

Jury Member Report – Doctor of Philosophy thesis.


Name of Candidate: Grigory Yashin

PhD Program: Engineering Systems

Title of Thesis: Development of group of flying robots with multifunctional robotic limbs aimed at operations in cluttered environments

Supervisor: Associate Professor Dzmitry Tsetserukou

Name of the Reviewer: Dr.-Ing. habil. Konstantin Kondak, German Aerospace Center (DLR), Germany

I confirm the absence of any conflict of interest	Signature:  Date: 22-11-2020
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The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Brief evaluation of the thesis quality and overall structure of the dissertation

The dissertation deals in general with new possibilities for improving functionalities of flying robots for tasks in natural environments. Two technological solutions were proposed, deeply analyzed, implemented and tested in simulations and labor experiments: telemanipulation using VR and legged skids for landing on uneven terrain as well as walking on it.

The overall structure of the dissertation, text and content is clear, easy to understand. Several important results are achieved and properly presented. The quality of the dissertation is very good.

The relevance of the topic of dissertation work to its actual content

The formulation of the topic of dissertation is made in hierarchical way starting from very general goals "How to improve the functional efficiency and control method of the unmanned aerial vehicles equipped with robotic limbs?" and ending in the logically followed well-structured technical problems: telemanipulation with wearable master device and VR as well as special legged landing gear capable to perform locomotion. The content of the dissertation fits the topic and formulated goals.

The relevance of the methods used in the dissertation

The candidates made a very good choice of methods to achieve the results corresponding to the formulated goals in given time and with available resources. The theoretical instruments and formal methods were combined with simulation technics and reals experiments in such a way that the achieved results allowed to give convincing answers to formulated dissertation goals. Significant effort was devoted to setting up experimental environment, developing two flying platforms and to the conduction of experiments. This was a consequence from the dissertation goals which require results validation in practical experiments.

The scientific significance of the results obtained and their compliance with the international level and current state of the art

The obtained results are at the current international level of development in the corresponding areas and provide valuable contribution to the current state of the art. The results were published in international journals and at conferences.

The relevance of the obtained results to applications (if applicable)

The achieved results are very relevant for industrial inspection and maintenance. I agree with the statement of the author that for most of the applications a fully autonomous execution of complex tasks is problematic due to the difficulties in perception and interpretation of the application environment in a global context. Therefore, telemanipulation technologies will provide solutions for real applications, at least in the next future. The proposed combination of a wearable master device with a visualization in VR is a very promising direction. Also, in my group, we plan to increase the effort in this direction for the next couple of years.

The quality of publications

The publications are of high quality. The publications were made in well-known, high ranking conferences and journals.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense