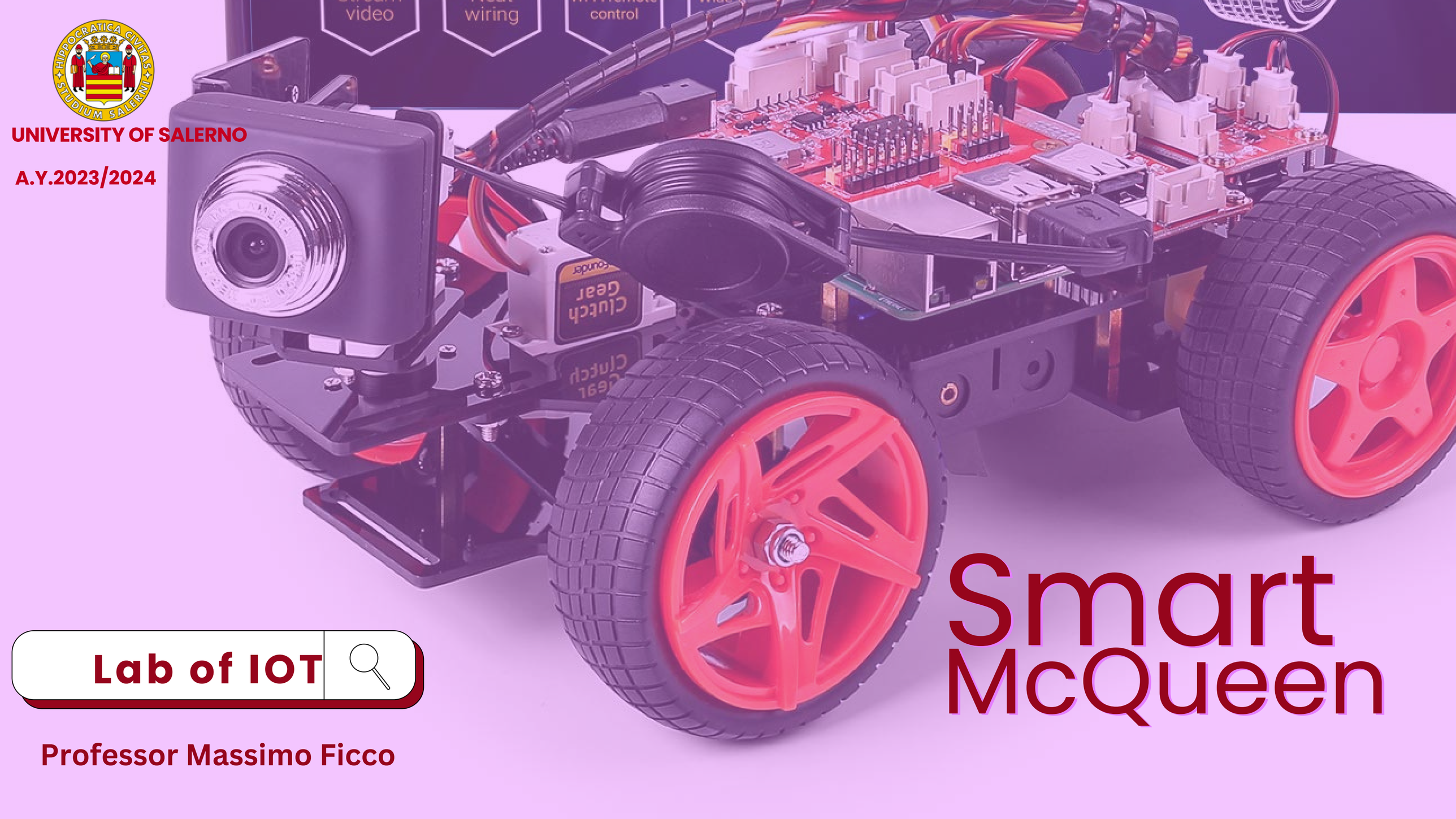

UNIVERSITY OF SALERNO

A.Y.2023/2024

Lab of IOT

Smart McQueen

