Title of Research Project:

Localization and Map Building Using Sensor Fusion for Autonomous Vehicle Navigation

Key Research Area

Mobile Robotics

Summary and significance of research project

The proposed project addresses the problem of navigation of an autonomous vehicle in large semi-and unstructured real world environments, which have not been engineered for the purpose of robot navigation. Maps are essential for self-localization, path planning and human-robot interaction. It is assumed that no a priori map exists and hence the problem is compounded by the fact that the robot needs to build a map of the uncharted territory whilst simultaneously localizing itself.

A multiple sensory approach is utilized for determining landmarks, and relative motion of vehicle. An extended Kalman filter based approached combined with computational intelligence is proposed to be used to recursively estimate the combined map and vehicle state each time a new observation becomes available, whilst ensuring the computation and memory requirements remain bounded for real time application.

The research is to be validated by implementing the multiple sensor-based localization and map building algorithms on an actual vehicle operating in complex semi and unstructured environments of a significant extent.

The work is to be carried out under the division's SRP (Mobile Robots) initiative, and forms part of the AcRF.