SmarTrash

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Problem:

We want to make it easier to clean trash cans. We want to put our device in trash can covers and that it will show in the user platform each trash can and how filled is it. By doing this, Trash cleaners can reduce their travels, by coming to trash cans only when they are almost full, and by doing so we save:

- The trash cleaners' time
- Reduce the amount of gas consumed by the trash cleaners, and the pollution created by the track.
- Reduces the chance of trash cans being full and not cleaned which yields in trash staying on the floor

What we did?

We connect to our MCU and Modem a Sonar and GPS.

The GPS is require in order to track the location of the trash.

And the sonar is require in order to measure how much the trash is empty.

The GPS: In order to communicate with the GPS we connect it to the same ground and Volt as the MCU and connect the TX pin of the GPS to PD11 pin in the MCU.

The GPS is always sending a data to the MCU and the MCU store this data in its buffer, so every time we want to read the location from the GPS we parse the text in the MCU buffer and find the relevant data (`$GPGGA sentences`).

The Sonar: In order to communicate with the sonar we connect it to the same ground and Volt as the MCU and connect the trigger pin to the PC9, Echo pin to PB6.

In order to measure the distance of the sonar, we do the following:

1) Send "0" to the trigger pin for 2 micro-seconds, in order to reset this pin.
2) Send "1" to the trigger pin for 10 micro-seconds, in order to tell the sonar to send its ultrasonic waves and start the distance measurement.
3) Measure the duration that the Echo pin were "1", this duration is proportional to the distance that the sonar read.

Data handle and visualization:

We decide to send the data to MQTT broker:

Host: " broker.mqttdashboard.com"

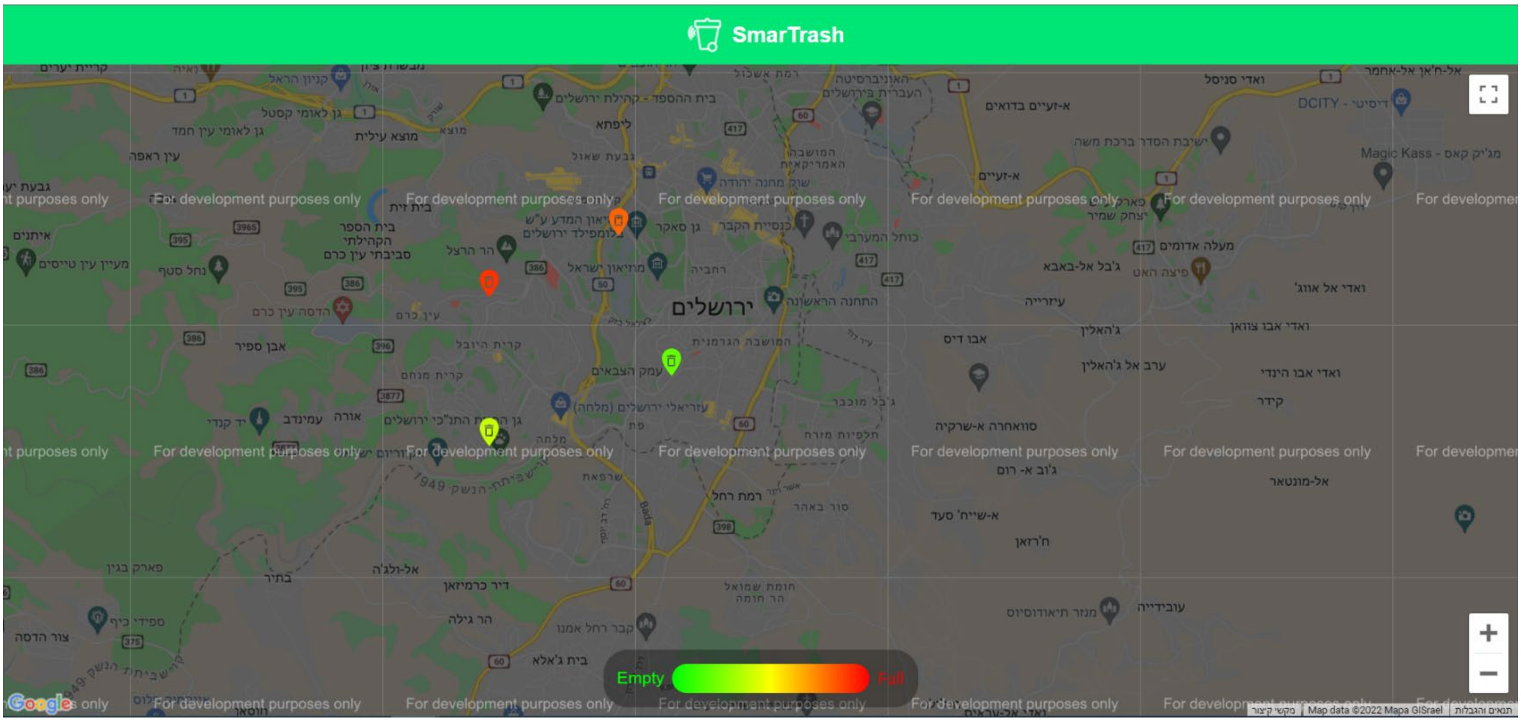
Topic: " huji_iot_class/2021_2022/smarTrash "

The MCU send the data to the broker every 15 minutes.

(Could change this constant easily at app.c:: `MINUTE_TO_WAIT`)

We also develop some nice site that listen to the same MQTT topic as we used, and visualize the received data on map:

Screenshot example (Every Trash icon represent different device):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