Sensor-based prototype for license plate detection and recognition in an urban limited traffic zone

Team:

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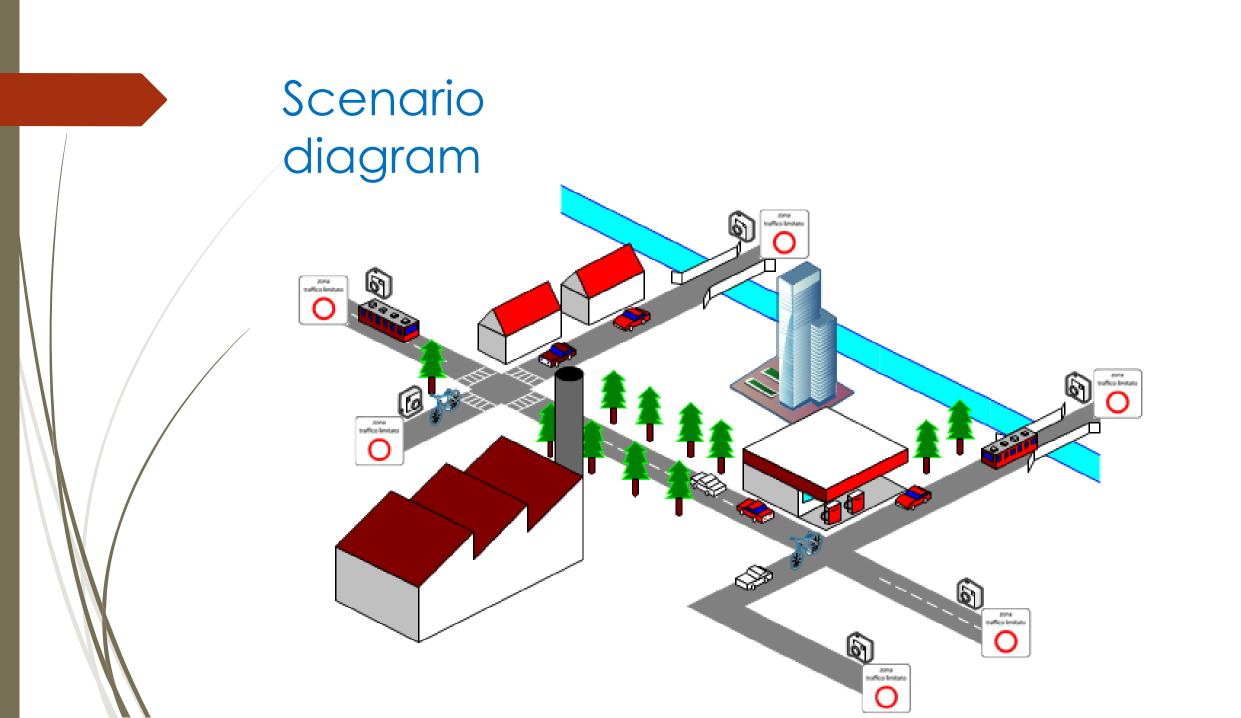
Andraghetti Lorenzo

