The HaBA Way

Stelzhammer, Graf, Breiteneder, Leibetseder, Pöchtrager

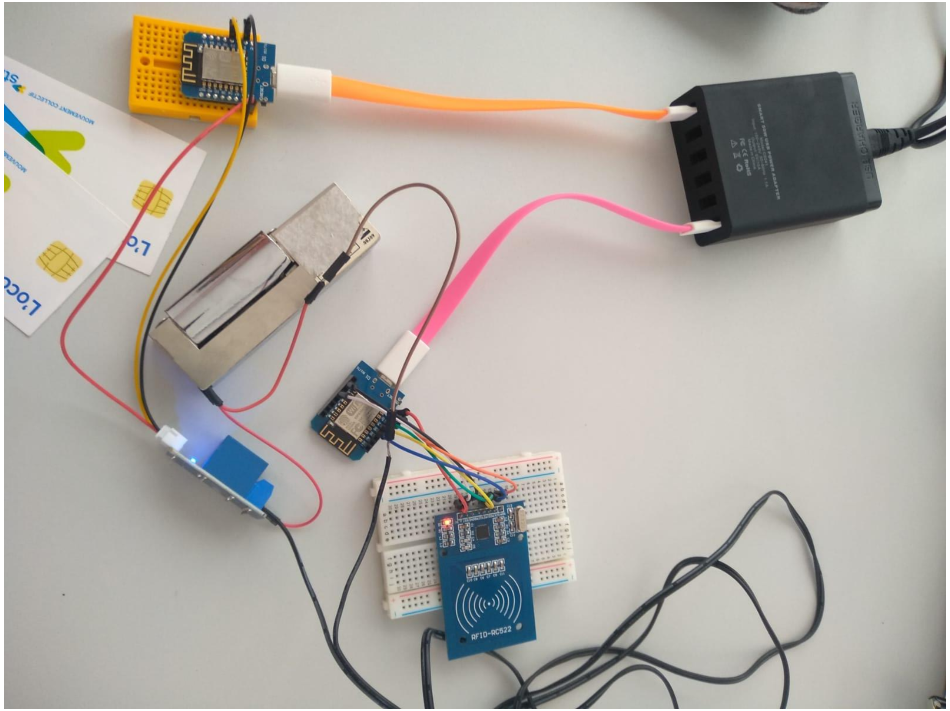
ULTIMATE FI

Used Hardware

- Humidity-Sensor
- Fire-Sensor
- Temperature-Sensor
- Water-Sensor
- Light-Sensor
- Lock
- Relais
- RFID-Scanner
- Submersible Water Pump
- Water hose

- 2 Raspberry Pi
- 5 Wemos D1 Mini
- Laptop (MyCroft)
- Smartphone
- 2 Hue Bulbs
- Z-Wave Controller
- Z-Wave Plug
- I^{2}C Digital Temperature Sensor
- Analog Brightness Sensor
- Analog/Digital Ground Moisture Sensor

