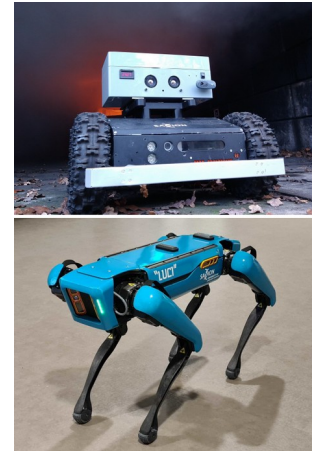## Internship: Calibration of a thermal-inertial system

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.

One of the critical elements that influences the accuracy of the obtained 3D map is a good calibration of the thermal-inertial system. Although the calibration procedure is very similar to calibrating a visual-inertial system, some modifications are required to factor in the additional challenges given by thermal cameras such as low contrast, inability to see color, high lense distortion,...

Task description

During this internship, the student is tasked with developing a calibration procedure that provides the intrinsic and extrinsic properties of a stereo set of thermal cameras as well as the 6-DOF transformation between the cameras and an inertial measurement unit (IMU).

At the end of the internship, the student should deliver a thermal-inertial setup that is calibrated such that the cameras' reprojection as well as the thermal-inertial motion estimation differences are minimal.

Practical Information

Student Profile: University Msc student with knowledge in computer vision.
Duration: 14-16 weeks (starting date is flexible).
Compensation: 230 euro per month, before taxes.
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