Review of the Ph.D. Thesis

Thesis title: **Multi-objective Optimization for Smart City Concepts: Smart Floating Cities (SFC)**

Thesis author: **Ayca Kirimtat, M.Sc.**

Study programme: **Applied Informatics**

Reviewer: **doc. Ing. Martin Černý, Ph.D.**

Reviewer's affiliation: **VŠB – Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science, Department of Cybernetics and Biomedical Engineering**

Presented Ph.D. thesis is focused on design of Smart Floating Cities using modern evolutionary algorithms.

The design or optimization of smart cities using the approaches of applied informatics is an up-to-date topic, which the author of the dissertation presents by a high-quality research of contemporary scientific literature. The chapter of the dissertation describing the state of the art is really well elaborated and proves its excellent orientation in the given topic.

Based on a literature research, the author proposed 3 different case studies, which she then subjected to selected optimization algorithms. The first case study is the accessibility development of Smart Floating cities, which presents the optimization task of dividing space into residental, agricultural, green and public with regard to visual comfort and accessibility of the proposed layout. The second case study focuses on finding a suitable balance of cost-effective platform building and efficient transit networking. The last case study is focused on the problem of lighting in Smart Floating Cities, more precisely the optimization of the design of shading devices. Each mentioned case studies are very well processed; the author correctly and clearly defines the parameters of the models and the relationship conditions between them. These are non-trivial models for which it is necessary to have enough additional expertise outside the field of informatics.

The core of the dissertation is the implementation and comparison of selected four multi-objective evolutionary algorithms used to solve optimization problems over defined case studies. All used modern evolutionary algorithms are sufficiently described in the work. The results of the optimization of individual case studies are very clearly and well presented in the work. The presented conclusions of the thesis are interesting, as evidenced by the successful publication activity of the author of the dissertation. Selected parts of the dissertation have already been published in three high-quality journals and have been cited by dozens of scientists. The other three high-quality journal publications of the author, partly focused on the topic of the dissertation, also have dozens of external citations.

The clear stylistic organization of the dissertation, the quality of the language level underline the care that was given to this dissertation.

It is clear that Ms. Ayca Kirimtat, M.Sc. is an expert in all areas of the presented dissertation. Her Ph.D. thesis is a complex scientific work. Its goals were completely fulfilled. The quality of its processing is excellent. The achieved results are interesting and at an excellent level.

Ms. Ayca Kirimtat, M.Sc. in the presented Ph.D. thesis proved the ability of independent scientific activity, at an excellent level -

I recommend the Ph.D thesis of Ayca Kirimtat, M.Sc. to its defence.

Questions for the defence:

How is the influence of the environment defined in the optimization task accessibility development of Smart Floating cities, specifically the position of coasts and islands (see, for example, the figures in Graph 11)?

Where do you see the greatest benefit of using IoT technologies in the design, construction and subsequent operation of Smart Floating Cities?

Ostrava, 15.8.2021

doc. Ing. Martin Černý, Ph.D.