MINUTES OF THE PhD STUDY BOARD MEETING

PhD Study Program: Engineering of Agricultural Technological Systems (EATS)

The PhD Study Board approved the proposed dissertation topic submitted by **doc. Ing. Milan Kroulík, Ph.D.** Out of the ten board members, eight voted in favour, one voted against, and one abstained.

PhD Program	**Engineering of Agricultural Technological Systems**
Supervisor	Doc. Ing. Milan Kroulík, Ph.D.
Department	Department of Agricultural Machines
Topic	**Integration of Data Sources and Artificial Intelligence for Decision Support in Precision Agriculture**
Annotation	The development of precision agriculture, supported by advanced sensor technologies, opens up new possibilities for creating extensive databases of data related to individual land parcels in time series. Currently, the sensor systems installed in agricultural machinery enable the autonomous generation of large datasets concerning temporal snapshots, fuel consumption, material inputs, yields, and qualitative indicators of the harvest, all of which are linked to specific parts of land blocks. In combination with image data obtained via unmanned aerial vehicles (UAVs) and satellite imagery, it is possible to parameterise economic indicators at the level of sub-blocks of land. Artificial intelligence tools will be employed for automated data processing, integration of multiple data sources, their merging and overlaying, with the capability to generate outputs for further agrotechnical decision-making. The study will utilize datasets acquired through telematic data collection, yield data, and harvest quality indicators, available satellite imagery, and for selected plots, data collected using UAVs equipped with multispectral and hyperspectral sensors. Outputs from optical sensors will further be used to generate vegetation indices for detailed assessment of crop status throughout the growing season. Data processing will be carried out using machine learning methods, particularly convolutional neural networks (CNN). With respect to the detailed evaluation of land block sub-units, it will be possible to make more efficient decisions regarding the production potential of the plots and the economic efficiency of crop cultivation related to specific crops. Hypothesis 1: Clear data documentation and its analysis in relation to management processes are associated with a reduction in costs ranging from 10 to 30 %. Hypothesis 2: Optimizing the shape of agricultural land parcels increases farming efficiency—even with a slight reduction in productive area

Compliance with targets of EATS study program	The topic closely reflects the principles of Industry 4.0, Agriculture 4.0 and Smart Farming through the integration of digital technologies and data-driven decision-making in agriculture.

Board Decision:

Out of ten board members, eight voted in favour, one voted against, and one abstained. Based on the comments submitted by board members, any identified discrepancies are expected to be resolved and corrected prior to the finalization of the research methodology. These comments are included in the accompanying email correspondence.

Prague, June 3rd, 2025

prof. Ing. David Herák, Ph.D.

Head of PhD Board

prof. Ing. David Herák, Ph.D.

Digitálně podepsal prof. Ing. David Herák, Ph.D.
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