Smart Lock



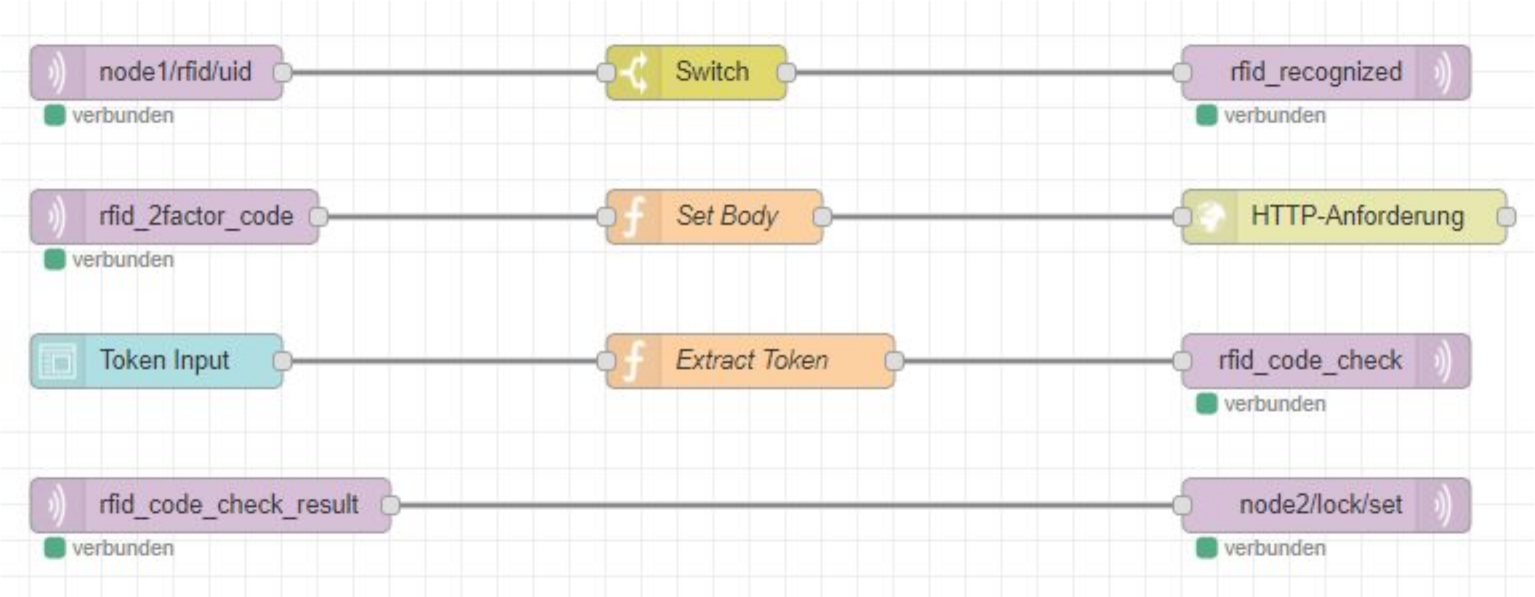
Smart Lock

Used Components

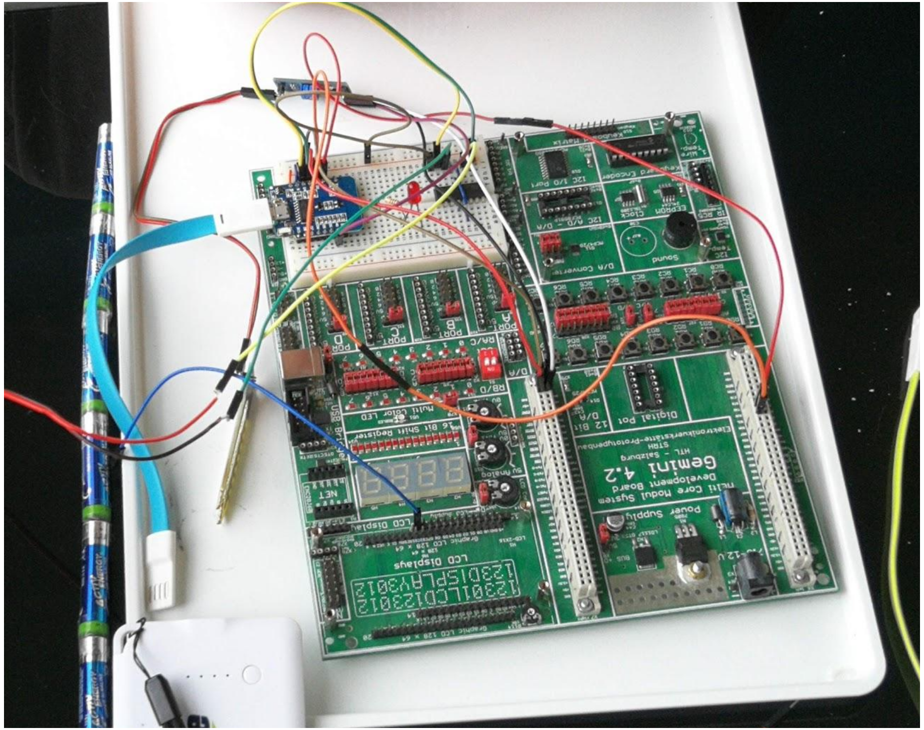
- Wemos D1 Mini (2x)
- Lock
- Relais
- RFID scanner
- Smartphone for push notification
- IFTTT for sending push notifications
- MQTT authentication server (written in Java)

Smart Lock

Node Red Configuration



Vertical Gardening - “Frankenstein”



Vertical Gardening Hardware

Base

- Wemos D1 Mini
- Gemini Board

Sensor

- I^{2}C Temperature Sensor
- Digital Brightness Sensor
- Analog Ground Moisture Sensor

Actuator

- Motor Driver
- Submersible Water Pump
- Water hose

Power

- 5V USB Battery Pack
- 12V Serial AAA Setup

Vertical Gardening

Wemos D1 Mini Configuration

- Not using the IoTEmpire framework (no support for water pump)
- Instead Arduino IDE for Wemos D1 Mini
- Implemented using C++

Vertical Gardening

Wemos D1 Mini Configuration

- Finite State Machine
  - Network
  - Temperature
  - Humidity
  - Brightness
  - **Water Pump**
- Connect to WiFi and MQTT Broker on start up
- Read sensor values every 15 minutes and publish to respective MQTT topics (“home/garden/vertical_gardening/...”)

Vertical Gardening

Wemos D1 Mini Configuration

- Theoretically no MQTT messaging necessary (sensors are all at one place)
- Dependent on the sensor values the pump is triggered to run for a certain amount of time

Vertical Gardening Whoopsies

- Digital outputs of sensors almost always less useful than analog
- Not enough Wemos D1 Mini available for the number of analog sensor pins necessary
- Bought the wrong pump on Amazon that required 12V

Vertical Gardening Whoopsies

- Initially used Arduino Uno with WLAN-Shield which messed up the measurements
- Didn’t have a stable temperature sensor, so we hooked into the I^{2}C bus interface of one of my existing projects (Gemini).
  - We then also used more components through interfacing such as **Buttons** and **LEDs**.
- For the battery we initially cut a usb cable, reduced it to the power pins and soldered them onto clean cables. (Attempt to get the pump running with 5V - for circuitry convenience → failed → motor driver and 12V pack)
- Where do you get a 12V pack on the weekend? → you scavenge for 8 1.5V AAA batteries from remotes and use tape to combine them in serial

OpenHab Integration

- Bindings
    - MQTT Binding
    - Hue Binding
    - Z-Wave Binding

- Items in .items
- Rules in .rules (partly Java)

MyCroft

- easy setup on Linux
- struggled with Docker on macOS (commands only for Linux)
- skill installation was just a “Hey MyCroft, install openHAB”
- mycroft.conf add ip and port of openHAB

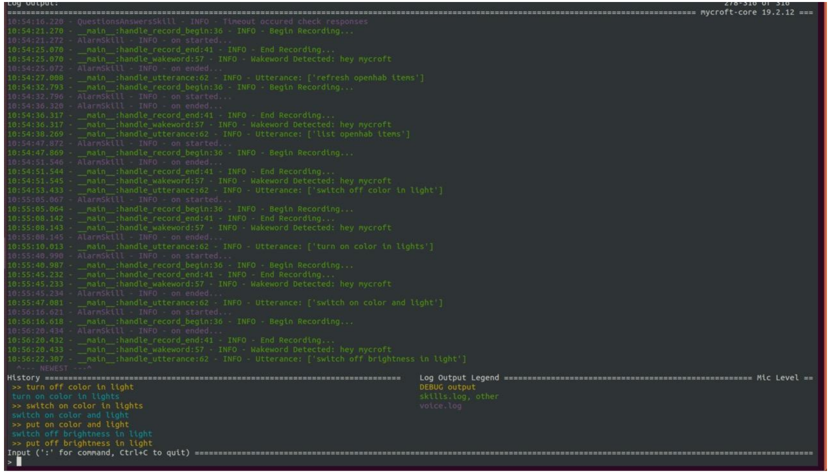
MyCroft

- http://xxx.xxx.xxx.xxx:8080/rest

- Reads .items-File of openHAB
  “Refresh openHAB items”

- special Syntax for creating Items
  “List openHAB items”

- CommandLine environment looks awesome!



```
Log Output:                                                                                              278-316 of 316
======================================================================================== mycroft-core 19.2.12 ===
10:54:16.220 - QuestionsAnswersSkill - INFO - Timeout occured check responses
10:54:21.270 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:54:21.272 - AlarmSkill - INFO - on started...
10:54:25.070 - __main__:handle_record_end:41 - INFO - End Recording...
10:54:25.070 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:54:25.072 - AlarmSkill - INFO - on ended...
10:54:27.008 - __main__:handle_utterance:62 - INFO - Utterance: ['refresh openhab items']
10:54:32.793 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:54:32.796 - AlarmSkill - INFO - on started...
10:54:36.320 - AlarmSkill - INFO - on ended...
10:54:36.317 - __main__:handle_record_end:41 - INFO - End Recording...
10:54:36.317 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:54:38.269 - __main__:handle_utterance:62 - INFO - Utterance: ['list openhab items']
10:54:47.872 - AlarmSkill - INFO - on started...
10:54:47.869 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:54:51.546 - AlarmSkill - INFO - on ended...
10:54:51.544 - __main__:handle_record_end:41 - INFO - End Recording...
10:54:51.545 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:54:53.433 - __main__:handle_utterance:62 - INFO - Utterance: ['switch off color in light']
10:55:05.067 - AlarmSkill - INFO - on started...
10:55:05.064 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:55:08.142 - __main__:handle_record_end:41 - INFO - End Recording...
10:55:08.143 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:55:08.145 - AlarmSkill - INFO - on ended...
10:55:10.013 - __main__:handle_utterance:62 - INFO - Utterance: ['turn on color in lights']
10:55:40.990 - AlarmSkill - INFO - on started...
10:55:40.987 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:55:45.232 - __main__:handle_record_end:41 - INFO - End Recording...
10:55:45.233 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:55:45.234 - AlarmSkill - INFO - on ended...
10:55:47.081 - __main__:handle_utterance:62 - INFO - Utterance: ['switch on color and light']
10:56:16.621 - AlarmSkill - INFO - on started...
10:56:16.618 - __main__:handle_record_begin:36 - INFO - Begin Recording...
10:56:20.434 - AlarmSkill - INFO - on ended...
10:56:20.432 - __main__:handle_record_end:41 - INFO - End Recording...
10:56:20.433 - __main__:handle_wakeword:57 - INFO - Wakeword Detected: hey mycroft
10:56:22.307 - __main__:handle_utterance:62 - INFO - Utterance: ['switch off brightness in light']
  ^--- NEWEST ---^
History ================================================================   Log Output Legend ========================== Mic Level ==
 >> turn off color in light                                               DEBUG output
 turn on color in lights                                                  skills.log, other
 >> switch on color in lights                                             voice.log
 switch on color and light
 >> put on color and light
 switch off brightness in light
 >> put off brightness in light
Input (':' for command, Ctrl+C to quit) ==================================================================================
> 
```

Questions?

Thank you!