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Our Team

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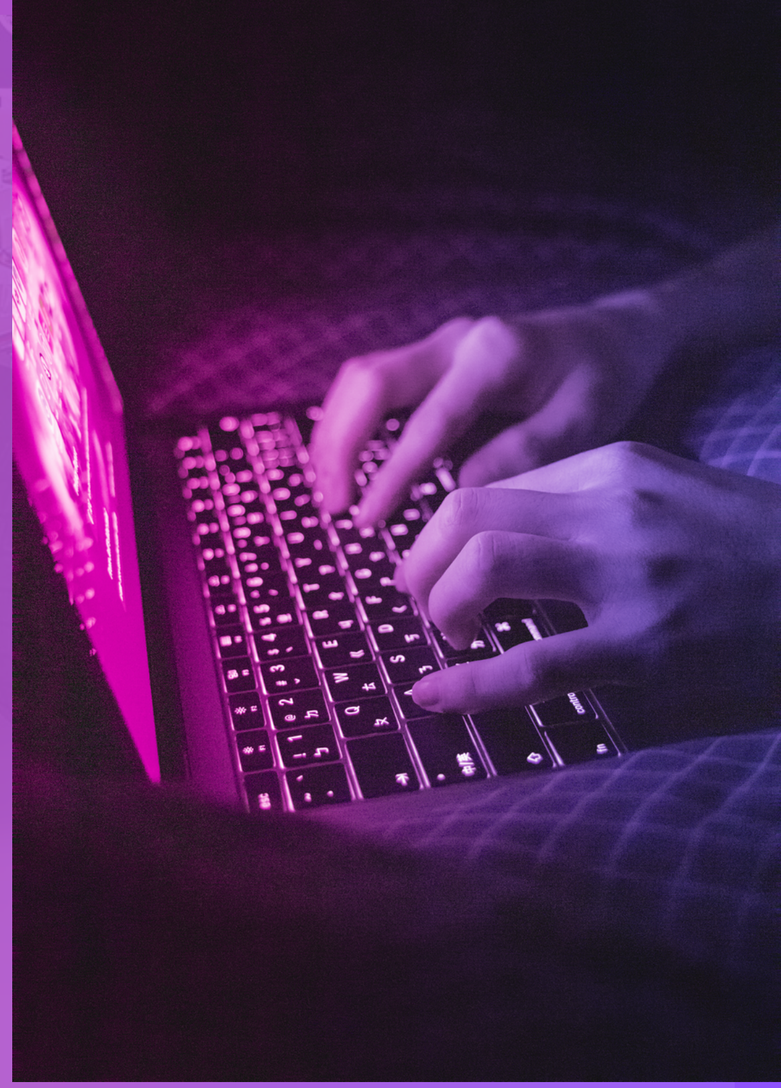


