

# UNIVERSITY OF TWENTE.

FACULTY OF ELECTRICAL ENGINEERING, MATHEMATICS AND COMPUTER SCIENCE

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DEPARTMENT  
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SUBJECT  
Review of the Ph.D. thesis of Otakar Sprdlik by Peter Veltink

Prof. Ing. Zbyněk Škvor, CSc.  
Vice-Dean for Science and  
Research, CTU in Prague  
Faculty of Electrical Engineering  
Technická 2, 166 27 Prague 6  
Czech Republic

Dear Professor Škvor,

The Ph.D. thesis of Otakar Sprdlik provides valuable and original scientific contributions.

Major scientific contributions are:

1. New algorithms for in-use quasi-static calibration of a 3D accelerometer using an ellipsoid fit (chapter 4). The principle of this method was reported in literature, but this research provides improved estimation algorithms which have been evaluated adequately
2. Tremor quantification based on separation of gravitational and movement acceleration components from 3D accelerometer signals and gyroscope signals (chapter 5).
3. Evaluation of these tremor quantification methods in terms of distinction of essential tremor patients from healthy subjects and prediction of clinical visual assessments using polynomial regression functions applied to these tremor quantification methods (chapter 5).
4. A method to estimate center of rotation during tremor movements (chapter 6, applied in chapter 7) in order to improve attitude estimation from 3D accelerometry. It is unclear whether the assumption of a constant or slowly changing center of rotation is adequate for actual tremor movements. In the Discussion and conclusions section at the end of chapter 7, it is proposed that an alternative analysis may be based on analyzing the actual displacements during tremor without making such an assumption. Despite this point, this is a valuable contribution
5. A method to estimate relative orientations (chapter 6). Although of interest, this method has not been validated experimentally.

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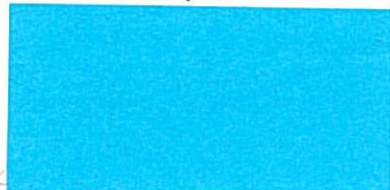
In summary, this thesis provides major scientific contributions building on good knowledge of the state of the art as reported in the scientific literature. The above listed contributions fulfill the objectives of the thesis as presented in the introductory chapter 1 (specifically section 1.2). The methods used are original, making new and valuable steps relative to methods reported in relevant literature.

The research has been well received in scientific literature: two papers have appeared in reviewed international scientific journals (Biomedical Signal Processing and Control and Journal of Neuroscience Methods) and 4 papers have been published in reviewed international conferences. One journal paper is under review.

In conclusion, this thesis is an adequate proof of original scientific research at the level of Ph.D.

The thesis leaves several interesting questions that can be the basis for a scientific discussion, which I would gladly have with the Ph.D. candidate if possible.

Yours sincerely

A solid blue rectangular box redacting the signature of Prof. dr. ir. Peter H. Veltink.

Prof. dr. ir. Peter H. Veltink  
18 April 2012