HAN'S ROBOT GERMANY

Development of an Embedded Communication Hub for the Acquisition of Sensor Data in a Robotic System

Project Thesis

Background

Collaborative robots are an upcoming trend in the automation industry which enable a closer interaction between humans and robots to realize/materialize productivity gains and relieve workers from repetitive, unergonomic or tiring tasks.

To fulfill the challenging tasks in this field, extensive sensor integration and sensor fusion is leading to a wide variety of different interfaces and measurement principles that need to be integrated into the embedded system.

The embedded system processing such critical data additionally must fulfill demanding machine and functional safety requirements by a certification body like TÜV.

Problem / Task

The goal of this project thesis is to develop an embedded system to collect and process sensor data within the robot axes. Therefore, the following tasks must be done:

- Analysis of requirements and needed IO interfaces for the system
- Design of a PCB using Altium designer
- Development of the embedded software for the system implementing the following functions
    - Readout of different sensors e.g. IMU (SPI), Encoders (BiSS-C),...
    - Control of status RGB LEDs e.g. WS2812b (incl. animations)
    - Preprocessing data acquired by the sensors (e.g. filtering)
    - Communication with Control System (via e.g. EtherCAT, USB or RS485)
- Test the system functionality

Requirements

The student pursuing this thesis should be highly motivated and self-organized, bringing in experience in embedded soft- as well as hardware design with ARM µCs.

It is beneficial if the student has experience using Altium Designer and STM32 products as well as their toolchain.

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