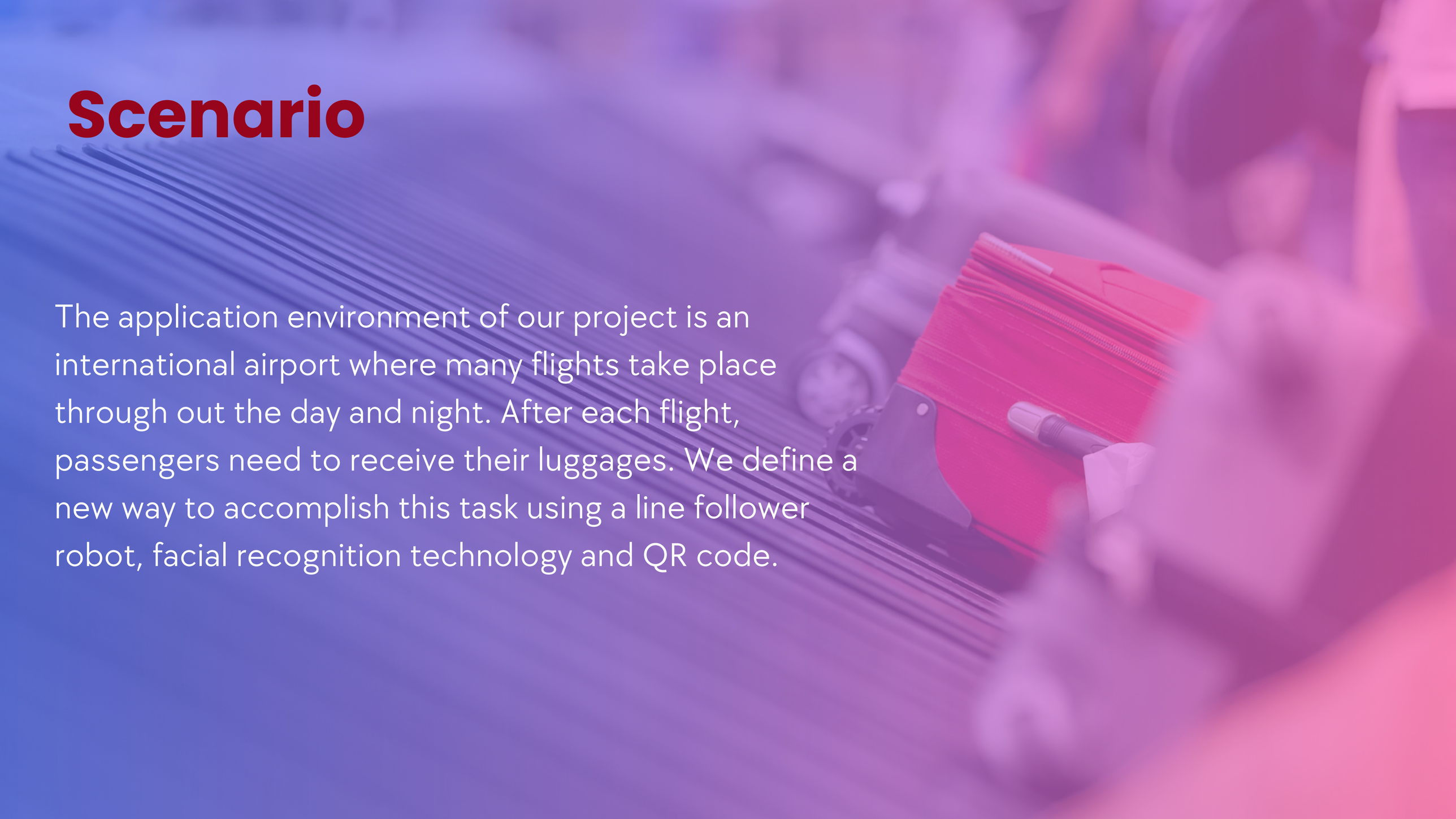
Overview

Nowadays, in the industry, there is a lot of use of line follower robot, in factories for moving equipment; In the smart green house and... This time we gave a new idea for these robots in the airport which we will explain further...

Let’s begin!

Scenario

The application environment of our project is an international airport where many flights take place through out the day and night. After each flight, passengers need to receive their luggages. We define a new way to accomplish this task using a line follower robot, facial recognition technology and QR code.



Our goals

Security

Each person's luggage reaches their own hands and the possibility of being stolen and making mistakes is minimized.

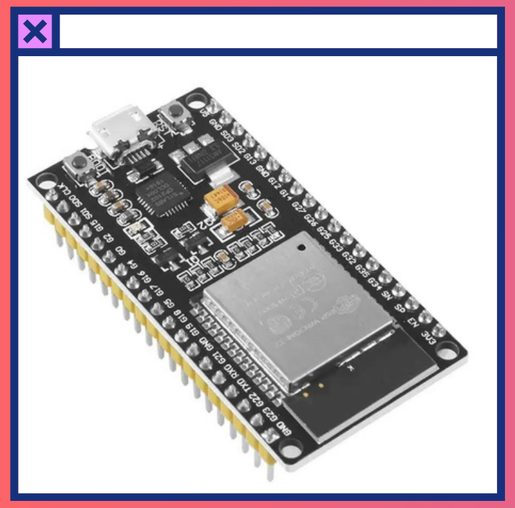
Order

Baggage is classified beyond the reach of passengers and is provided upon request.

