Review report of a final thesis

Student:	Bc. Richard Stanko
Reviewer:	Ing. Miroslav Skrbek, Ph.D.
Thesis title:	GPS assisted implementation of way-back function on ultra low power MCU
Branch of the study:	Design and Programming of Embedded Systems

Date: 20. 8. 2020

Evaluation criterion:	*The evaluation scale: 1 to 4.*
1. Fulfilment of the assignment	**<u>1 = assignment fulfilled,</u>** *2 = assignment fulfilled with minor objections,* *3 = assignment fulfilled with major objections,* *4 = assignment not fulfilled*
Criteria description: Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.	
Comments: The instructions for assignment were fulfilled, but the rest of the review contains several comments on the quality of the solution and the work itself.	

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
2. Main written part	*55 (E)*
Criteria description: Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies? Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 26/2017, Art. 3. Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.	
Comments: The chapter "Analysis and design" is very weak and shallow. It contains irrelevant history review of technologies and very brief description. Relevant description of GPS chip and BLE is missing even it is publicly available information in the form of datasheets, manuals and specifications. The relevant review of the navigation algorithms and algorithms for filtering GPS data is missing. The proposed solution can work on good quality data, but it is not suitable for noise GPS data, as it has been shown in experimental part of the work. The track shortening described in the text was not implemented. The proposed algorithm cannot recover when a user misses a waypoint on the recorded trajectory. The navigation algorithm and its possible problems is not sufficiently discussed in the text. The implementation part of the text is more relevant. The chapter "Power consumption measurement" is also problematic. The results of measurement were obtained when GPS signal was very poor or none. I understand that outdoor usage of expensive power source is problematic, but the relevant results might be obtained by much cheaper device. The results seems to be meaningless because the same information can be found in the ZOE-M8B chip datasheet. On the other hand the improvement of the assistance data for GPS was not measured and presented in the work. I also found the missing reference for Haversine formula on the page 31.	

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
3. Non-written part, attachments	*75 (C)*
Criteria description: Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.	

Comments:

The author of this work implemented the necessary software parts for the target system based on ARM, including communication with the ZOE-M8B chip and upload of assistance data. He also implemented BLE communication with the Android system to obtain assistance data. The Android application provides other functions that are not clearly described in the work. The Android application and the target system source files are included on the CD. I had the opportunity to test the application in person. Basic functions required by assignment - ARM to ZOE chip and ARM to mobile phone communications work, including data point acquisition. Navigation is problematic due to noise data and very simple algorithm implemented.

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
4. Evaluation of results, publication outputs and awards	*65 (D)*

Criteria description:
Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Comments:

The results of this thesis must be considered as proof of concept and all developed applications as a prototype. Since the work was done for particular company, it is valuable starting point for further development of the target application. From this point of view, the results are useful and development will continue in the company. On the other hand, from the Master thesis point of view, the work is insufficient. It can be very good Bachelor thesis, but relevant theoretical background expected for Master thesis is completely missing.

Evaluation criterion:	*No evaluation scale.*
5. Questions for the defence	

Criteria description:
Formulate questions that the student should answer during the Presentation and defence of the FT in front of the SFE Committee (use a bullet list).

Questions:

If we take into account the walk speed of 1 m/s (3.6 km / h), the criterion of a distance of 5 m for data recording and the sampling period of 1 second, we have 5 GPS points between the records. Why weren't intermediate points used to improve data accuracy?

Evaluation criterion:	*The evaluation scale: 0 to 100 points (grade A to F).*
6. The overall evaluation	*60 (D)*

Criteria description:
Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.

Comments:

In view of the above shortcomings, I evaluate the work as D.

Signature of the reviewer: