Informatik og Matematisk Modellering

M.Sc. Project

Project Title: Optimal Kalman-smoothing applied to advanced integrated navigation systems.

Based: IMM, Technical University of Denmark (DTU)

Advisor: Niels Kjølstad Poulsen, 321/016, nkp@imm.dtu.dk, +45 4525 3356
Mikael Bliksted Larsen, 305/128, MBL@sonardyne.com, +45 3155 8571

Background & Rationale

As marine offshore search for oil & gas resources is taking place in deeper waters, accurate navigation and positioning is becoming increasingly difficult. Accurate seabed maps are a precondition for the planning, design and safe installation of large subsea structures.

Historically offshore positioning and seabed mapping has been based primarily on use of underwater acoustics (range/bearing). To improve accuracy and reliability, advanced technologies from e.g. Aerospace industry are being adapted for use in commercial offshore survey:

- GPS/INS integrated multi-sensor navigation systems
- Autonomous robotics

Kalman-smoothing is a powerful generic state estimation technique that promises to improve navigation accuracy by statistical optimum post-processing and fusion of multi-sensor data.

Project description

Based on literature and guidance from leading experts, implement GPS/INS Kalman-smoothing in a Matlab simulation environment. Simulate realistic scenarios, e.g. an Autonomous Underwater Vehicle performing seabed mapping at 3000m water depth and evaluate accuracy.

In co-operation with industry, use experimental data sets to demonstrate practical utility of developed algorithms and SW. Prepare article for e.g. conference presentation and if time permits, implement a prototype commercial SW package for post-processing of navigation data.

Competency Requirements:

- Statistics and mathematics,
- Matlab practical experience (advantage),
- Windows/embedded programming C/C++ (extra plus, no strict requirement).

Duration and location

6-12 months, IMM-DTU, Sonardyne UK (London & Plymouth), possible part-time employment.