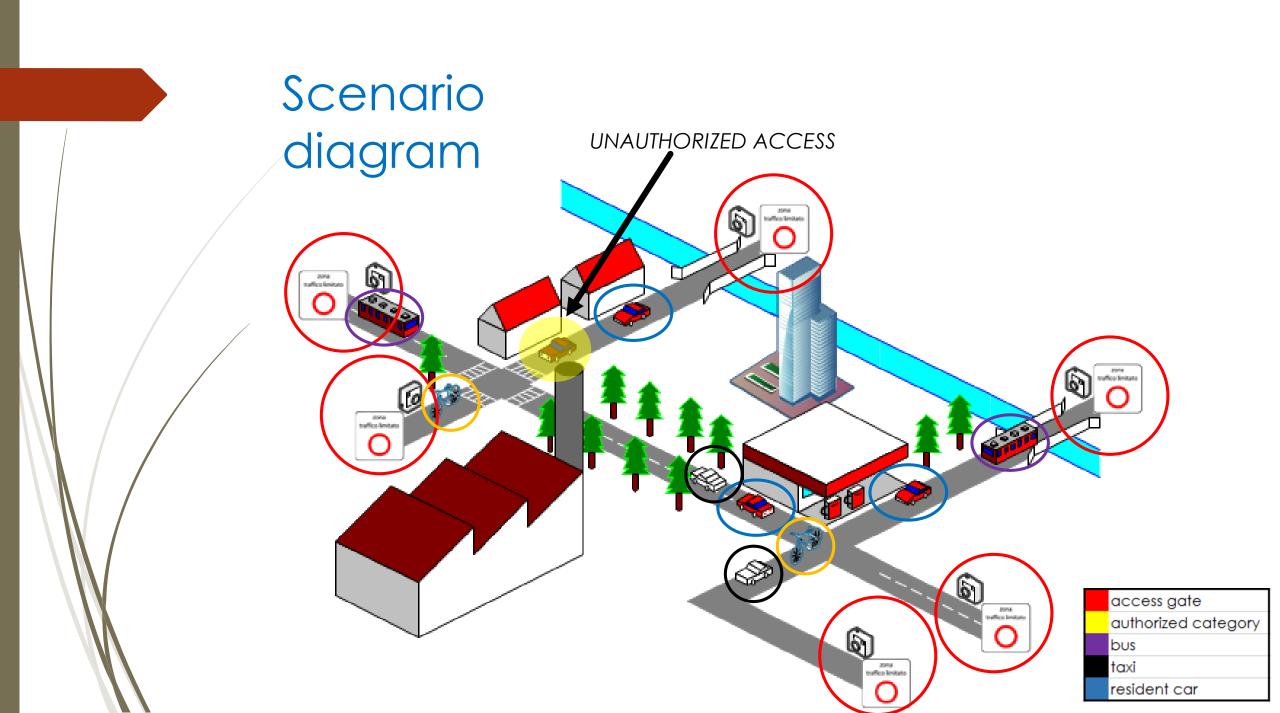
Berlati Alessandro

Corni Gabriele

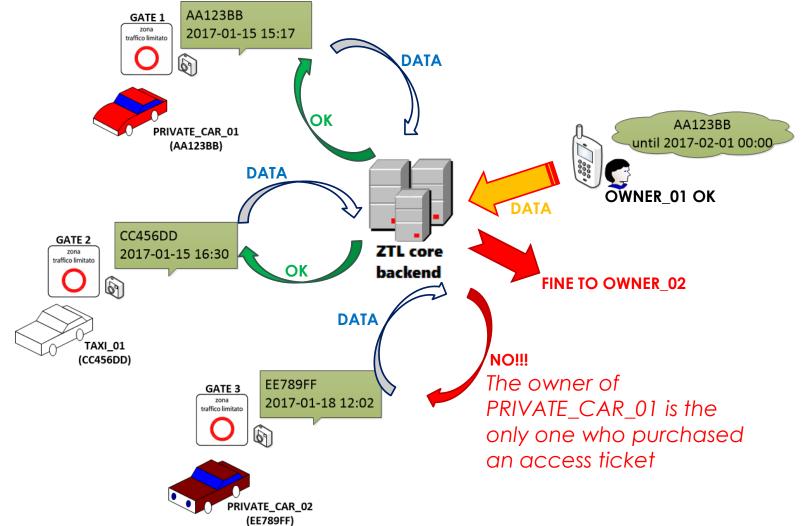
Scenario description

- Urban limited traffic zone
- Various access gates
- White list of authorized plates
- Different categories of vehicles (with different authorization access)
 - Resident cars, taxis, public transport, emergency vehicles (24/7)
 - Private cars (not authorized)
 - Motorbikes (24/7)
 - **.**.
- Possibility to buy a time-limited authorization ticket
 - 1 hour
 - 1 month
 - **...**