Monitor

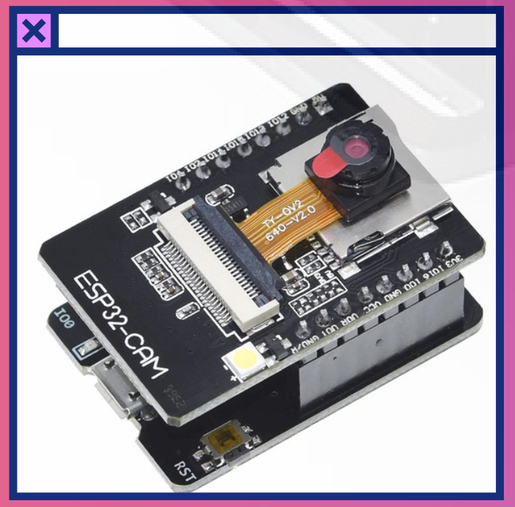
The information of passengers and the exact location of luggages are recorded by the system and in case of any problem, management and access are allowed.

Sensors:



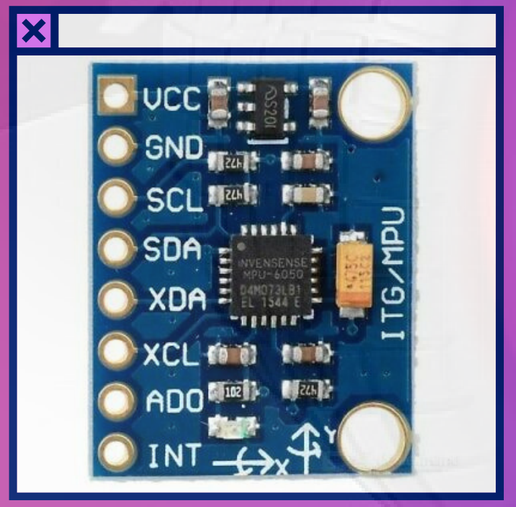
ESP32

we use it
as the controller
for each pickup point.



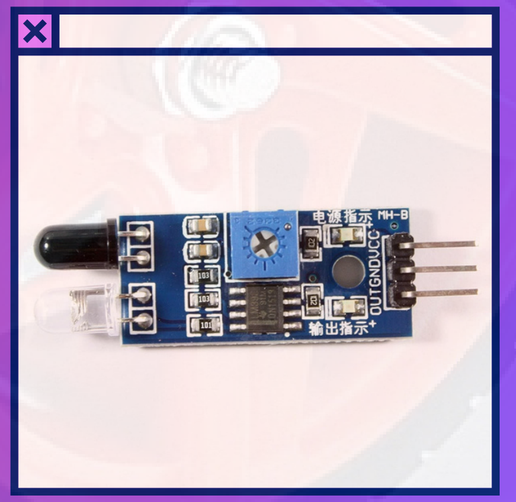
ESP32-CAM

It is used to scan
the qrcode on the cube
For every pickup point
there is one ESP32-CAM.



MPU 6050

It is a device that
combines a 3-axis gyroscope
and a 3-axis accelerometer.
It is used on the car to know
and calculate
the rotation of the car



IR

It is used to know
if a cube dropper
is empty of full.
Every pickup
point has two of them
one for each
cube dropper

How it works?

