

IoT internship

The project's applicability,
implementation & potentials
ft. personal commentary

Presenters:

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C N T E N T S



- Use cases - providing context
- Project structure
 - Arduino - Firmware
 - Raspberry Pi - Cloud client
 - PC - Cross-platform GUI App
- Questions, discussion



Use cases - providing context



Use cases - providing context

Outdoors - Local weather measurements and forecast

- You need your own measurements:
 - There are no well-known measurements nearby
 - You don't trust the lizard people's fake news
 - Maybe your surroundings are a pocket of different data



Use cases - providing context

Indoors - Monitoring and regulating a microclimate

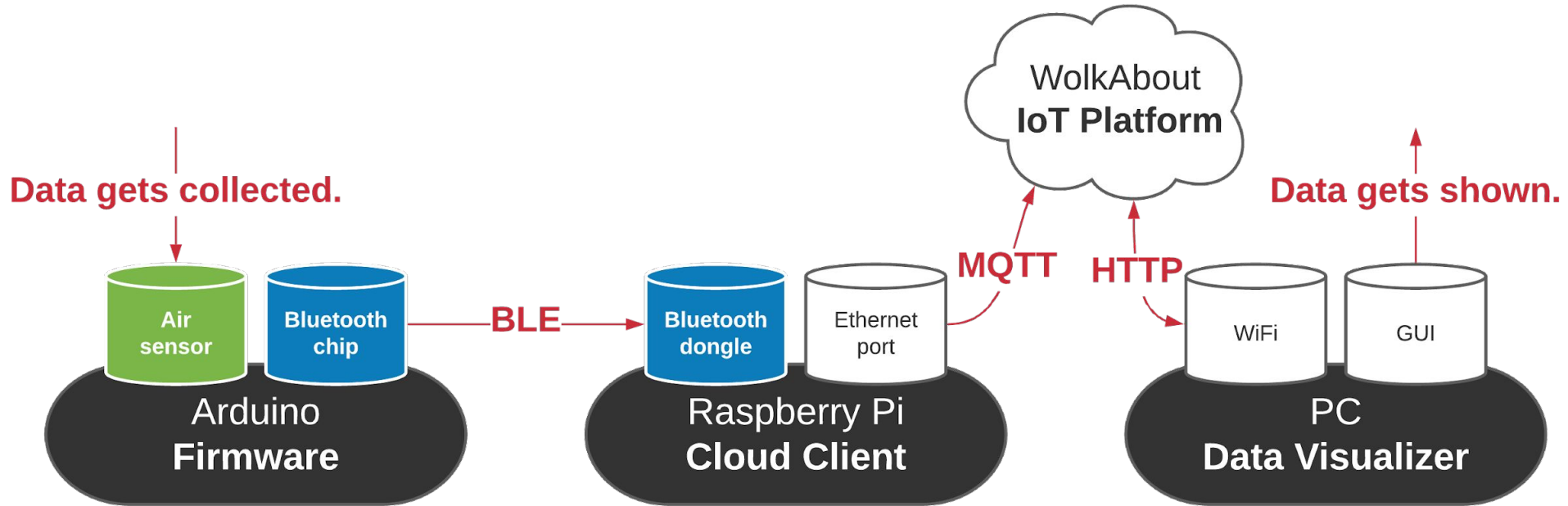
- Maybe you're dealing with delicate processes:
 - Storing food, volatile substances, or otherwise sensitive materials
 - There is a VOC detector onboard!
 - Fermentation, dry aging, smoking, baking or other cooking processes
 - Growing sensitive crops, regulating their atmosphere
 - Scientific experiments, testing gas properties



