Reactive Collision Avoidance for Aerial Robots Navigating in Underground Environments

Project goal: This research aims to investigate a last-resort collision-avoidance mechanism that is implemented onboard an aerial robot aiming to navigate complex underground settings. The method should employ different sensing modalities in order to provide robustness and satisfactory performance even in visually-degraded conditions. In particular, the combination of visible camera data and LiDAR ranging is considered as a starting point. Ideally, the designed solution should not assume that a reliable pose and map estimate is available and enable reactive avoidance even in the most degenerate cases.

Research Tasks:
- Literature review on reactive collision avoidance
- Conceptual design of sensing solution required
- Implementation of the collision avoidance mechanism in simulation
- Implementation of the sensing solution
- Implementation of the reactive avoidance controller onboard the aerial robot
- Experimental evaluation in the lab and the field

Required Skills:
- Good understanding of control
- Experience in C++/Python programming
- Experience with Robot Operating System (ROS)
- Embedded systems background

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