Introduction to the Internet of Things

MCIoT Session 12

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Outline Today

- Final Project
- PlatformIO
- IoTempower
  - Structured
  - Unstructured
Projects

• Teams of 4
  - Come up with your own idea (based on functional blocks described here)
    • https://courses.cs.ut.ee/2021/MCIoT/fall/Main/Projects
    - Advertise your 4-member team and topic via e-mail

• Implement project, put on GitLab

• Wiki
  - Write Readme – how to use/run this project
  - Write Story about the application domain
  - Short report about project experience

• Presentations ( on next slide)
Project Presentations

15 minutes per team, during week of 13.12

- Business pitch-style video (5-7 min)
  - Demo your application & walk through the story scenario

- Talk about your experience (5 min)
  - Roles / work distribution in team
  - What went well? What went south? Improvements for future

- Q&A (3 min)
Grading of projects

- Total: 20 pts
- Features, cohesiveness & complexity 10 pts
  - (whether 3+ blocks implemented OK, integrated into story)
- Final Presentation 6 pts
- Report & Readme 4 pts
  - On gitlab Wiki - link 2 video, scenario, role assignment, challenges, future improvements)
Examples from past

- See some last year projects here
  - https://courses.cs.ut.ee/2020/MCIoT/fall/Main/TeamsAmpTopics
- Android Tetris with online leaderboards and ESP32 controllers
- Movie recommender for group of people
- RC Car social game with IoT
- Internet of Toilets
MOVIER

Room code: 29673

Action
Adventure
Animation
Comedy
Crime
Documentary
Drama
Family
Fantasy

Select Genres

Everyone ready

My Hero Academia:
Heroes Rising

Class 1-A visits Nabu island where they finally get to do some real hero work. The place is so peaceful that it's more like a vacation... until they're attacked by a villain with an unharmable Quirk! His power is eerily familiar, and it looks like Shigaraki had a hand in the plan. But with All Might retired and citizens' lives on the line, there's

It's a match!

My Hero Academia:
Heroes Rising

It's a match!
RC Car social Game

• They were excited about the alcohol sensor
• There was no pandemic
• ... and an RC car
• ... a noise sensor
• ... gyroscope in phone
• Latency problems in MQTT → great “social” game
Building Cleaning (and Toilet) Management
Internet of Toilets

- Watch stock of cleaning supplies and Toilet paper (scale, distance sensor)
- Try to measure cleanliness: moisture, gas sensor, dash board
- Manager console
Announcement

- First checkpoint done, feedback is available → teams
- (deadline was soft, so make sure to get the points!)
- Don’t check in binaries like Word files or pdfs. (only images/screenshots allowed). Text: “Markdown” or “Restructured Text”.
- Don’t forget personal reflection (one per lab):
  - What went well (for you) in lab?
  - What didn’t go so well?
  - What was remarkable?
  - (Constructive) Suggestions welcome! (not, “give us the one solution that always works!”)
A bit on PlatformIO

• → portfolio
  - What is the advantage vs. Arduino-IDE
    • In general?
    • What do you personally like better?
    • What do you personally prefer in Arduino-IDE?
IoTempower Feature List

• In existing own “nice-to-have feature-list”:
  – During lecture check off more features (you might have started last time already)
  – Add notable features (under separator) (continue the work in portfolio)

• End of lecture: match and count
IoTempower

• Let’s open https://github.com/iotempire/iotempower

• Answer the following questions during demonstration (→ portfolio and bbb chat):
  – You already know how to install IoTempower locally in a Linux environment – what other ways of using/installing it are there?
  – Where are the tools/commands/scripts?
  – Where is documentation?
  – What is the role of the different folders in lib/node_types?
Services provided

• What is/needs to be running in an IoTempower system?
  – During presentation write down (portfolio) different services and how to find, monitor, control them – what are the alternatives?.
System in Folders

- myhouse
  - living_room
    - leds1 (rgb_strip)
    - leds2 (rgb_strip)
  - kitchen
    - toaster
      - consumption (i2c_dev returning power)
      - switch (output)
    - coffee-machine
      - coffee_left (ultrasonic distance)
      - milk_left (swimmer with reed switch → contact)
      - switch (output)
  - main
    - switch (output)
- system.conf

- Alone or with peer:
  - Which topic needs to be called with what to
    - switch on the coffee machine?
    - set all lights in living room to blue?
    - turn the main power off?
  - What is the general rule for forming topics in IoTempower?
  - When does it make sense to change something in system.conf?

- → portfolio
Nodes

• During demonstration add to **portfolio**:
  - What needs to/can go into node.conf?
  - How do [optional config.txt,] etc/iotempower.conf, system.conf, and node.conf influence environment variables for compiling? Give examples for when to change which.
Compilation

During demonstration write down answers to following questions (→ portfolio):

- What are the steps IoTempower executes, when you call deploy in a node-folder (or room or system folder)? What types of deploy are there?
- Why can only one deploy run at once?
Device and Filters

• While lecturer demonstrates:
  – What are the common functions, devices support?
  – What is the “fluent interface”?
  – Which functions need to be overwritten?
  – In which order and when are the overwritten functions called?
  – What is a Subdevice (look at output for example)?
  – What other generic filters would be nice?

• → portfolio – What is a device in IoTempower?
How to write a driver?

- If you are interested, check how I do it here live: https://youtu.be/pSjeRapINWU?t=535
IoTempower Recap

• Count how many of your preferred features are supported by IoTempower – compute vs. total (percentage)

• Put number in research report and refer to it in reflection part (why do you think you got this number?)

• Handcount
All you ever wanted to know about IoT Tempower (or not to know)

- This is a free-form lecture, you can guide it
- If no questions, I will show devices and how to use them
  - Analog (finger touch, moisture sensor):
    https://panopto.ut.ee/Panopto/Pages/Viewer.aspx?id=9398ee87-f947-44c5-8816-ade200856510