Steps:

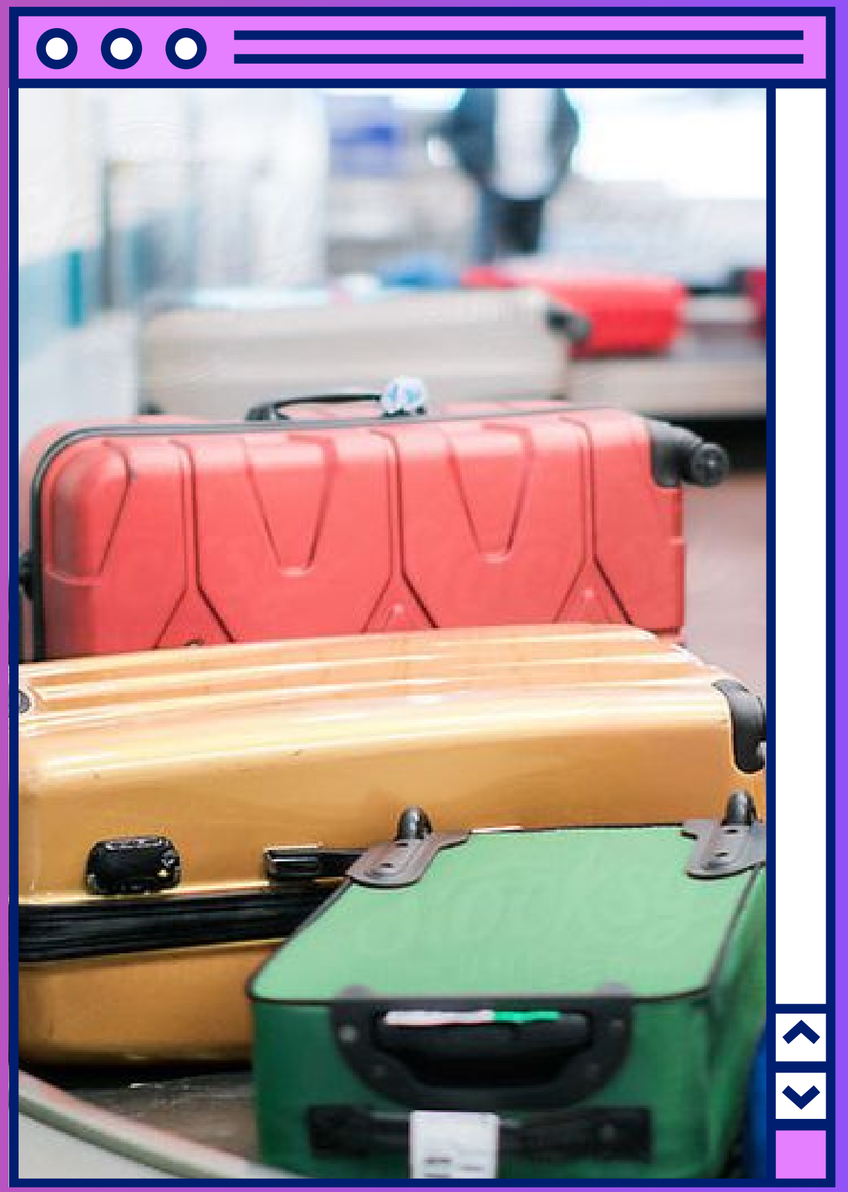
1. The robot’s camera recognizes the face code and send that to PC.
2. The PC find the Qrcode of the code and send a massage to the car.
3. The car starts moving along the path and arrives to the first pickup point.
4. The car sends a message to the pickup point controller to ask it to release the cube.
5. On receiving this message, the controller releases the cube and sends a response to the car.
6. The car knows that the cube has been released and starts moving along the path again.

Car(McQueen)

The car is based on the picar-v kit to which we added a gyroscope and a line tracking sensor. In order to reduce the turning angle, we removed the front wheels and instead used a single wheel that could rotate 360°. In order to support turning in place, we modified the picar library provided by the car vendor.
OpenCV is used to perform face recognition.