Project structure

Project structure

Three distinct pieces of software
- and how they are tied together

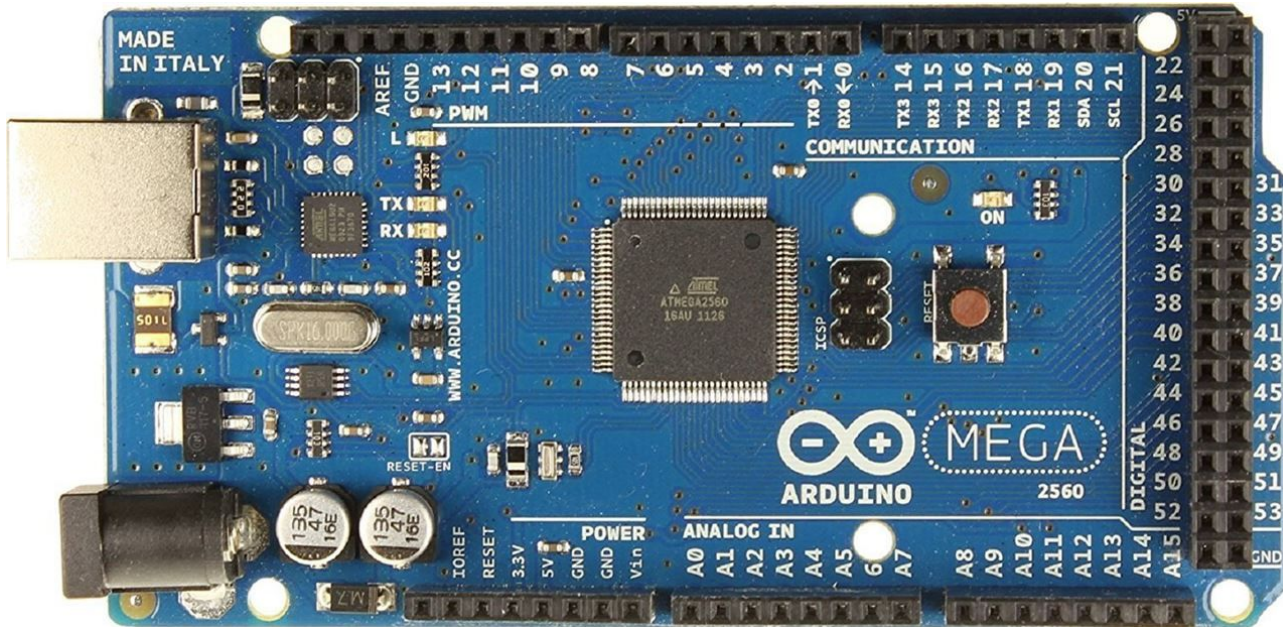




Arduino - Firmware

Arduino - the hardware

Key hardware components



Arduino Board

Arduino - the hardware

Key hardware components

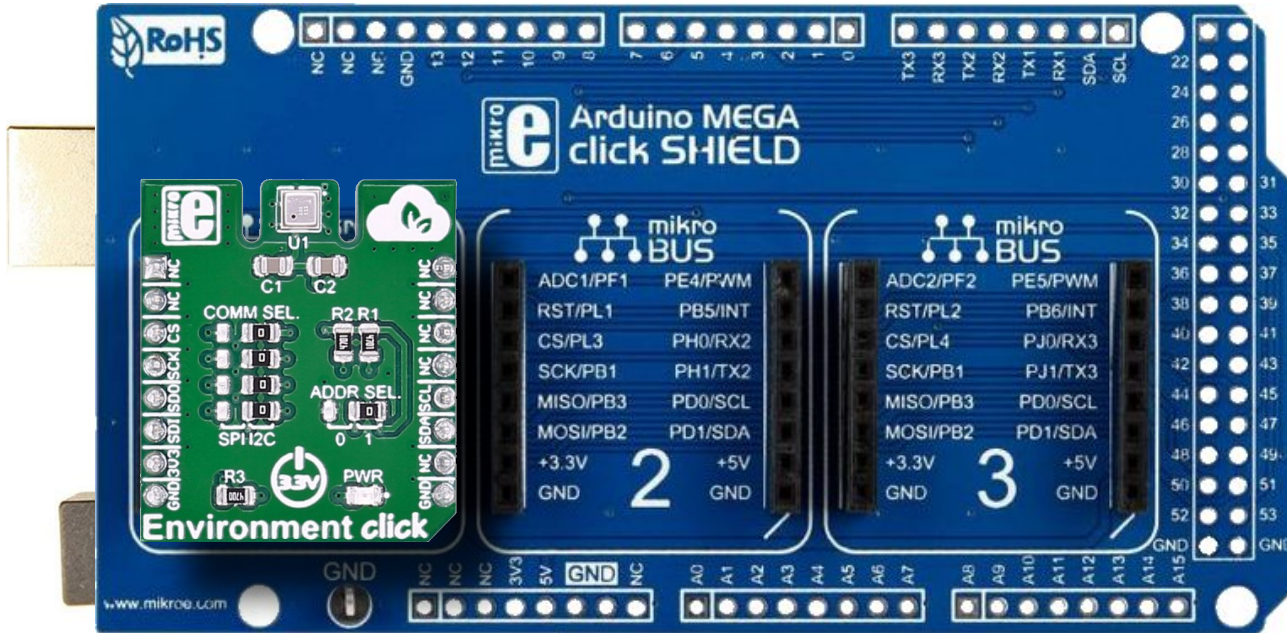


✓ Arduino Board

✓ Click Shield

Arduino - the hardware

Key hardware components



