Group 9

Frederik Alexander Hounsvad : frhou18  
Nikolai Emil Damm : nidam16  
Oliver Lind Nordestgaard : olvan18  
Peter Andreas Brændgaard : pebra18

# Project title:

Wirelessly controlled crane

# Overall project description:

Using a combination of ESP32s, a Raspberry Pi, and a MQTT service, we want to remotely control a crane so it can pickup goods from a simulated assembly line (a rotating disk with zones). The system will be able to:

* Recognize item types based on colour (scanned with a camera interfaced with the Raspberry Pi)
* Be controlled remotely by actuating upon topic values in a hosted MQTT service
* Use various hardware components:
  + Phototransistor to count rotations on the crane winch.
  + DC and Stepper motors
  + Self-built electromagnet
* Subscribe and publish state to the MQTT service for wireless communication between physical devices

Diagram

Description automatically generated

# Tasks:

* Write Arduino code to control crane and disc
* Write Arduino code to connect esp32 to Wi-Fi and MQTT
* Setup PI as Wi-Fi access point
* Create shell scripts which start relevant services when the PI boots
* Create camera application for scanning items
* Create web app to control esp32s over MQTT
* Log relevant data of the system
* Allow automatic and manual control of the system

# Which course objectives do you meet:

* Linux architecture
* Embedded linux systems
* Distributed embedded Linux systems, wired and wireless communication
* I/O interfacing to sensors and actuators
* Message passing design patterns
* Integrate simple embedded Linux systems into relevant applications (we use quite a few of the linux services to make our system possible e.g. to set up a wifi hotspot)
* Apply appropriate communication and message passing architectures for data exchange and remote management
* Setup and use version control systems