



iGP: Autonomous Car

iGP Module: Inertial Navigation and Mapping for Autonomous Vehicles

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Navigation and mapping in unknown environments is an important building block for increased autonomy of unmanned vehicles, since external positioning systems can be susceptible to interference or simply being inaccessible. Navigation and mapping require signal processing of vehicle sensor data to estimate motion relative to the surrounding environment and to simultaneously estimate various properties of the surrounding environment. Physical models of sensors, vehicle motion and external influences are used in conjunction with statistically motivated methods to solve these problems. This thesis mainly addresses three navigation and mapping problems which are described below. In this project, we study how a vessel with known magnetic signature and a sensor network with magnetometers can be used to determine the sensor positions and simultaneously determine the vessel's route in an extended Kalman filter (EKF). This is a so called simultaneous localization and mapping (SLAM) problem with a reversed measurement relationship.