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Brytning av månbaserat ^{3}He för användning som fusionsbränsle

Sammanfattning

Denna rapport utreder möjligheten att bryta ^{3}He på månen för att använda som fusionsbränsle i framtida fusionsreaktorer. Målet har varit att utreda hur en eventuell brytning kan gå till och om det är lönsamt. För att utreda dessa frågor har en litteraturstudie genomförts. Problem som berörs i rapporten innefattar brytning, transport och möjligheten att använda fusionsreaktorer som energiförsörjning på en tänkt månbas. Slutsatsen av rapporten visar att ^{3}He kan vara att föredra i fusionsreaktorer men tekniken måste först utvecklas för att det ska fungera.

Detection and Tracking by Wireless UWB and Camera Networks

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In this report we have focused on how wireless UWB and camera networks can be used to detect and track moving objects. The aim of the project was to investigate how these technologies can be integrated into the smart building, where there are a vast number of applications that can benefit from accurate position information.

This report describes the theory behind wireless UWB and camera networks, and image processing algorithms for detection and tracking using vision information. The difference between 2D and 3D localization has been investigated and a method to perform 3D localization using only two cameras is proposed. Localization by multiple cameras can be refined using an Extended Kalman Filter, and this report describes how this is done. Using MATLAB and a webcam we have implemented different background subtraction algorithms, and then used them for tracking moving objects. In collaboration with project D4, a method to fuse the information from a wireless camera network with an AGV is discussed.

Finally, a new application of wireless camera network called "The Smart Illumination system" is proposed. This application can be used to optimize the lighting in the smart building, and decrease the energy consumption and at the same time make the everyday life more comfortable.

Construction and Analysis of a GPS and Localization System for Sounding Rocket Experiment

Author:
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Abstract:
This implementation and analysis of a GPS and localization system is used in the MUSCAT experiment. It's objective is to collect raw GPS data from four free falling units in the middle atmosphere and save these to a memory for later derivation of local temperature profiles. The localization system is to calculate position in real time, transmit this via satellite and radio for recovery of the experiment units. The system was created by creating schematics, drawing circuit board layout, programming it in VHDL and finally verifying and analyzing the data. A circular circuit board with the diameter of 121mm containing a GPS front-end receiver, commercial GPS receiver, satellite modem and beacon transmitter was successfully constructed. Using a custom made circular broadband patch antenna reception of GPS signals and transmission of satellite messages was accomplished.

Titel

Using GPS to Determine the Drag of Falling Probes

Abstract

Abstract--- On of the goals of the RAIN sounding rocket experiment is to provide a proof-of-concept for measuring atmospheric density from the aerodynamic breaking of falling probes. The probes are tracked using an on-board GPS receiver that stores unprocessed GPS signals to memory. This thesis describes the post-processing software used to determine the probe's position, velocity and acceleration. The software implements a semi conventional receiver, with standard tracking loops but with a curve fitting method for code delay measurements and methods to handle frequent signal loss. The navigational solution is formulated as a global optimization problem, combining pseudoranges, carrier Doppler observations and inertial sensor data with IGS products. Some further comments are given on drag determination from the GPS data. The RAIN flight did not occur, but some results from ground tests are presented.

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