Graduation assignment: Real-time dense thermal 3D-reconstruction

With the recent development of higher-resolution long-wave infrared (LWIR) cameras, a.k.a. thermal cameras, they have become a viable navigation alternative in extreme environments where common visual and/or LiDAR solutions may fail. At Saxion's Mechatronics Research Group, thermal-inertial Simultaneous Localization and Mapping (SLAM) is being developed for various projects with Dutch fire departments and the police. Applications include reconnaissance in a smoke-filled environment during a building fire or before a tactical intervention in a dark location with LUCI. In this video (https://www.youtube.com/watch?v=jopZ-Dp3iMc&ab_channel=Klaaskanalles), a small demonstration of the research group's stereo thermal-inertial setup is given on Dutch television.

The research group recently created a proof-of-concept of a thermal SLAM algorithm operating during a fire incident. The system is capable of providing a sparse 3D-reconstruction, containing sufficient detail to plan movements and avoid obstacles. Some tasks such as crime scene or post-fire investigations however, require more refined knowledge of the environment.

Task description

During this Msc graduation assignment, the student is tasked with researching the possibilities of using a stereo set of thermal cameras to create a dense 3D-reconstruction of the environment in real-time.

At the end of the assignment, the student should deliver an algorithm capable of creating a real-time dense thermal 3D-reconstruction in different environments (e.g. during a fire incident, in a building hallway).

Practical Information

Student Profile: University Msc student with knowledge in computer vision.
Duration: 28-32 weeks (starting date is flexible).
Compensation: 230 euro per month, before taxes.
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