UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

Dipartimento di Scienze Fisiche,
Informatiche e Matematiche

IoT Systems

Project ideas

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Project ideas

- Focus on the last word: **ideas**
- It means these are just proposals
- You are more than welcome to read, discuss, propose enhancements
- In other words:
  - These projects represent a standard project
  - You can take one and improve it, though discussing your improvements with the teacher in advance

How to

- If you select a standard project, you do not need to ask any permission
  - If you want to modify it, or you want to propose a novel one, you **MUST** ask to the teacher in advance
- How to complete the project
  - You should write a report (LaTeX advised), detailing the scope, what tools you used, how the project works, if there's any performance to evaluate everything you believe is worth mentioning (English preferred)
    - Do not make too long reports. 8-10 pages with figures are more than enough. Plus, evaluation is not based on how much information you write on the report.
  - Prepare few slides to help you in the discussion on the exam day (English or Italian)

Evaluation

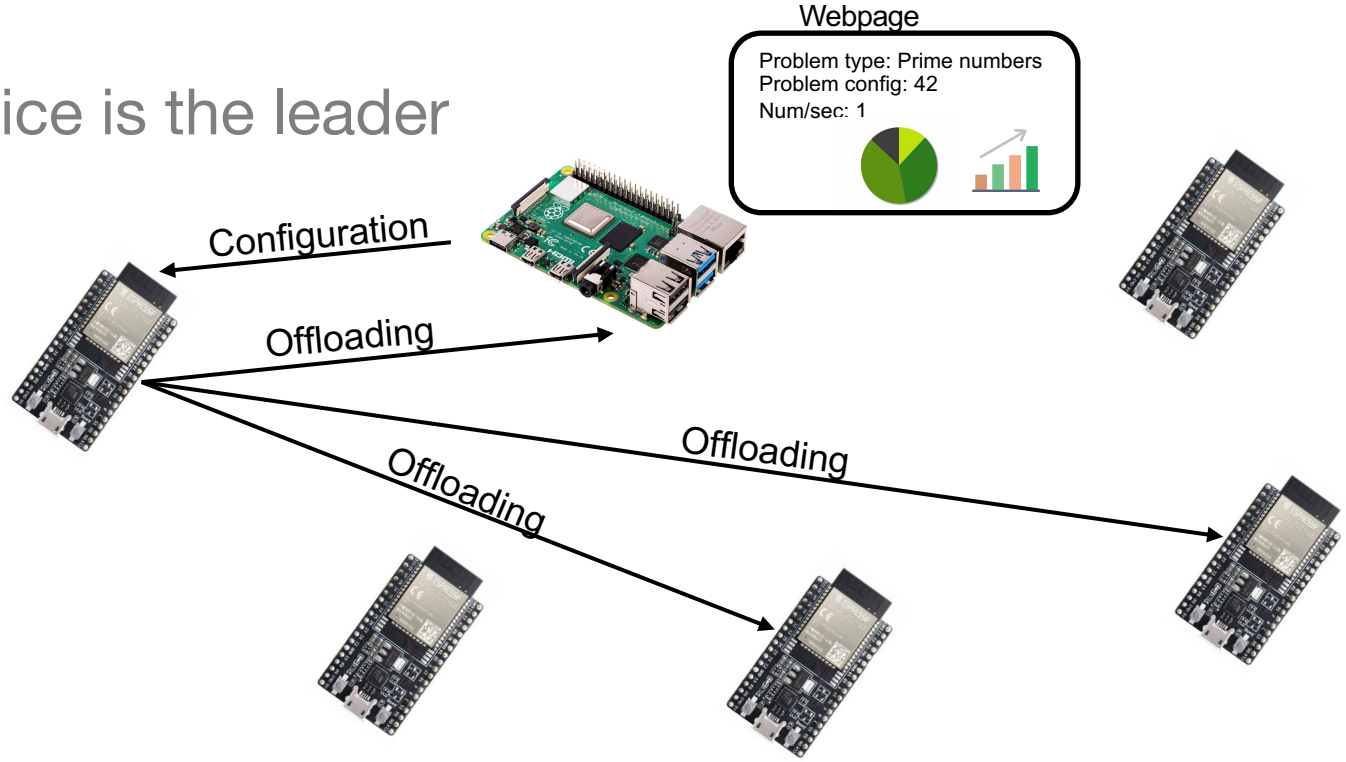
- You'll see that in the projects there are no technologies specified
- It means you should think, among those we have seen, which suit the most
- You are more than welcome to ask for advices, but you should be able to answer and defend your choices
- Evaluation is done on:
  - **Self-* capabilities**: how much your system is capable of self adapting and does not need setup intervention by you to work
  - **Appropriate choices**: there are many different technologies, each one serves a specific purpose, think about what to use and why
  - **Run test**: your project should be able to run, and also possibly resist to any problem which may occur (i.e. devices running out of battery, heavy latency etc.)

