

23I412 - EMBEDDED SYSTEM DESIGN LABORATORY

MINI PROJECT ABSTRACT

SMART PARKING SYSTEM

Abstract :

This project presents the design and development of a Smart Parking System that helps address common urban problems such as traffic congestion, time wastage, and inefficient use of parking spaces. In many cities and institutions, drivers spend a lot of time searching for parking, which leads to increased fuel consumption and air pollution. A smart parking system solves these issues by guiding vehicles automatically and managing available slots in real time. By automating the entry and exit process, it reduces the need for manual supervision and ensures that parking is used in an organized and fair manner. This contributes to smoother traffic flow, reduced stress for drivers, and a cleaner environment, making it a socially beneficial solution for smart city development.

The system is built using a Raspberry Pi Pico microcontroller, which acts as the brain of the project and controls all other components through programming in MicroPython. Two IR sensors are used—one at the entrance and one at the exit—to detect the presence of vehicles and trigger further actions. A servo motor is used to automatically open and close the parking gate when a vehicle is detected. An RGB LED is used to display the availability of parking slots with different colors (e.g., green for available, red for full). A buzzer provides sound alerts for events like a full parking lot or successful entry. Jumper wires connect all the components, allowing signals to flow between them and enabling smooth operation. Together, these components make the system efficient, responsive, and suitable for small to medium-sized parking areas.

