NTNU
Norwegian University of
Science and Technology

Faculty of Information Technology
and Electrical Engineering
Department of Engineering Cybernetics

MASTER THESIS DESCRIPTION SHEET

Name:	Andreas Haugland
Department:	Engineering Cybernetics
Thesis title (Norwegian):	Faktorisert implementasjon av et Kalman filter for integrerte treghetsnavigasjonssystemer
Thesis title (English):	A factorized Kalman filter implementation for aided navigation systems

Thesis Description: The NTNU UAVlab has developed a navigation systems toolbox to run inertial navigations (INS) offline used for experimentation, development, and validation. The toolbox has proven to be useful, but further developments are beneficial to increase performance, utility, and robustness, especially if the state space is large

The following tasks for the specialization project thesis should be considered.

1. Perform a literature review on
    a. Standard/batchwise and iterative/sequential EKF implementations for aided INS
    b. Kalman implementations based on covariance factorization such as QR, LU and UDU
2. Decide on a factorization method and implement a factorized Kalman implementations for aided INS. Justify our choice.
3. Reuse and update the motion simulator and sensor simulator developed in the specialization project.
4. Evaluate performance and runtime using simulated and benchmark with a non-factorized implementation from the project thesis.
5. Evaluate performance on experimental data if time permits.
6. Present and discuss your results.
7. Conclude your results and suggest further work.

Start date:	2021-08-16
Due date:	2022-01-05
Thesis performed at:	Department of Engineering Cybernetics, NTNU
Supervisor:	Associate professor Torleiv H. Bryne, Dept. of Eng. Cybernetics, NTNU