Introduction to the Internet of Things

Session 12

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Outline

- IoT Introduction Summary

- IoT Business Opportunities

- IoT Maintenance/ Predictive maintenance/ Heartbeat monitoring of network nodes

- The future of IoT
  - Labrador

Learning Objectives

- Define and critically reflect on the term "Internet of Things" as well as align and position Internet Of Things technology in comparison to cloud and mobile computing

- Equip most physical objects with networked sensors

- Equip and interact with most physical objects with actors

- Write code to set-up systems to collect, visualize, analyze, and act on data from the physical world

- Design and implement various IoT systems made up of sensors, wireless network connection, and actuators

- Build and test a complete working IoT system as well as design and implement respective simulator components to speed up testing

- Present and defend the design and implementation of several Internet Of Things Systems in a portfolio and public presentations

Summary

1. What is IoT; Hello World with ESP

2. Cloud/Edge/Fog, Stories, Buses; Network Hello World, IFTTT, DHT11, I2C display

3. Exchange Formats, Protocols; Coap, MQTT, Simulators

4. IoT Integration Frameworks, Node-RED; Node-RED integration, GUI, RGB-Led

5. Node-RED, Flogo in practice; Node-RED, Flogo

6. Project 1, IoTempower in practice; IoTempower

7. IoTempower under the hood; Project 1

8. Flogo2; IoTempower driver, ESP8266 power, Secure MQTT; Project 1, Node-RED bridge, LORA

9. LORA, Esp-NOW, Internet of Broken Things; Project 1; Esp-NOW

10. More IoBT, Project 2, Sensors&Actors, Lighting; Project 2, ESP-NOW, Lighting

11. Various IoT projects (Iot in Arts); Project 2, Servo Motor, RFID Reader

12. Summary, IoT Business Opportunities, Maintenance, Future, labrador; Project 2

Missing

- Other frameworks/ more than integration: Mongoose OS

- Other communication: PJON

- DIY RS485

- Analysis of field leaders, Players and consortiums in IoT

- Other microcontrollers (i.e. Particle, Raspberry Pi zero)

- Less IoTempower, more build your own platform

IoT Business Opportunities

- Google "small startups business opportunities internet of things" (and/or related topics)

- In regular project 2 teams, pick 5 articles

- Share articles between team members, read and answer following questions (15min):
  - Name three implemented successful business ideas
  - Name three implemented failed business ideas
  - What are challenges and opportunities arising from IoT for small business?

- Discuss the potential of your project 2 to be turned into a business venture
  - Prepare idea statement/elevator pitch (max 1min) describing project
  - Collect at least 2 con and 3 pro arguments for commercializing it

- Elect one team member who presents idea statement + 5 (pro and con) arguments

- → all your own findings in research record

Lab 12

- Start with stand-up meeting (next slide)
- Continue work on project 2
- Plan slots for 20 hours of work for every team member with regular in person meetings
- Budget time for recording and making the video
- Finish scenarios, create and start work packages

Stand-Up Meeting

- Elect a scrum master (person who pays attention that etiquette and logistics is taken care of and everybody can work to their maximum potential), must be not product owner

- Stand-up:
  - 10min max
  - Everybody stands up, will not lean on anything, or use their phones
  - Scrum master appoints a person who writes log (this person may sit)
  - Reports (clock-wise) on their work related to the project (<1min)
    - Last task you have done
    - Next task you will do (and how long you think this one will take)
    - Any things stopping you from being productive?

IoT Maintenance

- Predictive Maintenance (15min, research exercise → lecture notes)

  - What is predictive maintenance?

  - What problem(s) does it solve?

  - How is it related to the IoT?

  - Give 3 examples of predictive maintenance in the IoT.

  - Which role does data analytics play?

- Discuss with 1-2 neighbors, explain to each other, extend lists (10min).

Heartbeat Monitoring of Network Nodes

- Discuss public
  - How does a heartbeat monitor in a network work?
  - What can it be used for?
  - What can be secured in an IoT system with this type of monitoring?
    - What feature in IoTempower already supports heartbeats?
    - Is this predictive maintenance (or what would need to be added)?

The future of IoT

- We meet on Zoom Prof. Marcelo Zuffo from USP in São Paulo

- Google Marcelo, his work, Labrador, Caninos Loucos
  - What roles does Marcelo play?
  - What is the Labrador?
  - What has the Labrador to do with IoT?
  - Who is Jon Hall – how is he connected to Caninos Loucos?

- Write down one IoT and Labrador related question for Marcelo.

- → research report