CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Illuminating Optical Fiber Based Optical Camera Communications**
Author's name:	**Klára Eöllősová.**
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Electromagnetic Field
Thesis reviewer:	Vicente Matus Icaza
Reviewer's department:	IDeTIC – ULPGC, Spain

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **challenging**

How demanding was the assigned project?

This thesis addressed the characterization and implementation of an optical wireless communication (OWC) link based on the use of an illuminating optical fiber (IOF) and a camera as transmitter and receiver, respectively, which is a novel transmitter alternative for optical camera communication (OCC) systems. The experimentation carried out showed a performance of over 94% of correctly received bits up to three meters using 300 Hz modulation, which is a low-speed link, useful for a wide range of wireless device communication in the context of Internet of Things (IoT) that would serve as a complementary technology to those based on radiofrequencies. The tasks assigned were adequately challenging.

Fulfilment of assignment **fulfilled**

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.

This work not only included a review of the state of the art and a study of the different alternatives of IOFs, but it has a strong experimental base, including the characterization of transmitters and the assessment of the link under different conditions of rotation, shaping of the IOF, distances, modulation frequencies and a comparison of the IOF-based system versus a laser diode and a light-emitting diode. Thus, all the goals and tasks of the assignment have been correctly fulfilled.

Methodology **correct**

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

The methodology of this work focused on the experimental evaluation of the OF-OCC. It includes all the preliminary understanding of the context and the problem studied, as well as the further analysis of the results obtained. The approach is correct and aligns with the standard and well-known methodologies of the field OWC.

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?

The technical level of this thesis is excellent. The well-defined methodology and the focus on the experimental evaluation of OCC makes the results clear and usable. I strongly believe this work is of interest in the field and that the student shows an expertise that could bring her to further doctoral studies.

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?

The notations used, the quality of the figures presented, the depth of the study in general are excellent. The English language is correctly used and conveys the ideas in a clear way.

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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?

This thesis correctly addressed the review of the current state of the art on the field of OCC and other OWC categories such as visible light communication (VLC) and free-space optics (FSO). The Chapter 2 includes a comparison between these fields and deepens in the particular aspects of OCC that make it interesting among the OWC field. The Chapter 3 in turn, explains the principles of IOFs and their advantages. With these two chapters it is clear the originality and timely development of the work in the field.

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.

As mentioned before, this thesis is of a high quality, mainly because it is supported by an excellent experimental part and because of the correct contextualization of the problem studied. The student shows a level of research expertise that should be further exploited in doctoral studies that develop the future works described in the conclusions.

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.

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

The student should answer the following question during her presentation:

- **The use of illuminating optical fibers in OCC can be combined with the rolling shutter acquisition of digital (CMOS) cameras by placing the IOFs vertically so that the number of lines captured in the image sensor is increased (and consequently the number of bits per frame as well). How do you suggest the fiber can be correctly detected in the frame? Do you consider this part of the processing would critically affect the overall latency of the system? Can this latency be afforded in a sensor network?**

Date: **17.1.2022**

Signature: VicenteM

17.1.2022 Las Palmas de Gran Canaria, Spain

Firmado por MATUS ICAZA VICENTE - Y6082772E el día 17/01/2022 con un certificado emitido por AC FNMT Usuarios