BACHELOR'S THESIS ASSIGNMENT

I. Personal and study details

Student's name: **Škuta Adam**   Personal ID number: **474374**

Faculty / Institute: **Faculty of Electrical Engineering**

Department / Institute: **Department of Cybernetics**

Study program: **Cybernetics and Robotics**

II. Bachelor's thesis details

Bachelor's thesis title in English:

Detection of Drones Using Neural Networks from Combined RGB Camera and LIDAR Data

Bachelor's thesis title in Czech:

Detekce dronů pomocí neuronových sítí z kombinovaných dat RGB kamery a LIDARu

Guidelines:

Use a neural network for detection of drones using an RGB camera in combination with a 3D LiDAR sensor, placed onboard a flying UAV. It is possible to utilize a high-fidelity simulation or automatic dataset annotation using the UVDAR system for training of the neural network (see http://mrs.felk.cvut.cz/projects/midgard). Evaluate precision, speed, detection range and general performance of the algorithm. Compare the results with state-of-the-art solutions utilizing only RGB images as input for the detection. The task is motivated by the problem of autonomous aerial interception (see http://mrs.felk.cvut.cz/projects/eagle-one).

Bibliography / sources:

[1] Ch. R. Qi, O. Litany, K. He and L. J. Guibas, "Deep Hough Voting for 3D Object Detection in Point Clouds," arXiv 1904.09664, 2019.
[2] V. Walter, M. Vrba and M. Saska, "Automatic generation of training datasets for machine learning-based visual relative localization of micro-scale UAVs," RA-L, 2020.
[3] F. Ma and S Karaman, "Sparse-to-dense: Depth prediction from sparse depth samples and a single image," ICRA, 2018.
[4] J. Redmon and F. Ali, "YOLOv3: An incremental improvement," arXiv 1804.02767, 2018.

Name and workplace of bachelor's thesis supervisor:

Ing. Matouš Vrba,   Multi-robot Systems,   FEE

Name and workplace of second bachelor's thesis supervisor or consultant:

Date of bachelor's thesis assignment: **11.10.2021**   Deadline for bachelor thesis submission: **04.01.2022**

Assignment valid until: **30.09.2023**

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Ing. Matouš Vrba   prof. Ing. Tomáš Svoboda, Ph.D.   prof. Mgr. Petr Páta, Ph.D.
Supervisor's signature   Head of department's signature   Dean's signature

III. Assignment receipt

The student acknowledges that the bachelor's thesis is an individual work. The student must produce his thesis without the assistance of others, with the exception of provided consultations. Within the bachelor's thesis, the author must state the names of consultants and include a list of references.

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Date of assignment receipt   Student's signature