

# Master Thesis Review

## Capacitive sensors in prosthesis

**Thesis reviewer:** Ing. Jan Koprnický, Ph.D.  
The Institute of Mechatronics and Computer Engineering  
Faculty of Mechatronics, Informatics and Interdisciplinary Studies  
Technical University of Liberec  
Studentská 2, 461 17 Liberec  
jan.koprnický@tul.cz

**Author of the Thesis:** Bc. Martin Kopeček  
Electric and Information Engineering  
University of Applied Science Zittau/Görlitz

Martin Kopeček author of the thesis presents very interesting mechatronic problem – using of capacitive sensors in prosthetics. The student has cooperated on this project with Otto Bock Company. The main aim was an application of capacitive sensors in lower extremity prosthesis.

The structure of the thesis is well advised. It starts with the description of problematic of prosthesis, analyzes current state of art in this field.

Next parts of the work engage with the theory of capacitive sensing, own design of a capacitive sensor – electrical part as well as mechanical housing, realization of selected construction. After the prototype realization all necessary steps in calibration are made.

The final parts discuss and conclude all advantages and disadvantages of using of proposed sensor application in prosthesis and show possible continuation of the work.

The form of the thesis should be better compared to the quality of described work. There are many typing errors. I miss references in captions of figures, although the citation is done in text. A figure as a floating object can flow in a text and a caption should flow with it otherwise the reading is difficult. The same is with all tables where captions are missing completely.

The quality of some pictures should be better too. I do not understand why there are scanned sketches by hand instead of sketches in any CAD program. The other thing. Figures should not overlap the text field because book binding and margins for reader's notes or thumb. On the other hand there are many pictures very well done in high graphical quality and with all information.

## Conclusion

The thesis deals with very interesting mechatronics topic. The autor presents his ability to orient in different fields of engineering: in biological mechanics, electronics, mechanical engineering design and practical measurement of different kinds of physical values. All his observations he summarizes in the text part of the work. Although it shows some imperfections they are negligible compare to the big amount of practical work and fulfilling of all tasks. Thanks to this I recommend this work for defense and classify it by

**Grade A.**

## Questions for discussion

1. Where is *quadriceps* muscle? Is the caption of Fig. 4 on pg. 7 right?
2. Do you know how does the big letter epsilon look (see e.g. page 12)? Does it have the same size as big letters in latin?
3. From where is the value 763 mHz on page 30?
4. Can you explain Graph 8 (page 31) more clearly? Why is the value on the horizontal axe on the left higher than on the right?
5. What was the cause of the damage you describe on page 59 (Fig. 65)?
6. Is the temperature range 60 to  $-10^{\circ}\text{C}$  (page 73) enough? Should not be the negative temperature lower? Prostheses can be used outside in the winter, right?
7. What kind of electronic components (IC especially) are used in the device? Are they the same kind like for automotive applications?
8. Is Graph 25 well oriented? Should not be the independent value of temperature on horizontal axe?
9. How was the test *Relationship of the temperature and resistance* described in Graph 25 realized (constant current etc.)?
10. How do you make the compensation of capacity on temperature?

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Ing. Jan Koprnický, Ph.D.



## Classification

1	2	3	4
Grade A	Grade C	Grade E	Grade F