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Master Degree Course Electronics Engineering, MSc EE

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Hochschule Bremen
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Master 2018

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Estimation of the expected image transformation of a quasi-static scene using the inertial sensor of a moving camera.

ABSTRACT - Masterthesis

The following master thesis presents a method for detection of dynamic objects in thermal images taken by a moving camera. The main assumption is that by subtracting of two consecutive images movements become visible as subsequent changes in the respective image. The movement is caused by the camera motion through rotation and translation as well as by dynamic objects. To extract only the movement caused by dynamic objects the camera motion must be compensated. The camera motion will be determined with an inertial measurement unit. Furthermore the compensation of the camera motion will be performed by an image transformation of the previous image into the current image. The presented method shows that the determination of the camera movement by rotation already works with the raw angular rate of the inertial measurement unit. Dynamic objects are separated from static objects and can be displayed. Due to the high uncertainty of the inertial measurement unit with respect to the determination of the position the cam- era motion through translation cannot be compensated with the inertial measurement unit. Therefore the fundamental matrix will be introduced to determine the camera motion through translation. For determining the fundamental matrix several corresponding pixels are required in two consecutive images. The corresponding pixels will be estimate with the optical flow by Farneback. It turns out that the determination of the camera motion through translation can be done with the fundamental matrix provided that enough corresponding pixels can be fixed to static objects within the scene. A detection of dynamic objects can be performed by the epipolar geometry, in which dynamic objects can be detected by not complying with the epipolar geometry constraint.