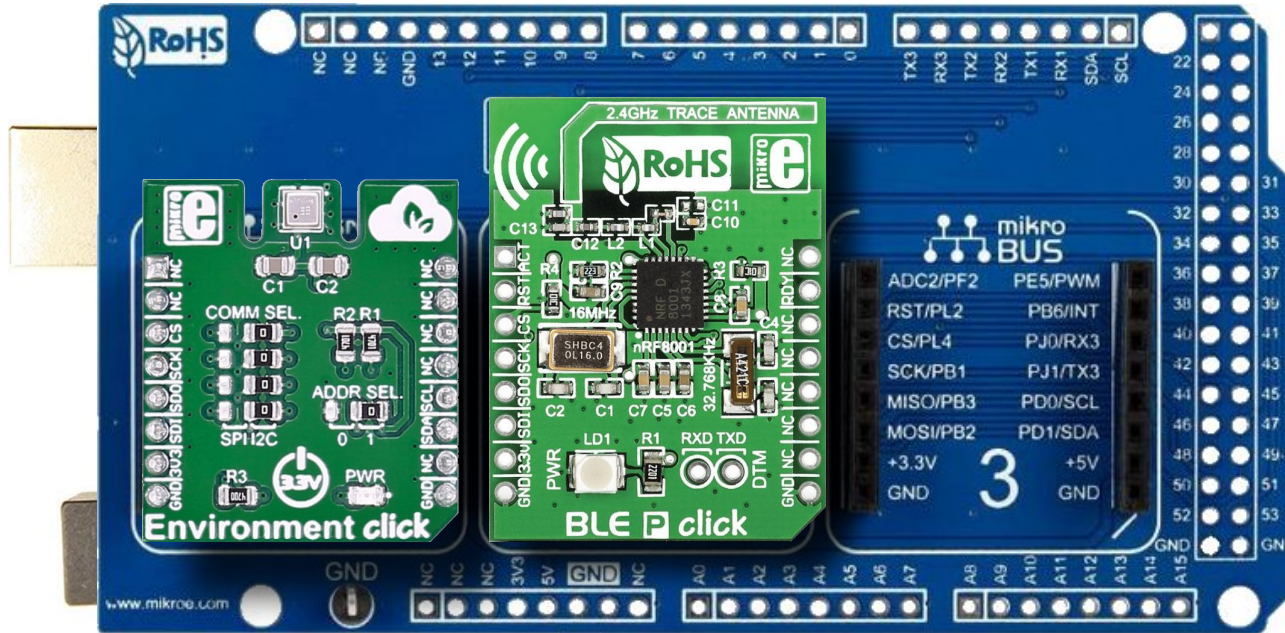
✓ Arduino Board

✓ Click Shield

✓ Environment Click

Arduino - the hardware

Key hardware components



✓ Arduino Board

✓ Click Shield

✓ Environment Click

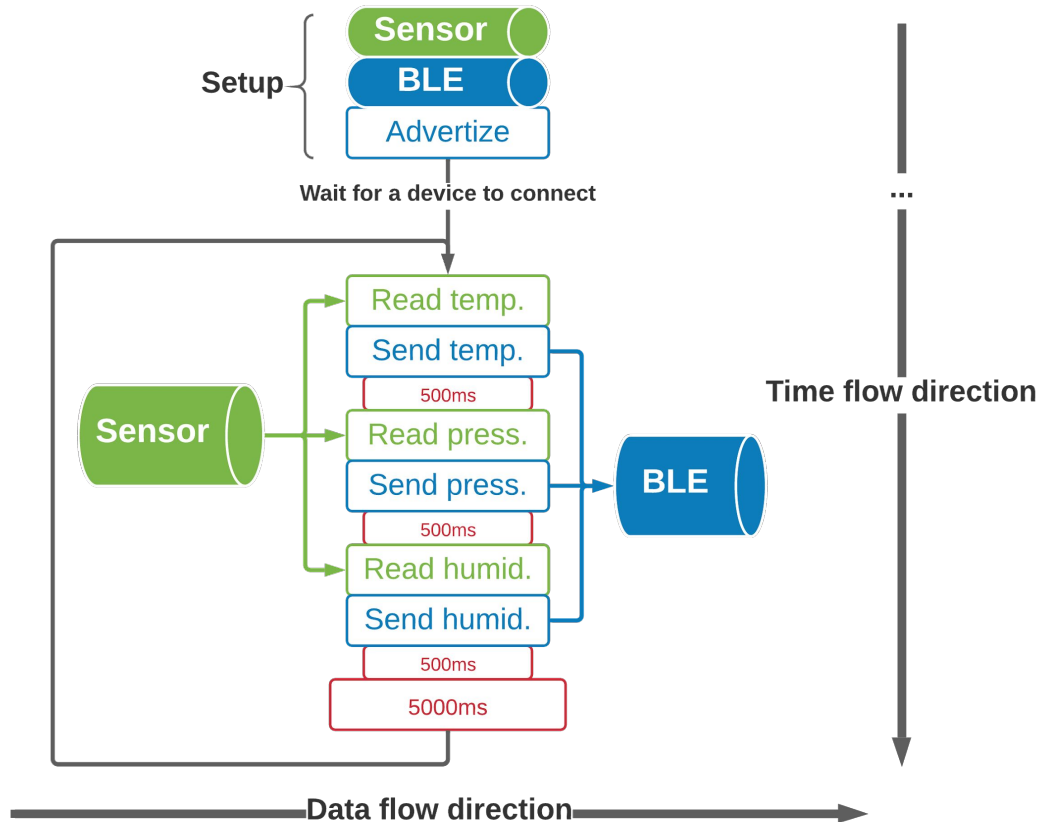
✓ BLE Click



Arduino - the tools utilized

- Access: From PC via Serial connection
- Working environment: Arduino IDE
- Programming language: C++
- Libraries:
 - Adafruit - **BME680 library**
 - Sandeep Mistry - **BLEPeripheral library**

Arduino - the algorithm





Arduino - future

Which features could be added or improved upon

- Make it possible for other types of clicks to collect data
- Add LEDs which indicate current state of device
- Add LCDs to print out the data
- Advertize itself more clearly and descriptively
- Add physical switches for different units of measurements