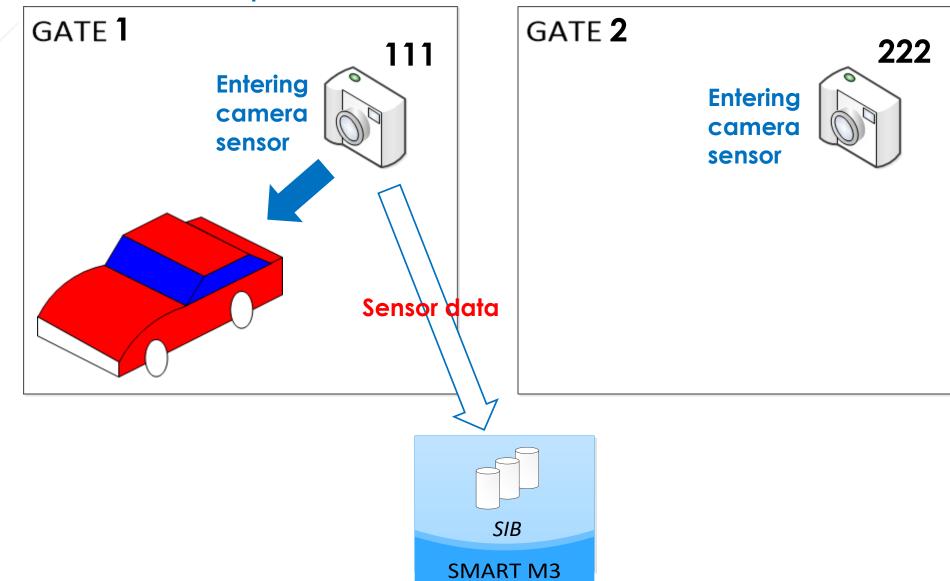
All-in-one the «big picture»



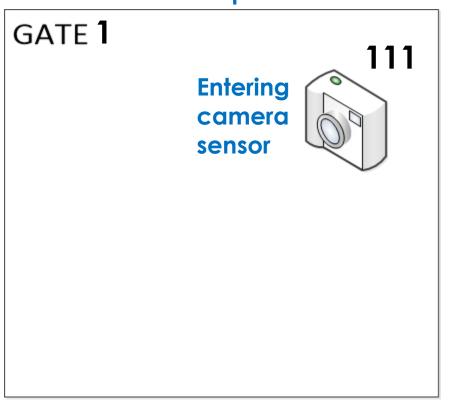
Scenario workflow

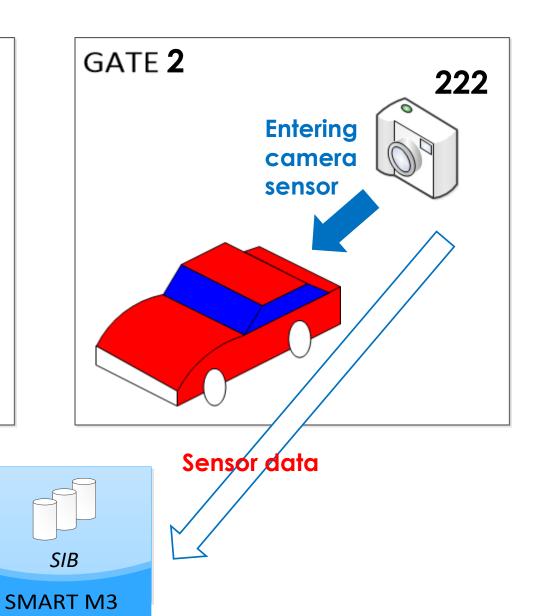
- The system comes with a pre-loaded white list of authorized plates with 24/7 granted access (eg: actual resident cars, taxis, buses, ...).
- The system is linked to the Vehicle Registration Institution (Motorizzazione Civile) and knows the bindings among every existing plate and its owner's personal details.
- Every client can buy a pass for entering the zone. Each pass includes an access ticket with a certain duration. Using the proper mobile app, it's possible to bind a plate to the purchased ticket. Once the registration is completed, the registered vehicle can enter the zone untill the ticket expires.
- Every access gate has a camera sensor that monitors in real time the vehicles entering the limited traffic zone. If a vehicle pass, its plate is detected and researched inside the white list: if a match isn't found (unauthorized access detected), the system sends a fine to the owner.
- Some categories of vehicles (eg: motorbikes) can enter the zone without permission.

Lab. example

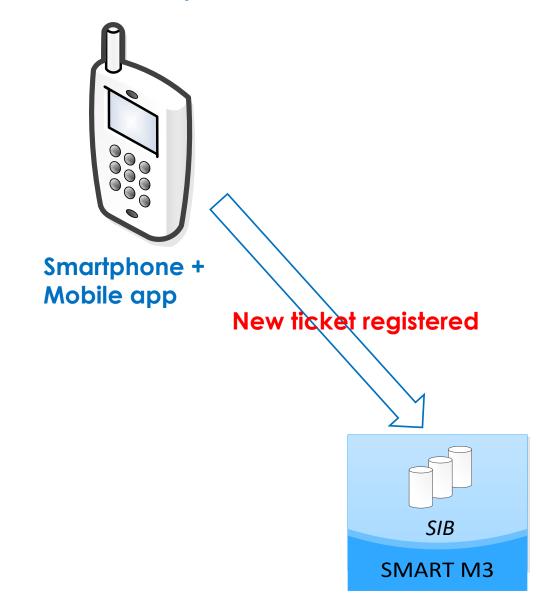


Lab. example





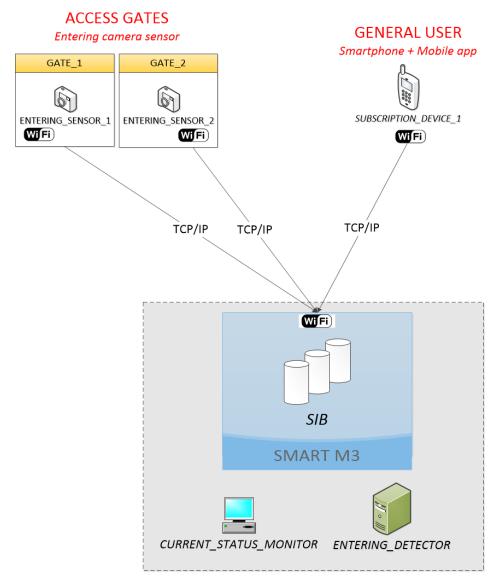
Lab. example



Lab. example notes

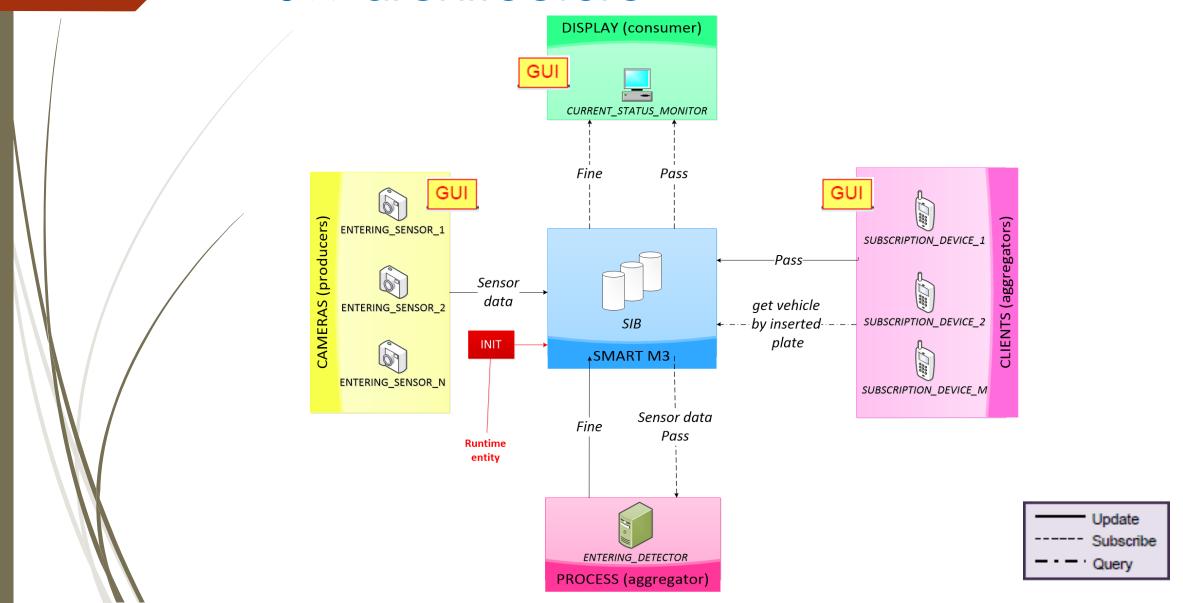
- An FPGA module with a connected camera module is suitable for process incoming plate's data.
- For an optimal data processing, both motion detection and OCR are needed.
- Our FPGA's software can only recognize few specified images within a video stream: the board hasn't enough computational resourses for handling the whole process.
- ► For these reasons, in this lab. example we have used a Java simulator interface instead of the real FPGA.
- The Android mobile app, on the other hand, has been concretely implemented.

HW architecture

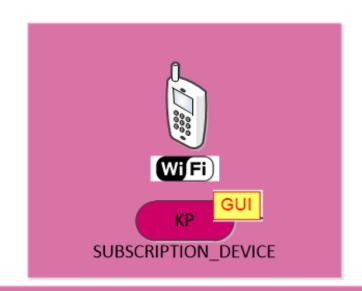


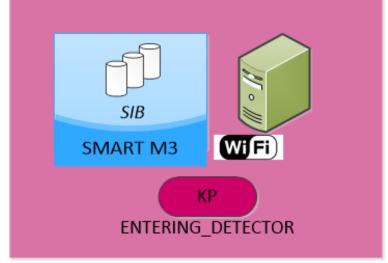
MONITORING OPERATOR

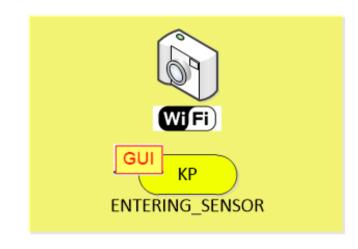
SW architecture

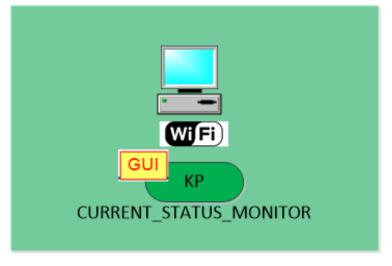


