Interdisciplinary Project

Development of an Inertial Sensor Calibration environment

Sensors, Navigation & Data fusion

Inertial sensors (gyroscopes and accelerometers) require extensive calibration to deliver the high accuracy and integrity that is required for aerospace applications.

The Institute of Flight System Dynamics uses a three-axis motion simulator to stimulate these sensors with well-known rotations and accelerations. Comparing the sensors output with the simulator’s true motion allows the identification of the inertial sensor’s error model. For non-stationary calibration profiles, it is vital that the inertial sensors output recording is synchronized to the simulator’s true motion.

In this project, a realtime control system for simultaneously controlling the motion simulator and recording the inertial sensor’s output shall be developed and implemented. This includes selection and setup of a linux-based realtime operating system and the development of a realtime software to interface the rate table via its UDP interface as well as the inertial sensors via serial interface.

In addition, different possibilities for the trajectory generation (from file, online algorithm, from external source) shall be examined. Further features and possible tasks are open to discussion.

Scope of work:

- Literature research on realtime-extensions for linux,
- Familiarization with the motion simulator’s realtime interface,
- Setup of a linux-based realtime system,
- Development of a software that allows realtime control of the motion simulator and synchronized recording of inertial sensor data,
- Bonus task: Feed (filtered) flight-simulator live-data to the motion simulator

Requirements:

- Motivation, creativity and interest in realtime control,
- Experience in C/C++ programming and Linux,
- Knowledge in realtime linux extensions (e.g. Xenomai) desirable but not mandatory

For questions and applications please refer to c.blum@tum.de

Kontakt: Christopher Blum  
MW3601  
089 (289) 16041  
c.blum@tum.de