# PSOT - Public Space Occupancy Tracking

IoT Project Final Presentation


# APPLICATION

PSOT is a system that monitors the occupancy of certain public spaces through the collection of unique MAC addresses using Raspberry Pis spread out in those spaces.

The information would then be available through a web dashboard and sent through a message queue. This way people can quickly choose places to study, have lunch, etc.

# ABOUT THE PROJECT

Nowadays, it is common for a person to carry a device with connectivity capabilities. These devices usually have associated with them a MAC address that is supposed to be unique.

If we run on the assumption mentioned above, we can measure the amount of people in a space by counting the amount of devices in the vicinity using their MAC addresses.

# PLANNED PROOF OF CONCEPT

- Single Raspberry Pi scanning and collecting MAC Addresses around itself, through bluetooth and Wi-Fi
- A database collecting the scan data
- A periodic algorithm that gathers the scan data from the database and calculates the occupancy of each space
- A very simple dashboard that displays the current occupancy of each space, updating it in real time

# REALISED PROOF OF CONCEPT

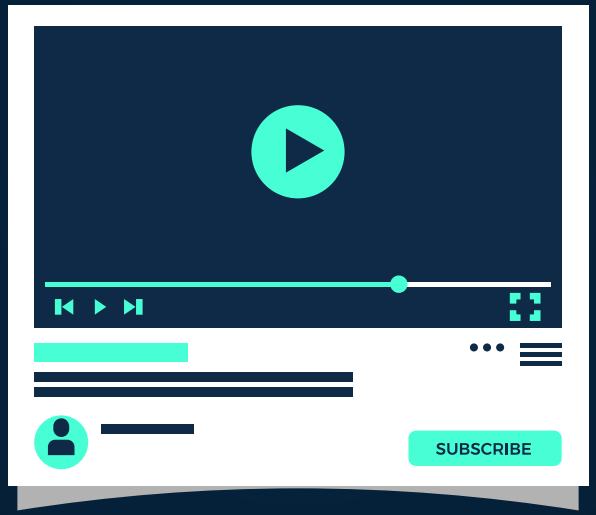
The realised proof of concept contains all elements predicted in the plan, however:

- The Raspberry Pi only collects MAC addresses through Wi-Fi
- As it is more uncommon for devices to communicate through bluetooth making it uncommon to catch their MAC address
- So, for a proof of concept it wasn't worth the effort

# CHALLENGES

- We can't force devices to give us their MAC address, this means we have to scan for long periods of time. This won't guarantee that the scanners find every MAC address, however, so the aggregator has to consider multiple scans over a period of time.
- Another point is since the scanners are only scanning for Wi-Fi packets, we can only detect devices if they are connected the a Wi-Fi access point, making this system only suitable for spaces with Wi-Fi networks that many devices are connected to.
- Detecting only MAC addresses isn't enough, since one person can have more than one device, like a laptop and phone, and there are devices that don't belong to anyone, like printers.
- To counteract this, there must be many calibration parameters, like scaling constants to adjust the number of detected mac addresses or MAC address blacklists to filter out devices we know are not associated with people.

# VIDEO DEMO



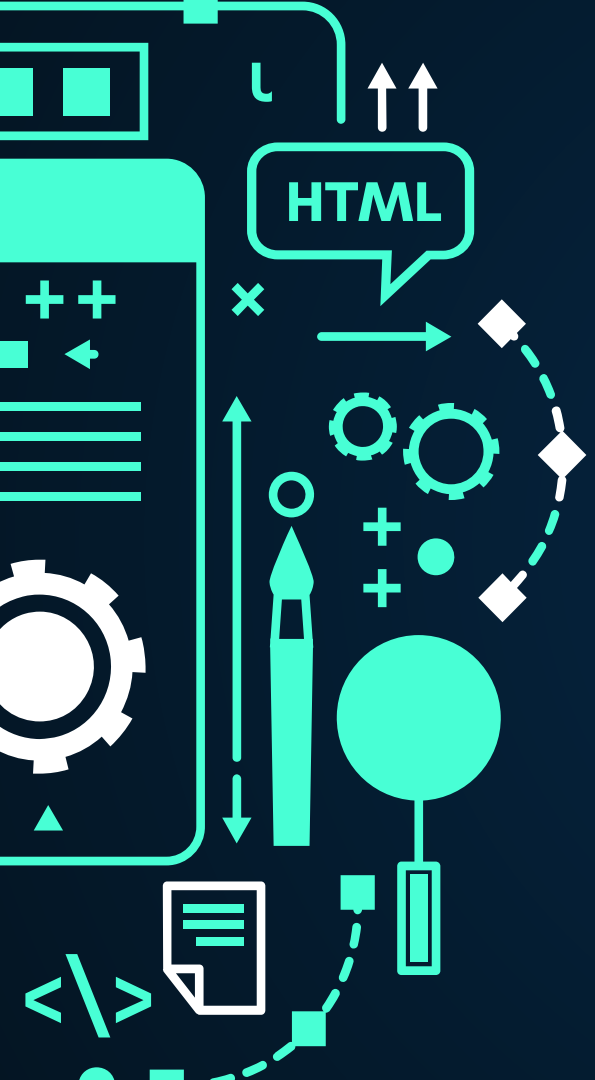

https://drive.google.com/file/d/1SfzJ2hdXoxZzysMr1iBNw1JLm-vEdrLt/view?usp=sharing

# WHAT WE LEARNED

- Working with the Raspberry PI, mostly on setting up it's configurations so it needs the least possible setting up to get the scanner running. We learned about editing the network files on the OS and enable startup services like ssh to make it easier to connect to the device to work on it.

- We also learned about creating a data processing system with many services that collect data and apply algorithms over it.

- Finally, we learned of the challenges that come with this subject of measuring the occupancy of spaces through the scanning and detection of devices.




# THANK YOU!

Does anyone have any question?

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# CREDITS

This is where you give credit to the ones who are part of this project.

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