

# Supervisor's statement of a final thesis

Czech Technical University in Prague

Faculty of Information Technology

**Student:** Denis Titov  
**Supervisor:** Ing. Stanislav Jeřábek  
**Thesis title:** Improvement of Contactless Smart Card Emulator in FPGA  
**Branch of the study:** Information Technology

**Date:** 12. 6. 2017

<p><i>Evaluation criterion:</i></p> <p><b>1. Difficulty and other comments on the assignment</b></p> <p><i>Criteria description:</i> Characterize this final thesis in detail and its relationships to previous or current projects. Comment what is difficult about this thesis (in case of a more difficult thesis, you may overlook some shortcomings that you would not in case of an easy assignment, and on the contrary, with an easy assignment those shortcomings should be evaluated more strictly.)</p> <p><i>Comments:</i> The tasks of the thesis contained ISO standard studying, existing work studying and understanding for further code extensions/enhancements, designing new proprietary protocol for data processing and also several communication protocols between parts of the system. Finally it involved testing of the whole enhancement system. Because of the thesis requires to study standard, understand existing code, write another code for HW and SW too, I rate it as more difficult.</p>	<p><i>The evaluation scale: 1 to 5.</i></p> <p><i>1 = extremely challenging assignment, 2 = rather difficult assignment, 3 = assignment of average difficulty, 4 = easier, but still sufficient assignment, 5 = insufficient assignment</i></p>
<p><i>Evaluation criterion:</i></p> <p><b>2. Fulfilment of the assignment</b></p> <p><i>Criteria description:</i> Assess whether the thesis meets the assignment statement. In Comments indicate parts of the assignment that have not been fulfilled, completely or partially, or extensions of the thesis beyond the original assignment. If the assignment was not completely fulfilled, try to assess the importance, impact, and possibly also the reason of the insufficiencies.</p> <p><i>Comments:</i> Analysis and implementation part is really good. There are made several well analysed decisions and implementation seems to be logical correct. However there is almost completely missing testing because of lack of time in the end of student's work. Only individual parts are tested (HW - behavioral simulation; SW - unit testing). There is no test of the whole system at once and no practical test.</p>	<p><i>The evaluation scale: 1 to 4.</i></p> <p><i>1 = assignment fulfilled, 2 = assignment fulfilled with minor objections, 3 = assignment fulfilled with major objections, 4 = assignment not fulfilled</i></p>
<p><i>Evaluation criterion:</i></p> <p><b>3. Size of the main written part</b></p> <p><i>Criteria description:</i> Evaluate the adequacy of the extent of the final thesis, considering its content and the size of the written part, i.e. that all parts of the thesis are rich on information and the text does not contain unnecessary parts.</p> <p><i>Comments:</i> Except for testing (which was only minimal) thesis fulfills all requirements.</p>	<p><i>The evaluation scale: 1 to 4.</i></p> <p><i>1 = meets the criteria, 2 = meets the criteria with minor objections, 3 = meets the criteria with major objections, 4 = does not meet the criteria</i></p>
<p><i>Evaluation criterion:</i></p> <p><b>4. Factual and logical level of the thesis</b></p> <p><i>Criteria description:</i> Assess whether the thesis is correct as to the facts or if there are factual errors and inaccuracies. Evaluate further the logical structure of the thesis, links among the chapters, and the comprehensibility of the text for a reader.</p> <p><i>Comments:</i> Thesis is logically structured, there are made several well analysed decisions and their implementation seems to be logical correct. Thesis contains description of ISO 14443-4 standard and also discuss several requirements from the standard in context of FPGA programming. I would just appreciate a little more figures or tables of data flow examples. Text description of the protocol and the data flows would be easier to understand with them.</p>	<p><i>The evaluation scale: 0 to 100 points (grade A to F).</i></p> <p>95 (A)</p>
<p><i>Evaluation criterion:</i></p> <p><b>5. Formal level of the thesis</b></p>	<p><i>The evaluation scale: 0 to 100 points (grade A to F).</i></p> <p>85 (B)</p>

*Criteria description:*

Assess the correctness of formalisms used in the thesis, the typographical and linguistic aspects, see Dean's Directive No. 14/2015, Article 3.