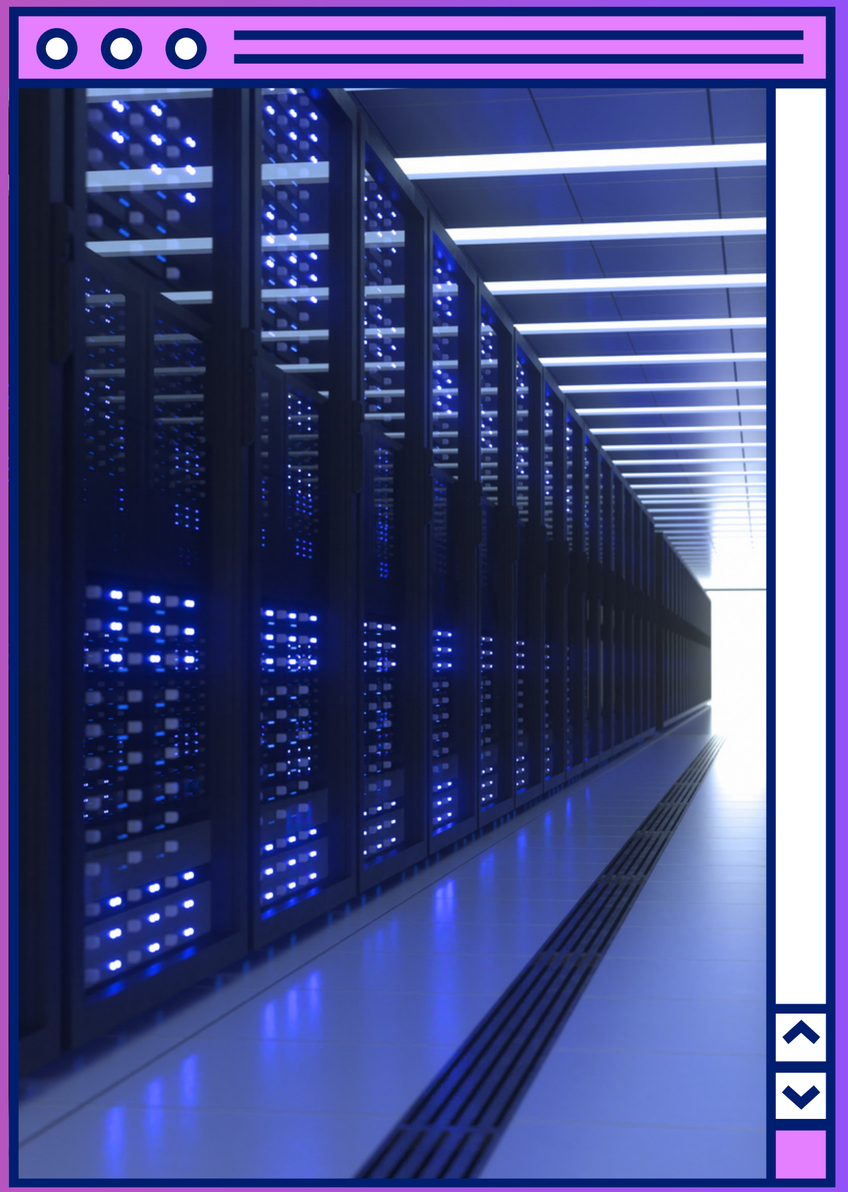
Pick up point

Every pickup point controls two cube droppers. For every cube dropper a servo motor is used to control the release of the cube and an IR sensor is used to check the presence of the cube. A set of 3 LEDs is used for every cube dropper to signal its state (empty, full, waiting for cube insertion).
Every pickup point implements an MQTT client. It subscribes to a topic where it can receive requests for cube insertions and publishes on a topic the result of a cube insertion and its release.



Server

The server applications is written in TypeScript and runs on Node.js. It implements an MQTT and subscribes to all of the topic of the system.
This application is connected to a MySQL database on which it stores informations about the persons and the positions of the cubes.



Application

The mobile application is developed in Flutter, which allows for it to be run on both Android and iOS.
The application provides 3 screens:

- First screen: allows to watch the stream from a qrcode scanner and displays the content of the qrcode payload.
- Second screen: displays the status of the connection of the devices that compose the system.
- Third screen: displays a map of the track and the location of the cubes that the car currently needs to fetch.


Thank you for your
attention...!