Raspberry Pi - Cloud Client

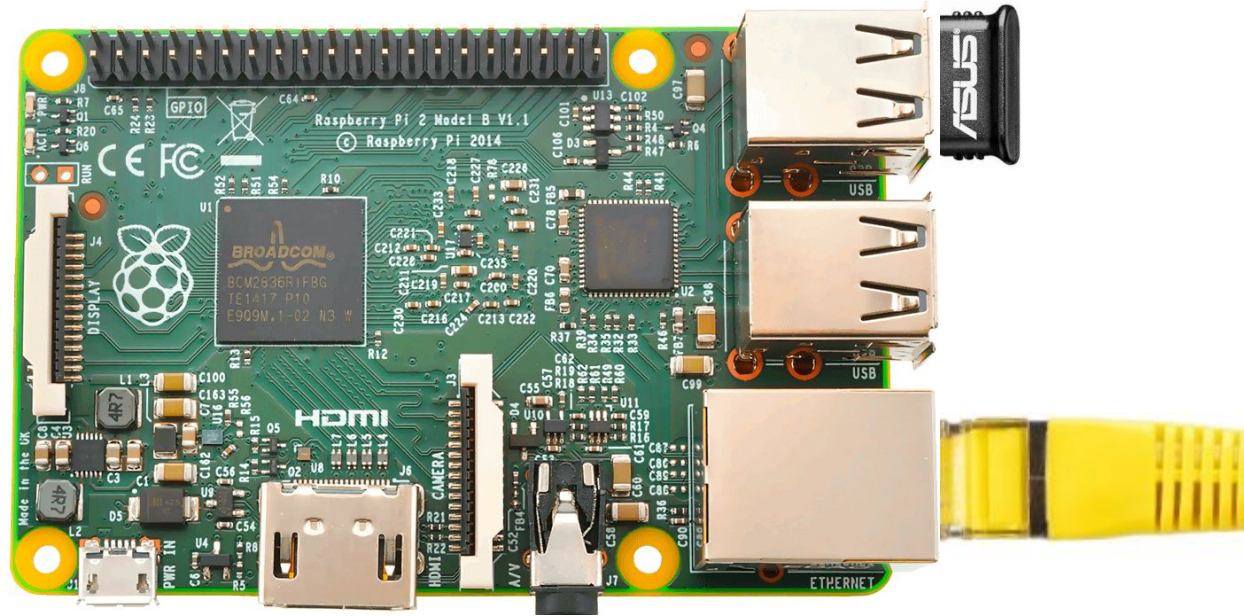
Raspberry Pi - the hardware

Key hardware components

Raspberry Pi 2 ▼

BLE Dongle ▼

Ethernet Cable ▼



Raspberry Pi - the hardware

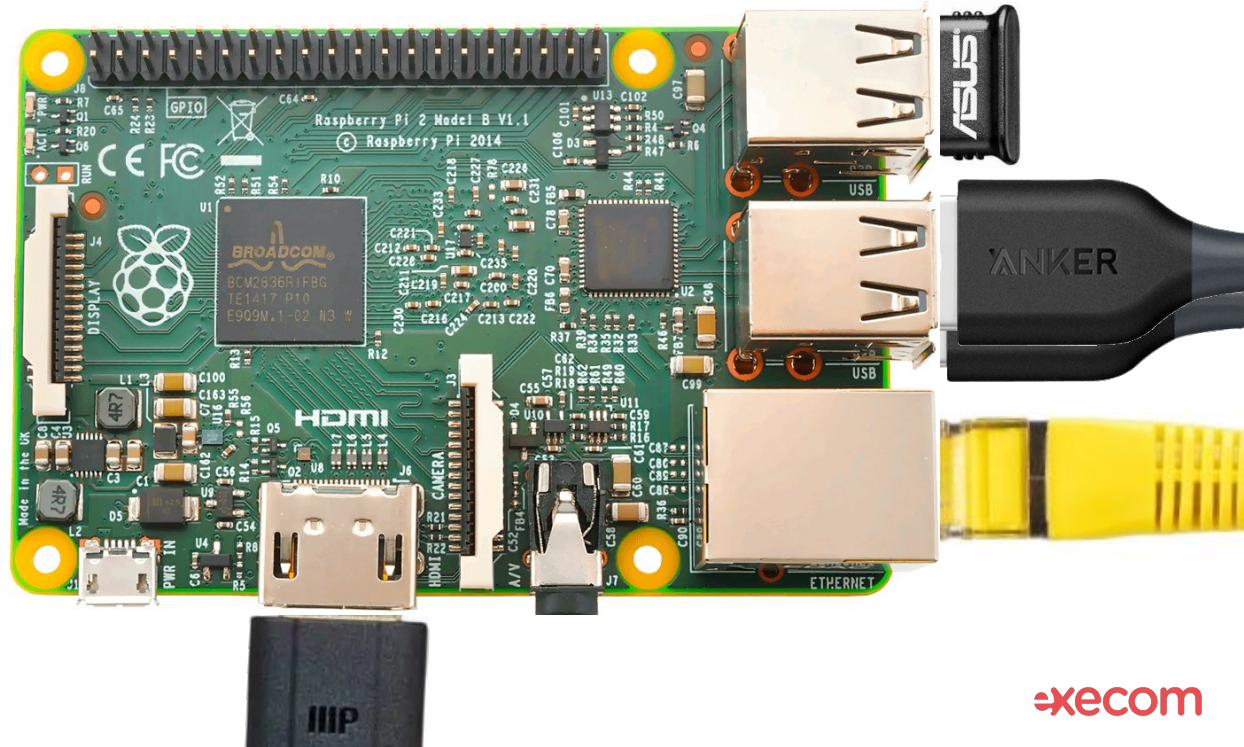
Key hardware components

Raspberry Pi 2 ▼

BLE Dongle ▼

Ethernet Cable ▼

Peripherals ▼



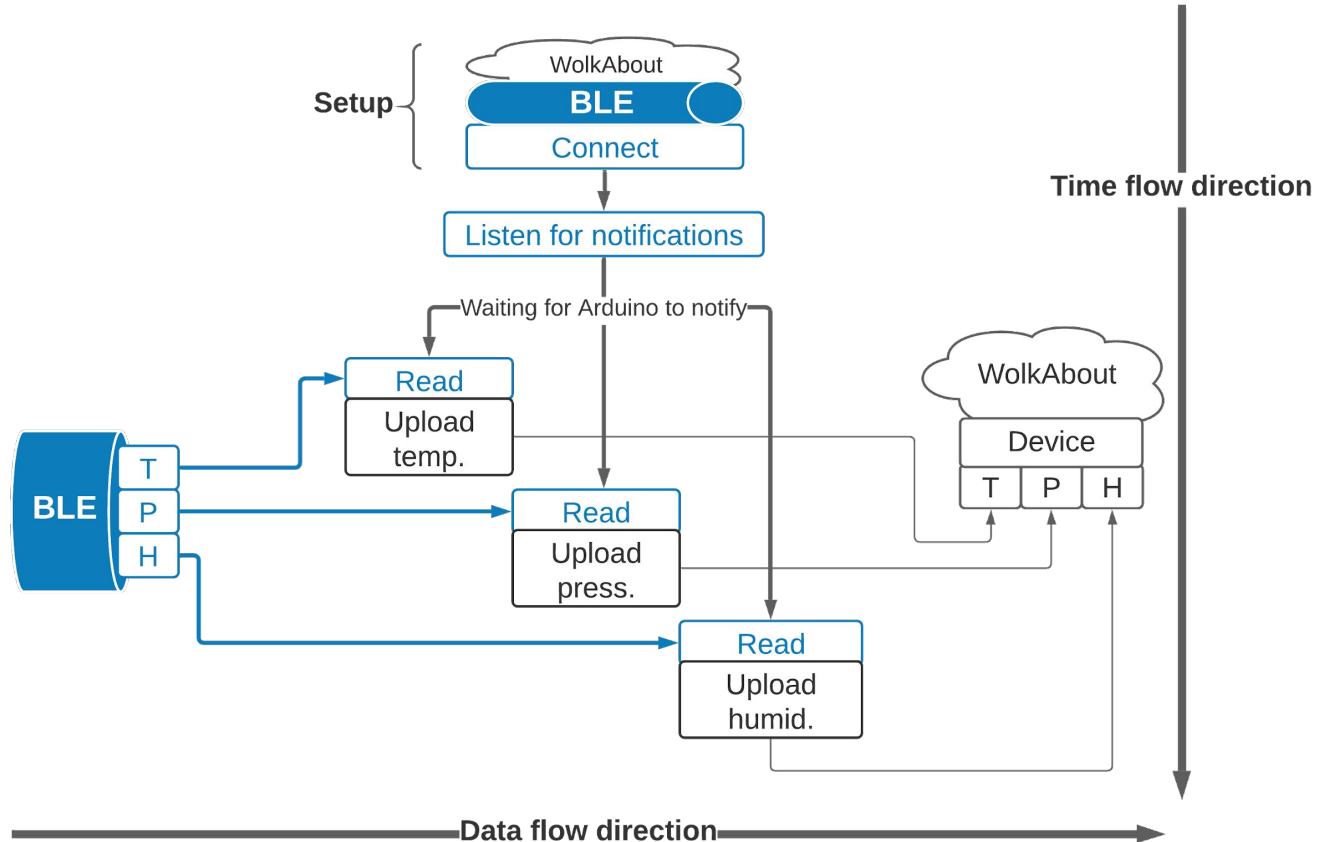


Raspberry Pi - the software

Tools utilized & algorithm in broad strokes

- Access: Linux - Raspberry Pi OS (formerly Raspbian)
“Headless”, from PC via SSH
- Working environment: Geany IDE
- Programming language: C++
- Libraries:
 - Psychogenic - **Gattlibpp**
 - WolkAbout - **WolkConnect C++**

Raspberry Pi - the algorithm





Raspberry Pi - future

Which features could be added or improved upon