*Comments:*

The text contains some typographic mistakes, however, the understanding is not affected at all. The thesis is relatively easily readable and, as far as I can grade it, its English language level is average or better.

*Evaluation criterion:*

*The evaluation scale: 0 to 100 points (grade A to F).*

**6. Bibliography**

90 (A)

*Criteria description:*

Evaluate the student's activity in acquisition and use of studying materials in his thesis. Characterize the choice of the sources. Discuss whether the student used all relevant sources, or whether he tried to solve problems that were already solved. Verify that all elements taken from other sources are properly differentiated from his own results and contributions. Comment if there was a possible violation of the citation ethics and if the bibliographical references are complete and in compliance with citation standards.

*Comments:*

Although there are only a few references it responds to very practical focus of the thesis. The main references are existing work and ISO standards, which requirements are implemented into existing work or the brand new parts of the emulator system. I appreciate using of libraries for implementing communication between individual parts of the system.

*Evaluation criterion:*

*The evaluation scale: 0 to 100 points (grade A to F).*

**7. Evaluation of results, publication outputs and awards**

85 (B)

*Criteria description:*

Comment on the achieved level of major results of the thesis and indicate whether the main results of the thesis extend published state-of-the-art results and/or bring completely new findings. Assess the quality and functionality of hardware or software solutions. Alternatively, evaluate whether the software or source code that was not created by the student himself was used in accordance with the license terms and copyright. Comment on possible publication output or awards related to the thesis.

*Comments:*

Student implemented required extension for run-time configuration and also all mandatory parts of standard 14443-4. Only simple echo has been implemented as proprietary protocol but implementation of some more complicated protocol was not goal of the thesis. There are missing some more complex and deep tests of the system. We just have to believe that all parts of the system tested in simulation will work correctly individually and also as parts of the whole system. Some partially results of this thesis have been used in paper on conference MECO 2017.

*Evaluation criterion:*

*No evaluation scale.*

**8. Applicability of the results**

*Criteria description:*

Indicate the potential of using the results of the thesis in practice.

*Comments:*

Results could be used for demonstration and study purposes. It should be deeply tested and after that could the work extended with optional commands support or with another HW resources (microcontroller). In the thesis is dominating implementation of ISO standard but there are also some discussion about its difficulties when implementing on FPGA.

*Evaluation criterion:*

*The evaluation scale: 1 to 5.*

**9. Activity and self-reliance of the student**

9a:  
1 = excellent activity,  
2 = very good activity,  
**3 = average activity,**  
4 = weaker, but still sufficient activity,  
5 = insufficient activity  
9b:  
1 = excellent self-reliance,  
**2 = very good self-reliance,**  
3 = average self-reliance,  
4 = weaker, but still sufficient self-reliance,  
5 = insufficient self-reliance.

*Criteria description:*

Review student's activity while working on this final thesis, student's punctuality when meeting the deadlines and consulting continuously and also, student's preparedness for these consultations. Furthermore, review student's independency.

*Comments:*

Student was working very hard but unfortunately mainly in a few last month. He worked very independently but he had to discuss some technical and ISO standard details to understand them properly.

*Evaluation criterion:*

*The evaluation scale: 0 to 100 points (grade A to F).*

**10. The overall evaluation**

83 (B)

*Criteria description:*

Summarize the parts of the thesis that had major impact on your evaluation. The overall evaluation **does not** have to be the arithmetic mean or any other formula with the values from the previous evaluation criteria 1 to 9.

*Comments:*

All mandatory parts of the thesis assignment were studied, analysed and implemented. Results of the work are really promising, the analysis, decisions and implementation seems to be logical and well-done. However it is risky to mark the final solution as working with only individually behavioral (unit) tests of parts of the system with grey-box testing of typical situations approach.

Signature of the supervisor: