Real Time Department Occupation Tracker

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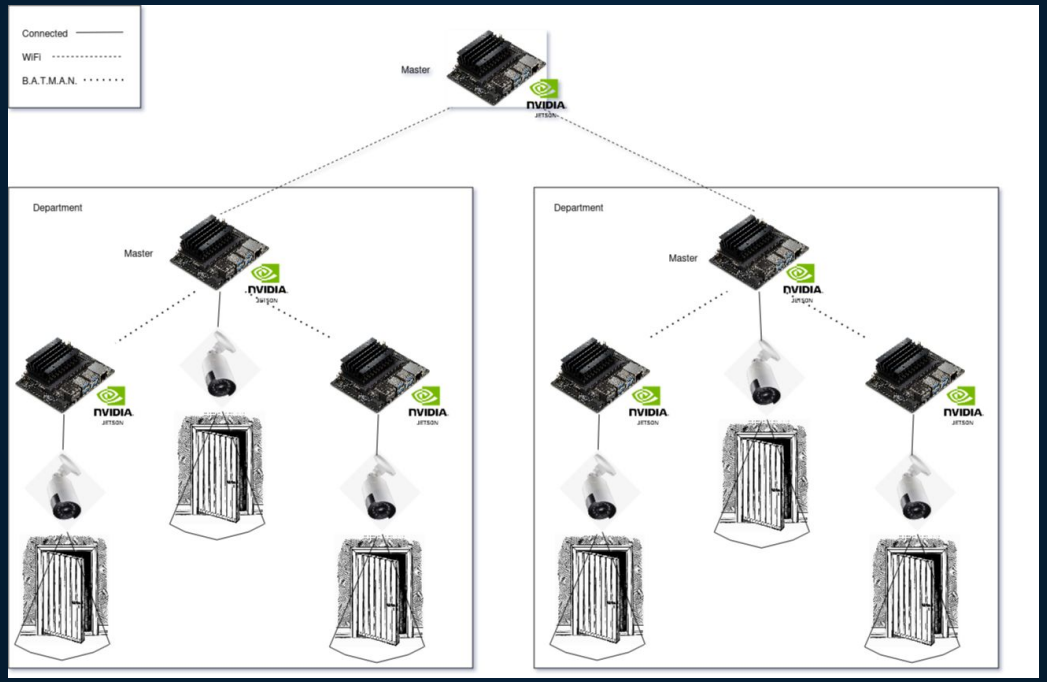
OBJECTIVES

- The goal is to keep track of the number of people currently in departments/university building students have access to.
- This information could be useful for department management and statistics, as well as for students who want to know how busy the library is, for example.
- To count people, cameras will be installed at each entrance to the department. These cameras will have a top-down view.
- A dashboard will display the real-time counter of people in each department.
- B.A.T.M.A.N. protocol Ad hoc Network with Mosquito MQTT (short range).
- Wi-Fi connects departments to a Dashboard (long-range).

TIMELINE

- Jetson equipped with a camera will detect people entering and exiting a department.
- The Jetsons in each department will be connected using B.A.T.M.A.N. protocol.
- One Jetson per department will function as the main counter and receive updates from the other Jetsons and itself.
- The counters of each department will be then displayed on a dashboard hosted on a Jetson and connected to the other main Jetsons via WiFi.

ARCHITECTURE



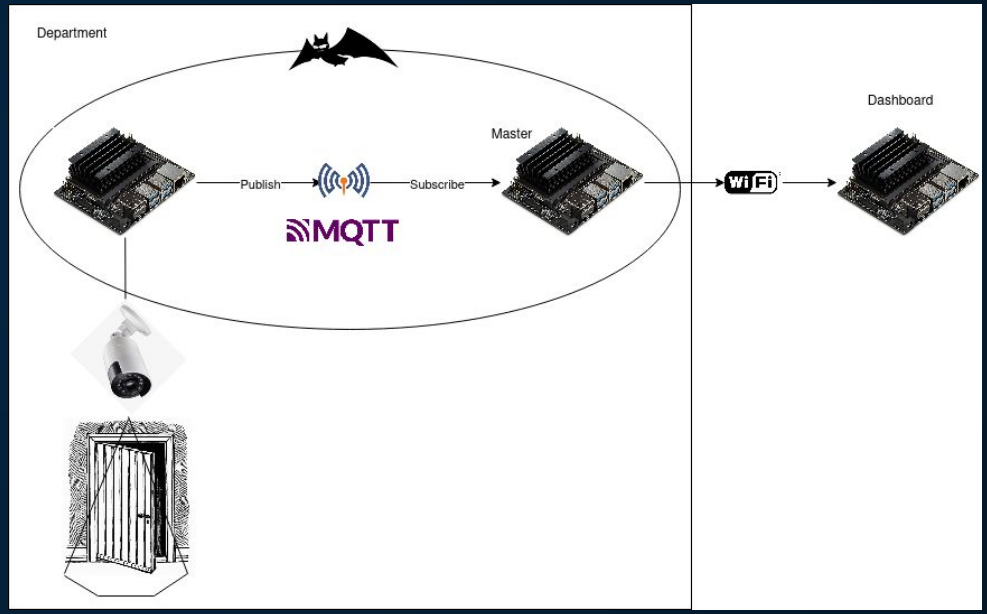
TRACKING PROCESS

- Using Yolov5, we are able to detect people walking within vision of the camera
- Every person is attributed an id in order to avoid incorrect counting
- When the person passes through the middle of the camera's vision, the counter increments or decrements based on the direction they are walking towards
- The counter is displayed on the Dashboard

PACKET TIMELINE

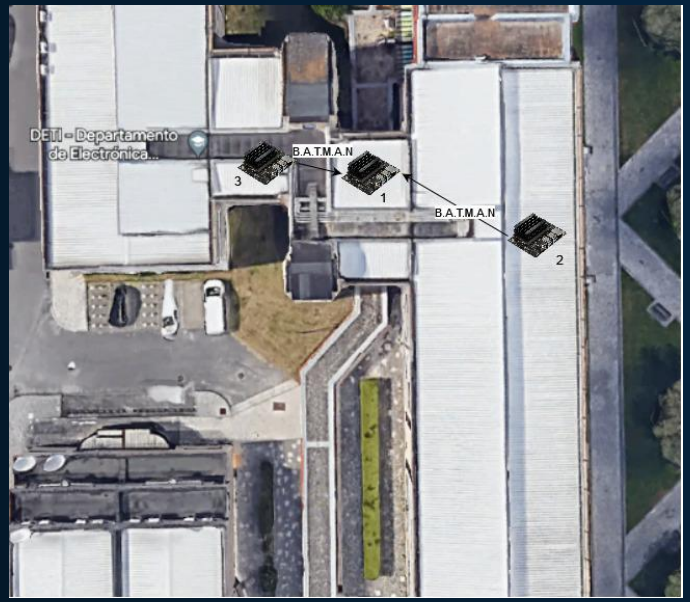
When Person is detected by the camera:

- The captured data is encoded into a packet.
- B.A.T.M.A.N. determines the optimal route
- The master Jetson subscribes to MQTT topic
- The camera Jetson, publishes the packet to MQTT broker
- The MQTT broker forwards the packet to all subscribers, including the master Jetson. The master Jetson, processes the received data sends to dashboard Jetson via Wi-Fi
- Dashboard displays the information



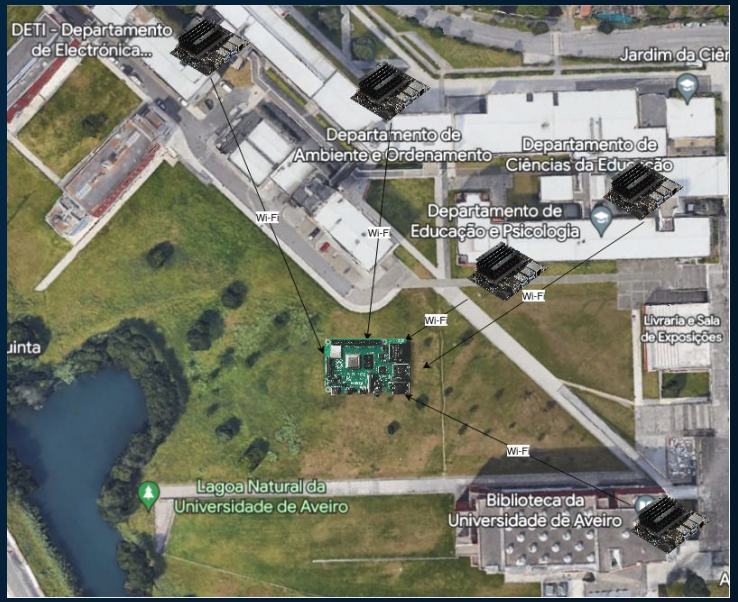
LAYOUT

DETI



Legend:
1 – contains the counter and can update it
2 & 3 – only send their updates

