IOSUD – Politehnica University of Timișoara
Doctoral School of Engineering Studies

RESEARCH ON FOLDING MECHANISMS FOR THE DEVELOPMENT OF A MEDICAL DISINFECTION ROBOT

Doctoral Thesis – Abstract

for obtaining the scientific title of doctor at
Polytechnic University of Timisoara
in the doctoral field Mechanical Engineering

autor eng. Elida-Gabriela TULCAN
scientific supervisor Prof.univ.dr.eng. Erwin-Christian LOVASZ

month June year 2026

The doctoral thesis focuses on research on bar folding mechanisms in order to determine the optimal structure for the development of a medical disinfection robot.

The main objectives of the doctoral thesis are:

1.Analysis of the current state of research in the topic of the doctoral thesis.

2. Structural synthesis of folding mechanisms with bars.

3. Identification of convenient solutions of folding mechanisms that ensure a maximum ratio between the extended position and the folded position.

4. Kinematic-positional analysis and optimal synthesis of folding mechanisms.

5. Evaluation of the kinematic performances of the studied folding mechanisms.

6. Creation of the model of the mobile disinfection robot with folding mechanism.

7. Experimental testing of the model of the medical disinfection robot with folding mechanism.

The doctoral thesis is structured in 3 chapters: Chapter 1 – Presentation of the topic of the doctoral thesis, the methods and concepts used, Chapter 2 – Scientific papers in extenso, published as scientific results, respectively Chapter 3 – Final conclusions, personal contributions and further research directions.

Chapter 1 presents the main methods and concepts used, respectively the Introduction part, Current state of research on mobile disinfection robots, Objectives of the doctoral thesis, Structural synthesis of bar folding mechanisms, Kinematic analysis of folding mechanisms, Dimensional synthesis of folding mechanisms, Methods of optimized dimensional synthesis of symmetric folding mechanisms with 7 elements, Analysis of performance indicators of optimized folding mechanisms, Design of the experimental model of the folding mechanism, respectively Experimental realization and simulation of the folding mechanism.

Chapter 2 presents the scientific works in extenso, published as scientific results or which are in the process of being published and have been accepted.

Last but not least, Chapter 3 presents the Final Conclusions, personal contributions and further research directions.

In conclusion, the research conducted within the doctoral thesis has demonstrated that the use of folding mechanisms in the design and construction of a medical disinfection robot represents an innovative and highly effective solution to the current challenges and needs in medical institutions.