imperix

Written by: nicolas.cherix@imperix.ch
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PUBLIC DOCUMENT

INTERNSHIPS AND RESEARCH PROJECTS

Written by: Imperix ltd, Rte des Ronquos 23, 1950 Sion, Switzerland
Addressed to: Any R&D-performing academic institution or industrial company

1. SOFTWARE DEVELOPMENT PROJECTS

TRANSIENT WAVEFORM GENERATOR FOR REAL-TIME MONITORING SOFTWARE

Motivations: Imperix is interested in adding new features to its real-time monitoring software "Cockpit", which can be easily implemented as add-on modules. Among them, an advanced waveform generator would be very useful for testing control dynamics.

Objectives: Develop a GUI that allows generating various reference steps, simulating different stimuli, or importing setpoint profiles. Translate the waveform into a series of points, which can be interpreted by the digital controller (embedded C/C++). Write the counterpart code on the controller that interprets the waveform and coordinates the transient generator with the datalogger (virtual oscilloscope).

Skills: Good C++ coding skills (for both high-level programming and embedded C/C++), familiar with Qt framework, knowledge of OPC-UA a plus.

Level: This project can be addressed by any student with the above skills set.

CONTINUOUS DATA LOGGING FOR REAL-TIME CONTROL APPLICATIONS

Motivations: The "Cockpit" software, developed by imperix, integrates waveform capture functions similar to a multichannel oscilloscope. The software also integrates a long-term recorder, but operating at a down-sampled rate. Imperix wishes to enable users to acquire continuous streams of data (typ. 16 bits, 10-300 kHz), on multiple channels, with no lost frame.

Objectives: Implement a mechanism to evaluate the Ethernet link usage and detect missing data. Implement data buffering and streaming modules on the real-time controller (Embedded Linux). Implement the data recorder (PC side) as a Cockpit module.

Skills: Previous experience with embedded systems is mandatory.
Prior experience with data streaming is a plus.

Level: This project can be addressed by any student with the above skills set.

WEB-BASED LICENSE MANAGEMENT FOR CUSTOMER GROUPS

Motivations: Imperix needs to manage licenses for its customers, who happens to be often groups of users, instead of individual accounts on the website. Besides, this unconventional license management must be able interact with a specialized software (Cockpit) as well as specialized hardware (B-Box RCP). Support available from existing Wordpress plugins is unfortunately insufficient.

Objectives: Develop web-based support (Wordpress) for group-based license management. Implement an API that is suitable to both Cockpit and the B-Box and provides sufficient protection (typ. man-in-the-middle attack).

Skills: Good command of PHP is essential. Previous experience with Wordpress is recommended. Basic knowledge of cryptography is a plus.

Level: This project can be addressed by any student with the above skills set.

USER EXPERIENCE DATA COLLECTION FOR SPECIALIZED NETWORKED HARDWARE

Motivations: Imperix wishes to leverage user experience statistics in order to facilitate the continuous improvement of its software products.

Objectives: Collect user experience data (e.g. user configuration, usage statistics, error logs, etc.) from the B-Box RCP. This work requires to gather the corresponding usage data (Embedded Linux), as well as to store it in the cloud, in a GDPR-compliant way.

Skills: Basic familiarity with Embedded Linux and Google Cloud is desired. Some interest for the compliance-related aspects of the project is also important.

Level: This project can be addressed by a bachelor student.