

I. Personal and study details

Student's name: **Ivanov Mikhail** Personal ID number: **481275**
Faculty / Institute: **Faculty of Electrical Engineering**
Department / Institute: **Department of Control Engineering**
Study program: **Cybernetics and Robotics**
Branch of study: **Cybernetics and Robotics**

II. Master's thesis details

Master's thesis title in English:

Object detection for UAV from color and depth image

Master's thesis title in Czech:

Detekce objektu z fúze informace z barevné kamery a hloubkových dat pro UAV

Guidelines:

The goal of this thesis is to detect cuboids object with specified colors and sizes for autonomous UAV. The object will be detected from RGB color images fused with depth information. The following tasks will be solved:

- 1) Study methods for color image segmentation, depth image segmentation and color segmentation guided by depth information.
- 2) Design and implement algorithm for cuboid detection from color images together with depth information from sensor Intel RealSense D435.
- 3) Test and analyze developed algorithm in real experiment for data from UAV (and/or for data taken by human) in terms of correctness and computational speed. Compare the developed algorithm with other approach(es).

Bibliography / sources:

- [1] Holz D., Holzer S., Rusu R.B., Behnke S. (2012) Real-Time Plane Segmentation Using RGB-D Cameras. In: Röfer T., Mayer N.M., Savage J., Saranlı U. (eds) RoboCup 2011: Robot Soccer World Cup XV. RoboCup 2011. Lecture Notes in Computer Science, vol 7416. Springer, Berlin, Heidelberg
- [2] Dou M., Guan L., Frahm J.M., Fuchs H. (2013) Exploring High-Level Plane Primitives for Indoor 3D Reconstruction with a Hand-held RGB-D Camera. In: Park J.I., Kim J. (eds) Computer Vision - ACCV 2012 Workshops. ACCV 2012. Lecture Notes in Computer Science, vol 7729. Springer, Berlin, Heidelberg
- [3] Ma, L., Kerl, C., Stücker, J., & Cremers, D. (2016, May). CPA-SLAM: Consistent plane-model alignment for direct RGB-D SLAM. In 2016 IEEE International Conference on Robotics and Automation (ICRA) (pp. 1285-1291). IEEE.

Name and workplace of master's thesis supervisor:

RNDr. Petr Štěpán, Ph.D., Multi-robot Systems, FEE

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

Date of master's thesis assignment: **28.01.2020**

Deadline for master's thesis submission: **14.08.2020**

Assignment valid until:

by the end of winter semester 2021/2022

RNDr. Petr Štěpán, Ph.D.
Supervisor's signature

prof. Ing. Michael Šebek, DrSc.
Head of department's signature

prof. Mgr. Petr Páta, Ph.D.
Dean's signature

III. Assignment receipt

The student acknowledges that the master'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 master's thesis, the author must state the names of consultants and include a list of references.

Date of assignment receipt

Student's signature