



# M.Sc. Project

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**Project Title:** New methods in Kalman filtering: Application to GPS/INS Aided Inertial Navigation systems.

**Based:** IMM, Technical University of Denmark (DTU)

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## Background & Rationale

Kalman filtering is a very important statistical method for state estimation in stochastic dynamic systems. One of the first practical applications was navigation of the Apollo space vehicles that eventually landed a man on the Moon. Recent developments in Kalman filtering combined with availability of sufficiently powerful DSP embedded processors holds significant potential for applied Kalman filtering in the future, especially for use with non-linear systems. Aided Inertial Navigation Systems (e.g. GPS/INS) is one important modern application.

## Project description

Implement new Kalman filtering algorithms in an Aided Inertial Navigation Systems (AINS) simulation environment and demonstrate improved navigation performance. Analyse use of non-linear sensor measurements e.g. range/bearing. In co-operation with industry, obtain experimental data sets from a high end commercial inertial navigation system that is available for test. Apply algorithms to real-world data and evaluate results.

If time and skills permit, implement algorithms on AINS embedded DSP (Texas floating point) and demonstrate real-time use.

Prepare an article for a scientific journal, trade journal or conference presentation.

## Competency Requirements:

- Statistics and mathematics, ideally some knowledge of Kalman filtering
- Matlab practical experience,
- Embedded programming (extra plus, no strict requirement).

## Duration and location

6-12 months, IMM-DTU in co-operation with Sonardyne Int., possibly part-time employment.