Project 1

- Framework to load balance data analysis on the device or at the edge
- Identify 3 computational problems which needs data collected on the device
  - These problems may also have different frequencies of execution
  - Assess the computational capabilities of devices
  - Make it possible to send data to another device (i.e. Raspberry PI or ESP32)
  - Receive results
- Choose one or more communication technologies
  - Choose different datarates
- Evaluate number of problems solved, latency, queues, bandwidth used etc.
- The project may also implement OTA updates

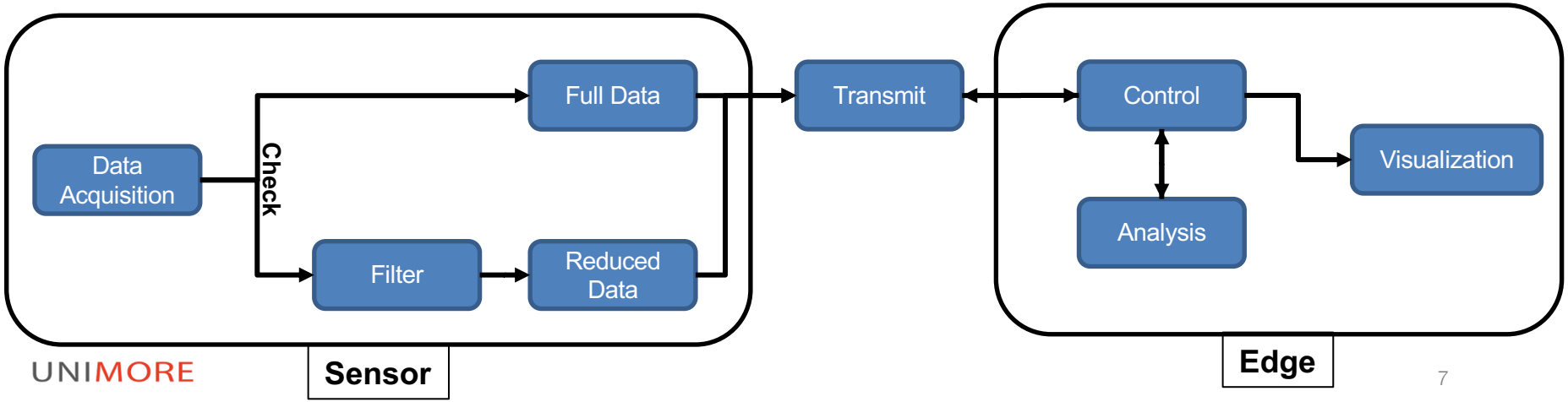
Project 1 – example

- 1 device is the leader



Project 1bis

- Make the project modular and capable of offloading parts of the problem
- Data should be high frequency and time sensitive (e.g. ECG, video streaming) and can also be simulated



Project 2

- Context-People-Aware computing
- Create a controller for your network (e.g. with Raspberry Pi or with a laptop)
- Create a WoT device with at least one actuator (e.g. led). This will be named **static**
- Create a WoT device to mimic a wearable device. This will be named **mobile**
- Create a WoT device to mimic a wearable device. This will be named **mobile 2**
- The **mobile** device should
  - Offer the possibility to configure some user preferences (e.g. max allowed temperature, humidity levels, noise etc.)
  - Offer its own sensors and actuators as Things
  - Optional: publish these in a WoT Thing Directory (e.g. TinyIOT Thing Directory) or register them through MQTT
- The **static** device should
  - Be able to interpret some values (e.g. temperature) and know how to fulfill them through its own actuators
- The **mobile 2** device should
  - Register to the network
  - Visualize/use a sensor value offered by the **mobile** device
- The controller should
  - Optional: Implement a Thing Description Directory and/or an MQTT Broker
  - Look for preferences of registered devices and try to fulfill them
    - This can also be simulated for demo purposes (e.g. switching a led on «means» switching on the AC)
- Goal of the project is that the **static** device adapts its computation based on the **mobile** device preferences and that the **mobile** device extends the capabilities of the network so that **mobile 2** device may leverage on additional sensor data
  - Important note: static and mobile do not know each other
  - They only know the IP of the network coordinator

Project 2 – example