

## DIPLOMA THESIS EVALUATION

### OPPONENT EVALUATION

**Author name:** Bc. Denis Griaznov

**Thesis title:** Electromyography control of robotic systems

**Opponent:** Prof. Dr. rer. nat. Stefan Bischoff

**Opponent workplace:** University of Applied Science Zittau/Görlitz

A. Abstract quality, keywords matching . . . . .	Very good (2)
B. Research scope and processing . . . . .	Excellent (1)
C. Level of theoretical part . . . . .	Very good (2)
D. Appropriateness of the methods . . . . .	Excellent (1)
E. Results elaboration and discussion . . . . .	Excellent (1)
F. Students own contribution . . . . .	Excellent (1)
G. The conclusion statement . . . . .	Excellent minus (1-)
H. Fulfillment of Thesis tasks (goals) . . . . .	Fulfilled
I. Structure, correctness and fulness of references . . . . .	Excellent minus (1-)
J. Typographical and language level . . . . .	Excellent (1)
K. Formal quality . . . . . (text structure, chapters order, clarity of illustrations)	Excellent (1)

#### Comments, remarks

Master Thesis deals with hand gesture recognition based on myoelectric signals (EMG) from a Myo Armband.

This is a demanding task since it is not clear whether the EMG sensor data is sufficient for this task.

Modern methods of machine learning, part of artificial intelligence in computer science were used to differentiate between different hand gestures. Results are very impressive and are shown on a PC.

In addition, an Arduino-based robot was built to demonstrate the ability of hand gesture recognition based on myoelectric signals from Myo Armband.

This work has an important contribution to the control of a robot by myoelectric signals.

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Overall assessment:

A very nice job in mechatronics, which ranges from artificial intelligence to the embedded area of servo control.

Questions for the defense:

1. Explain the difference between Savitzky-Golay smoothing and the Moving Average filtering
2. Page 21 Figure 2.9: It seems that only two principle components are sufficient for classifying the different gestures. Is it right ?
3. Page 28 Table 3.1: Recognition rates of Support vector machine, k-nearest neighbors algorithm and LSTM Neural Network are very good for all classification methods and differences very small. What do you think about using Hidden Markov Model (HMM) or Convolutional Neural Networks (CNN) as Classification Methods ?

Overall classification:

Work meets the Master degree requirements and therefore I recommend it for defense

I suggest to classify this work by grade Excellent (1)

In Zittau

date 11 / 06 / 2020

By signing I certify that I am not in any personal relationship with the author of the thesis

Prüfungsausschuss  
Hochschule Zittau/Görlitz  
University of Applied Sciences  
Fakultät Elektrotechnik und Informatik  
Fachbereich Elektro- und Informationstechnik

Opponent signature