HW/SW architecture

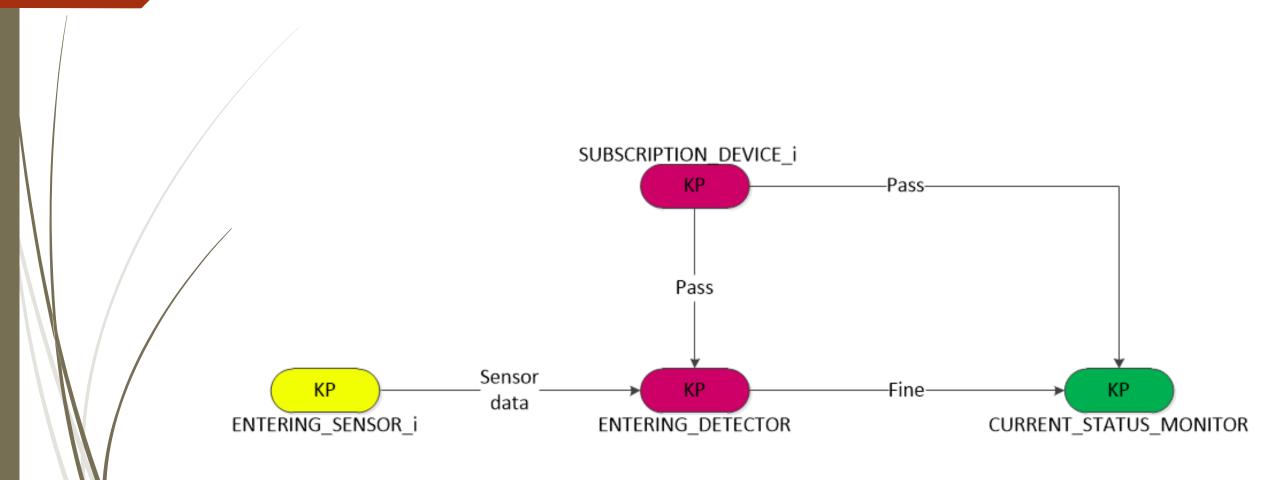




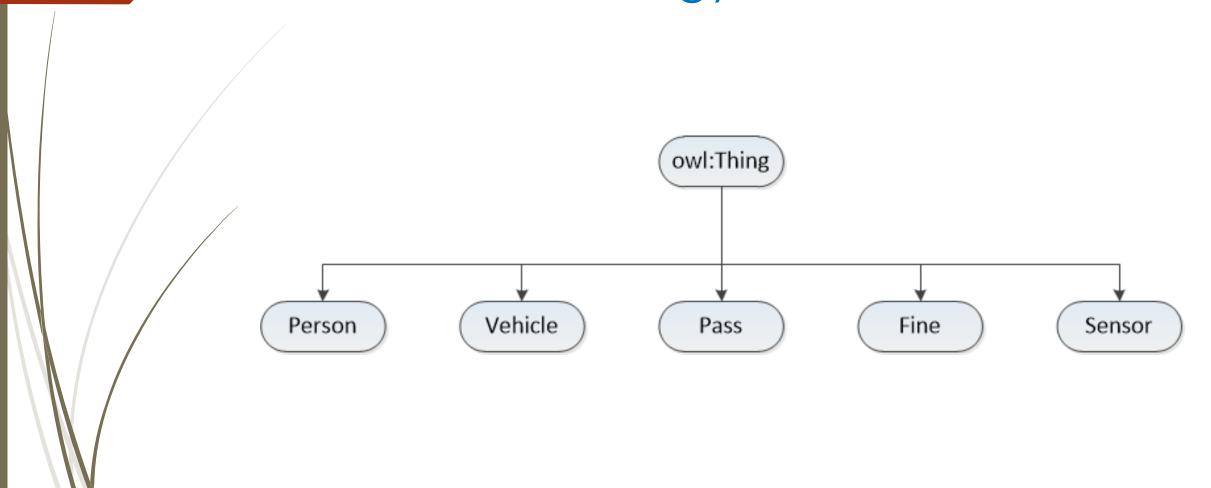




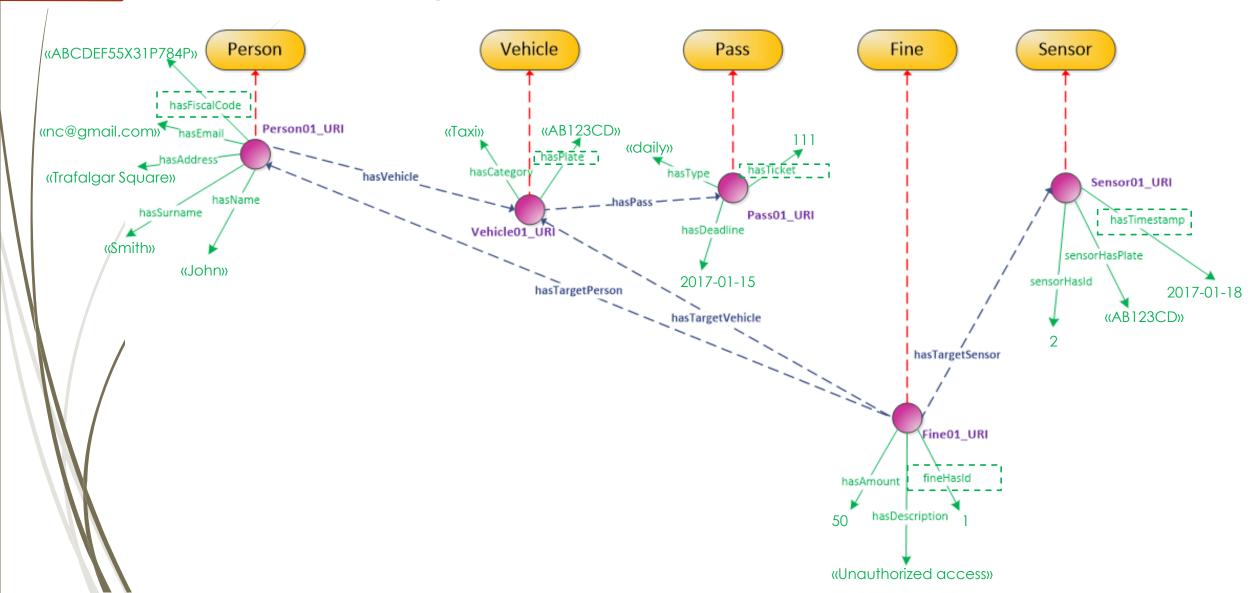
Data flow



Reference ontology class tree



Ontology awareness



Ontology graph

