Hydroponics controller design spec

# Arduino PLC

The PLC needs to take care of the following tasks

Essential tasks for v1 system

* Switching on/off the lights at set times (requires RTC)
* Get on/off times for lights from thingsboard dashboard
* Switch on/off the pump
* Switch on/off the input fan
* Switch on/off the exhaust fan
* Switch on/off heater
* Control the speed of the exhaust fan
* Get latest control setpoints for temp, humidity, pressure and c02 from thingsboard
* Get sensor values from every Modbus Sensor
* Send sensor values to thingsboard dashboard via ethernet/MQTT
* Automatically perform on/off control with heater to control room temperature
* Get pump on/off times (maybe pump frequency i.e. every 3 hours etc) from thingsboard
* Switch on pump at set times
* Automatically perform proportional control of exhaust fan speed to meet pressure and c02 setpoints

Tasks that could wait until v2

* Send email alert via thingsboard if pump is activated but water does not flow.
* Send email alert if temp/humidity/pressure goes outside range
* Get thingsboard to send alert if PLC is offline

# Modbus Sensor

* Send sensor values to PLC via modbus
* Every sensor has temp, hum, pressure
* Optional add on of c02 or flow
* Powered by 12v from panel modbus cable
* Individually addressable over modbus

# Thingsboard Dashboard

* Set setpoints for temperature, humidity, pressure and c02
* Display averaged sensor values for temp, humidity and c02
* Set times for lamps to switch on/off at
* Set pump duration and frequency
* Display image taken from webcam