- Access multiple devices (although not at once) and juggle all of them
- Figure out the inconsistencies and random bugs with BLE
- Expand from T, P, H into other types of data
- Figure out type of data received on the spot, from a previously unconnected device
- Connect to multiple Wolk virtual devices and juggle all of them



PC - GUI App

PC - Hardware

Key hardware components





GUI App - the software

Tools utilized

- Access: Windows 10
- Working environment: Qt Creator
- Programming language: C++
- Libraries:
 - Qt Company - **Qt**
 - cURL Project - **libcurl**



GUI App - the software

Qt's strength - Expanding on the hardware

- Qt offers the ability to build projects for all major platforms
 - Windows PC
 - Linux PC
 - Android
 - iOS
- Vastly broadens the target market with little additions

End user - Hardware

All major platforms





Qt App - the algorithm

**It's best to just see it in
action during the demo.**



End user platform - future

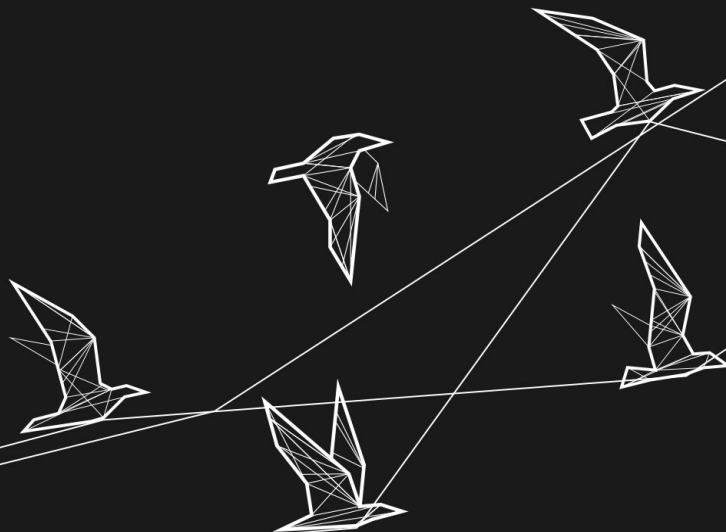
Which features could be added or improved upon

- Build for all other major platforms, especially mobile ones
- Add charts
- Save charted data to files
- Other types of data
- Looking at multiple devices simultaneously
- Separating each device with its data into own GUI unit
- Add warnings/alarms for too high or too low values
 - Add additional intervals (apart from too low, ok, too high) for complexity
- Add actuators, managing them
- Being able to make and save multiple configurations (set of sensors, actuators and their mutual influences)



Thank you!

Questions?



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