations and notes

The dissertation is widely developed and presents a complete scientifically-research work. The author has presented systematical research of the problem and has proposed original scientifically-applied results and useful practical solutions. The final results fully resemble the desired goal: "Reengineering of second-hand industrial universal robots (IUR) by renewing the mechanics, rebuilding the electronics and software, test of the robotic systems and embedding of new industrial applications".

I have the following remark of the presented dissertation in redaction and technical matter:

- The reference list is not well formatted and doesn't follow the requirements of the literature content. This is especially relevant for the quotation of patents and company literature.

My recommendation for the student is to keep his research work ongoing and to publish his results in refereed international journals.

CONCLUSION

I highly evaluate the work over the dissertation and the accomplished results. The dissertation follows the requirements of ЗРАСРБ, and the guide of its application as well as the specific requirements for gaining scientific degrees and academic title in ICT-BAS. Based on that I recommend to the honorable scientific jury to award eng. Stefan Borisov Karastanev a scientific title "doctor" in Educational area: 5. "Technical sciences", Professional division: 5.2. „Electrical engineering, Electronic and Automation“, Scientific discipline: „Automated systems for information processing and management“

Sofia,
18.10.2019

**NOT FOR
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Jury member: assoc. prof. dr. Krustyo Hinov