BACHELOR'S THESIS ASSIGNMENT

I. Personal and study details

Student's name: **Petřík Vít** Personal ID number: **499246**

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:

Fusion of UWB-Based Distance Sensors with a Visual Relative Localization System

Bachelor's thesis title in Czech:

Fúze senzoru vzdálenosti na báze UWB se systémem vizuální relativní lokalizace

Guidelines:

Range sensors based on the UWB (Ultra-wideband) signal technology enable robust wireless measurement of relative distance between two devices. This property complements the drawbacks of relative localization based on computer vision, such as the UVDAR system used by the MRS group, namely their reduced precision in terms of distance estimation. Compared to UWB sensors howerver, computer vision methods make it possible to estimate the relative bearing of a target.
If used together, the two sensor types can enable a more precise relative localization of flying Unmanned Aerial Vehicles (UAVs) than if each was used separately.
The goal of this thesis is to develop a system for fusion of the output data from the two aforementioned sensor types, and to implement this system in the Robot Operating System (ROS).
The system should optionally also be tested on real flying UAV.

Bibliography / sources:

[1] V. Walter, N. Staub, A. Franchi and M. Saska. UVDAR System for Visual Relative Localization With Application to Leader–Follower Formations of Multirotor UAVs. IEEE Robotics and Automation Letters 4(3):2637-2644, July 2019.
[2] Y. Shimizu and Y. Sanada, "Accuracy of relative distance measurement with ultra wideband system," IEEE Conference on Ultra Wideband Systems and Technologies, 2003, 2003, pp. 374-378, doi: 10.1109/UWBST.2003.1267867.
[3] Stanford Artificial Intelligence Laboratory et al. (2018). Robotic Operating System. Retrieved from https://www.ros.org

Name and workplace of bachelor's thesis supervisor:

Ing. Viktor Walter Multi-robot Systems FEE

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

Date of bachelor's thesis assignment: **20.02.2023** Deadline for bachelor thesis submission: **26.05.2023**

Assignment valid until: **22.09.2024**

Ing. Viktor Walter	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