THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Actigraphic Data Analysis in Bipolar Disorder Patients**
Author's name:	**Václav Hlavác**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	David Cuesta Frau
Reviewer's department:	External

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**
How demanding was the assigned project?	

The advent of wearable devices for actigraphy monitoring and logging, mainly smartwatches and fitness bracelets, has enabled the development of new actigraphy data analysis tools and applications. Initially, all these applications were mainly focused on the leisure realm, but step by step they are also permeating the medical domain. However, little has been done specifically in the field of bipolar disorder, and this thesis is one of the few examples already available. This novelty makes the thesis very challenging, because there are not many similar studies available, and both the author and his supervisor will have certainly had to act as pioneers in many of the endeavors accomplished.

Fulfilment of assignment	**fulfilled with minor objections**
How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.	

The thesis has fulfiled the assigned tasks, although I find some sections a little bit unbalanced, specifically the last section 9, Patient state classificator, since it should have been tackled in a deeper way. I also think there is no need for a specific section about Approximate Entropy within a section about Sample Entropy, just a few comments as the precursor of Sample Entropy, not longer.

Methodology	**correct**
Comment on the correctness of the approach and/or the solution methods.	

The approach is correct, it involves the study of all the stages that play a significant role in the analysis of actigraphy data, specifically in the case of the states related to Bipolar Disorder.

Technical level	**A - excellent.**
Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?	

Yes, the thesis is excellent for a bachelor study, both technically and scientifically.

Formal and language level, scope of thesis	**A - excellent.**
Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?	

Yes, the thesis is written scientifically, following the logical steps of a pattern recognition method, with the analysis of features and the classification results. Easy to follow and understand, with a very high level of English. I also have to say that I have enjoyed reading this thesis very much as the other work I have reviewed because t is very well written, and the topic is of great interest for me. No doubt other researchers will find it very much enjoyable and professional as well.

Selection of sources, citation correctness	**A - excellent.**
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?	
Yes, the background knowledge applied in this thesis is properly referenced and the contributions clearly distinguished.	

Additional commentary and evaluation (optional)
Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.
This is a work whose scientific and technical level is well beyond the level expected for a bachelor student, as the other work reviewed. I recommend both the student and the supervisor to carry on with this research beyond the present work because, if the student plans to achieve a PhD, this work has the potential to become a PhD thesis provided some additional research is conducted.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

Questions:

1. *I see a great variability in almost all the results of the thesis, and a great overlapping among intervals for depression, mania and remission. The author somehow acknowledges this fact by concluding that the performance is still not suitable for a real-life application. Then, What performance could be considered good enough for a classifier of practical use? Does the author think there is enough room for improvement to achieve that? If yes, How (Any clues yet)?*

2. *Does the author think that the data acquisition should be somehow improved to enhance the discriminating capability of the classification approach proposed? If yes, How?*

3. *Could also a more active role of the patient during acquisition be of interest? For example, by requiring the patient to mark some additional events or to perform some specific controlled activities like walking a certain distance at a certain speed? Other mental disorders are monitored using a multisite monitoring approach and try to find changes in movement patterns.*

The grade that I award for the thesis is A - excellent.

Date: **12/06/2020**   Signature: