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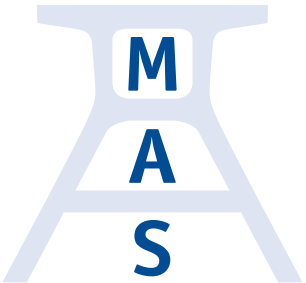
DUISBURG
ESSEN

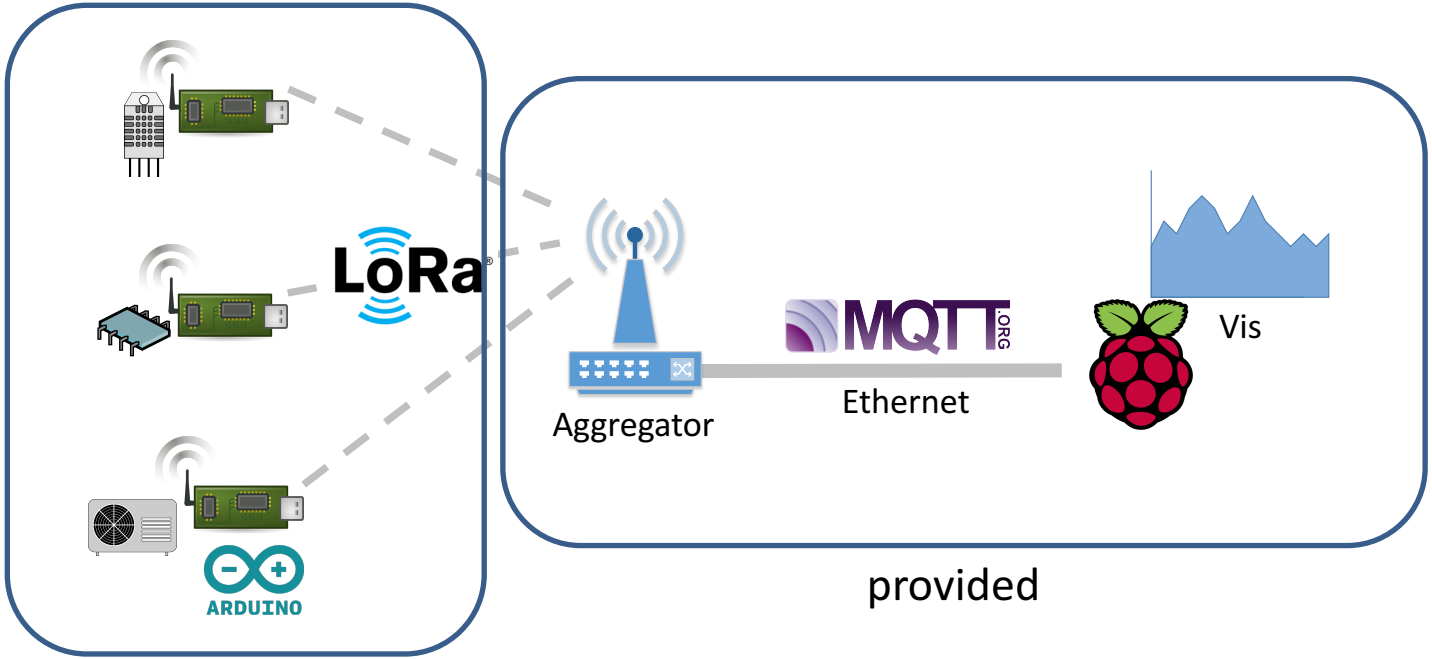
Open-Minded

Practical IoT and Crowdsensing Considerations

IoT Crowd 2017 ▪ 2017-08-02



Hands-On Experiment Setup



https://github.com/mas-ude/iotcrowd-2017

Grab an Arduino, Radio and Sensors!

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- Install the Arduino IDE from https://arduino.cc and launch it
- Under *Sketch → Include Library → Add .ZIP Library* add the Radiohead library, downloadable at http://www.airspayce.com/mikem/arduino/RadioHead/
- Get a sensor of your choice and connect it via shield or directly via pins
- Plug your Arduino into the USB port
- Under *Tools* make sure you have selected the right board (*Arduino/Genuino Uno*) and port
- Load an example project from https://github.com/mas-ude/iotcrowd-2017

Important Notes

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```
#define SENDER_ID 2

// Singleton instance of the radio driver
RH_RF95 rf95;
float frequency = 433.0;
```

- Make sure the frequency is always 433 MHz
- Assign yourself an unique SENDER_ID; there are 6 distinct colors for the debug output, calculated with `SENDER_ID % 6`. Speak with your neighbors!
- Don‘t modify the values inside the defined `structs`, or the gateways may not recognize your packets correctly
- Use the serial monitor and `Serial.print{ln}()` statements to debug

Sensor Types

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- Ultrasonic
- Sound
- Temperature
- Temperature & Humidity
- Dust

- Connect sensors to the right pins (compare and/or adjust with example code

Exercises

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Configure a node with 2 (or more) sensors

Attach more than one sensor to a single Arduino and send all sensor readings to the Gateway. Remember to keep a delay of at least 200ms between sending signals to avoid problems.

Let two nodes compare their sensor readings and send the mean

Take 2 nodes with the same sensors and calculate the mean of each sensor reading. Try to find a way where the gateway doesn‘t get the individual readings but only the mean value.

Moving Beyond the Examples

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- Familiarize yourself with the sensor data sheets to get correct results
- Test other sensors or transmissions
- Test the range (and toy with TX power, modulation schemes)
  - Optimize your battery life!
- Think of experiments that you want to conduct
  - Types of data, RF interfaces, architecture
  - Where, who, when?
  - Aggregation and/or visualization?