Learning Lab: Internet of Things (IOT)
2024/25 winter semester | module |

thws Technical University of Applied Sciences Würzburg-Schweinfurt

Assignment 9: The IOT Challenge

Objectives

- Executing your own project
- Remember your learnings

Required Equipment

- Installed and running Raspberry Pi with OS
- Connection to the Internet
- Power supply for the Pi
- Monitor with HDMI cable
- Keyboard and Mouse connected via USB
- SenseHat
- Additional material (like LEDs, etc)
- NodeRED

Challenge Description

Let us consider the following situation. Schweinfurt wants to take the next step towards a "Green City" with IoT and the focus on traffic. You are responsible to develop a first prototype using NodeRED, SenseHAT and a Raspberry Pi. For the first prototype no integrated solution has to be developed.

Here are the main aspects of "Green City Schweinfurt":

- Project vision: We want to carry out a project that will **revolutionize the traffic.** Our Vision: **"Sustainability and safety first with IoT"**. The roads have to be managed by means of central control of the process and parameters for more sustainability for the environment and safety for all participants in traffic.
- We distinguish the following roles: **administration, drivers and pedestrian** (ok, very limited focus ...)
- Our **User Stories** (i.e. the requirements) - Before you start, prioritize the requirements according to business value. What should be done first, as it is most important?
    - The driver can change to level 3 automation (two presses on the joystick). The LEDs of the SenseHAT show blue color.
    - The administration need a central display of the environmental temperature in the town hall to make the right decisions.
    - The pedestrians want to change the pedestrian traffic light from red to green with their smartphone (hint: try to access the NodeRED dashboard from your smartphone).
    - eCall system: when the IMU detects a shake (threshold >1), an MQTT message is send out and the warning lights are turned on (LED matrix flashes red)
    - In case of a detected traffic jam(ML model), administration and nearby drivers are informed (MQTT message)

Further Inputs

Hints

Useful Resources for Own Searches

Node-RED and Sensehat

Retrospective

Please answer the following question(s)

1. What happened during the project?
2. What have you learned?

and document each answer.

Source(s)

- Lars Brehm, Holger Günzel: "Learning Lab: Home Automation with Internet of Things (HAT)" https://www.ll4dt.org/