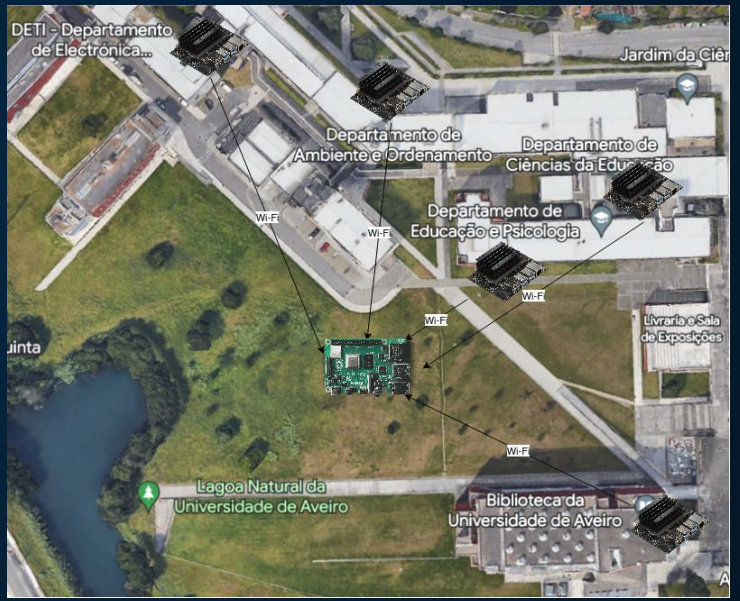
UNIVERSIDADE



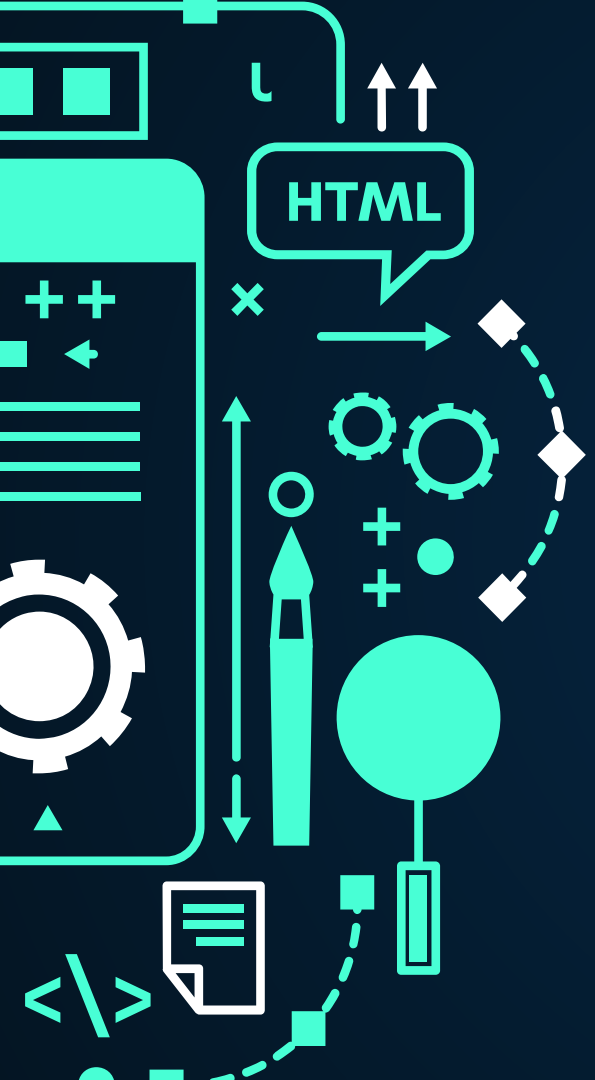
FUTURE WORK

In the future, there are various things to do and improve:

- The Dashboard should be moved to an external Raspberry Pi or Server;
- A set of Jetsons in an Wifi network would be deployed per department of the University;
- Add a counter to each department and have a global counter



DEMO



THANKS!

Does anyone have any questions?

Git Repository - https://github.com/GilFernandes2000/real-time-person-counter.git