

Fusion of Sonar, Camera and LiDAR Data for Enhancing the Perception Capabilities of Underground Robots

Project goal: This project aims to investigate the potential of fusing sonar, camera and LiDAR data to support the perception skills of robots operating in underground environments. In particular, the focus is on a minimalistic system consisting of ultrasonic sonar sensors, a single-beam LiDAR sensor, a camera, and an IMU such that through their fusion reliable localization and ranging data in visually-degraded underground settings is provided. The envisioned system should be possible to be integrated onboard a lightweight sub-1kg flying robot.



Research Tasks:

- Literature review on ultrasonic and LiDAR ranging
- Literature review on state estimation
- Conceptual design of the proposed multi-modal sensing solution
- Embedded system implementation of the considered sensing solution
- Handheld evaluation in the lab in fog-filled settings
- Experimental evaluation onboard a flying robot
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Required Skills:

- Experience in C++ and Python programming
- Experience with Robot Operating System (ROS)
- Embedded systems background

Contact Details:

If you are interested in this project, please send your transcripts and CV to Dr. Kostas Alexis (kalexis@unr.edu) or Dr. Christos Papachristos (cpapachristos@unr.edu).