Telemark University College

Faculty of Technology

FM3006 Project / SCE4006 Project

Title: **Home Automation Platform using Windows 10 IoT**

TUC supervisor: Hans-Petter Halvorsen, Nils-Olav Skeie

External partner: National Instruments

Task description:

Home automation (also know as Smart House, Smart Home, etc.) solutions has greatly increased in popularity over the past several years. Home Automation may include centralized control of lighting, heating, ventilation and air conditioning, appliances, security locks of gates and doors and other systems, to provide improved convenience, comfort, energy efficiency and security.
Keywords: Industrial IT, Raspberry Pi, Arduino, IoT, Windows 10 IoT, Wireless Data

<u>Some</u> of the following topics should be selected and investigated in this project:

- Study of existing Home Automation Systems and explore the Arduino and the Raspberry Pi platforms to see how they can be integrated and used for Home Automation.
- Explore functionality using Raspberry Pi with Windows 10 IoT
- Logging, Monitoring and Control of typical Data in Homes, e.g., Temperature, etc.
- A Web based logging service similar to e.g., Xively or Temboo should be developed.
- Further development of a platform for monitoring and presentation of data.
- Use of RFID for Access Control
- Camera surveillance with Raspberry Pi
- Explore Wireless Communication, such as WiFi, Bluetooth SMART, XBee, RFID together with Raspberry Pi and Arduino. RFID should be used for Access Control (e.g. open doors). XBee should be used for Wireless Sensor Communication.
- Using Arduino/Raspberry Pi for Monitoring and Datalogging using Web Services and "Data Dashboard for LabVIEW" (App for Smartphones and Tablets)
- Development of PID control and other Control strategies like MPC for temperature control in houses.
- Using OPC UA together with Raspberry Pi
- Weather Data Monitoring and Prediction for Temperature Control
- Using Arduino within LabVIEW; LabVIEW LINX

- Explore possibilities for using LabVIEW within Raspberry Pi 2
- Security issues within Home Automation solutions
- Analyze, design and development of a prototype that can be built into a suitcase.

Based on the student's interest, they should select <u>some</u> of the topics above in collaboration with the supervisor for further investigation.

Task background:
Home Automation Systems have been very popular today and many vendors have solutions within this area. This must also be seen in connection with Internet of Things (IoT).

Arduino is a low cost open-source electronics prototyping platform. The Arduino has analog and digital I/O.

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and may be used with a standard keyboard and mouse.

Student category: SCE students

Practical arrangements: None

Signatures:

Supervisor (date and signature):

Students (date and signature):