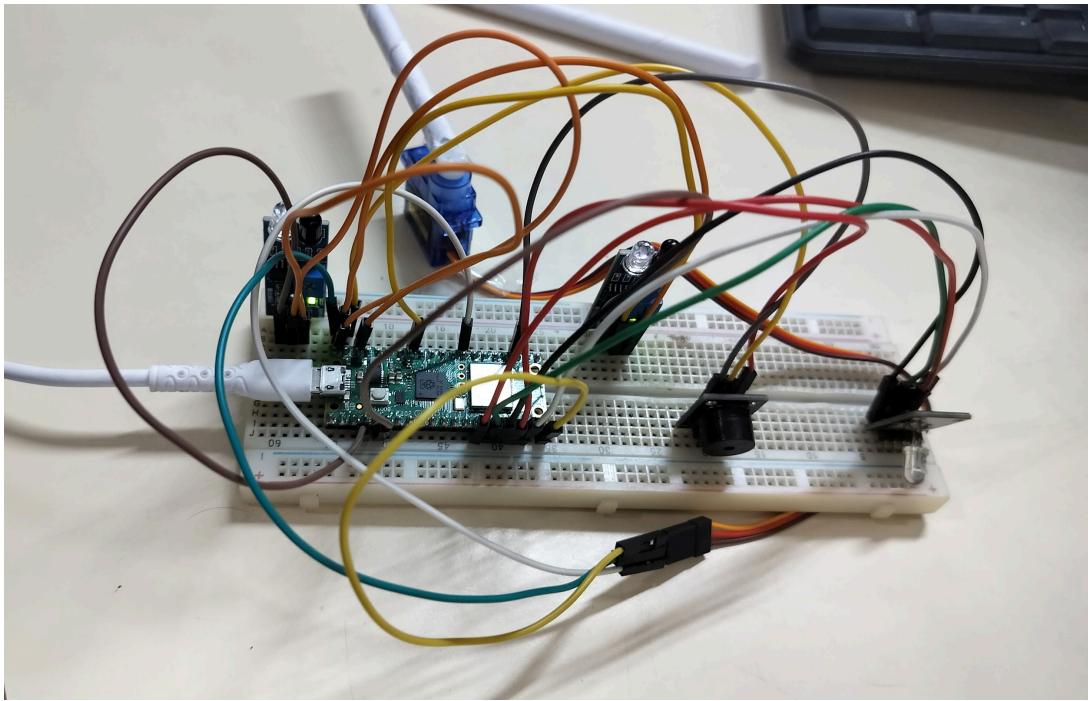


Fig 1 : Hardware Setup

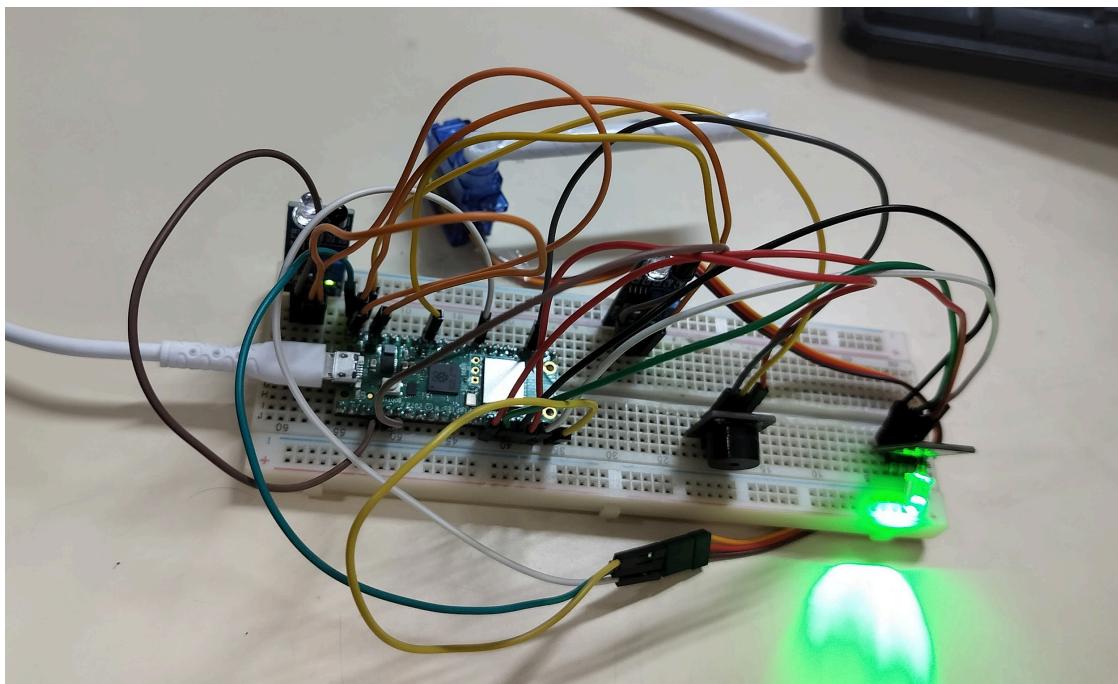


Fig 2 : Car Entry

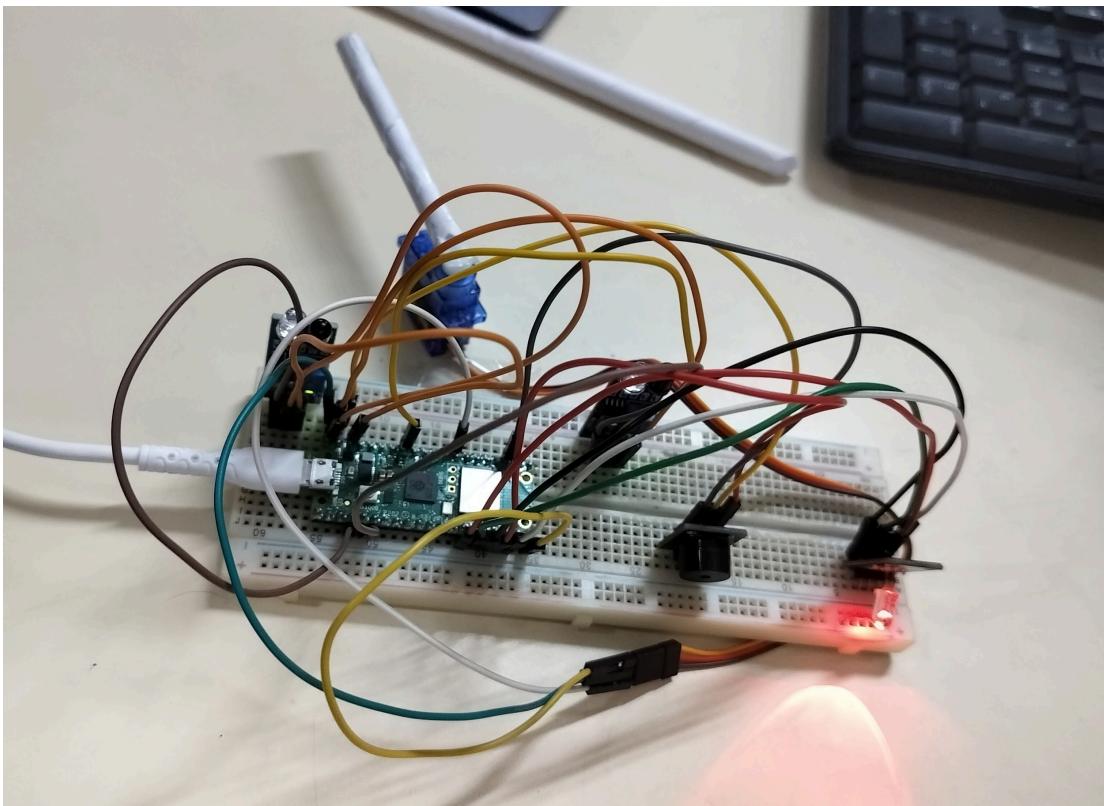


Fig 3 : Parking Full

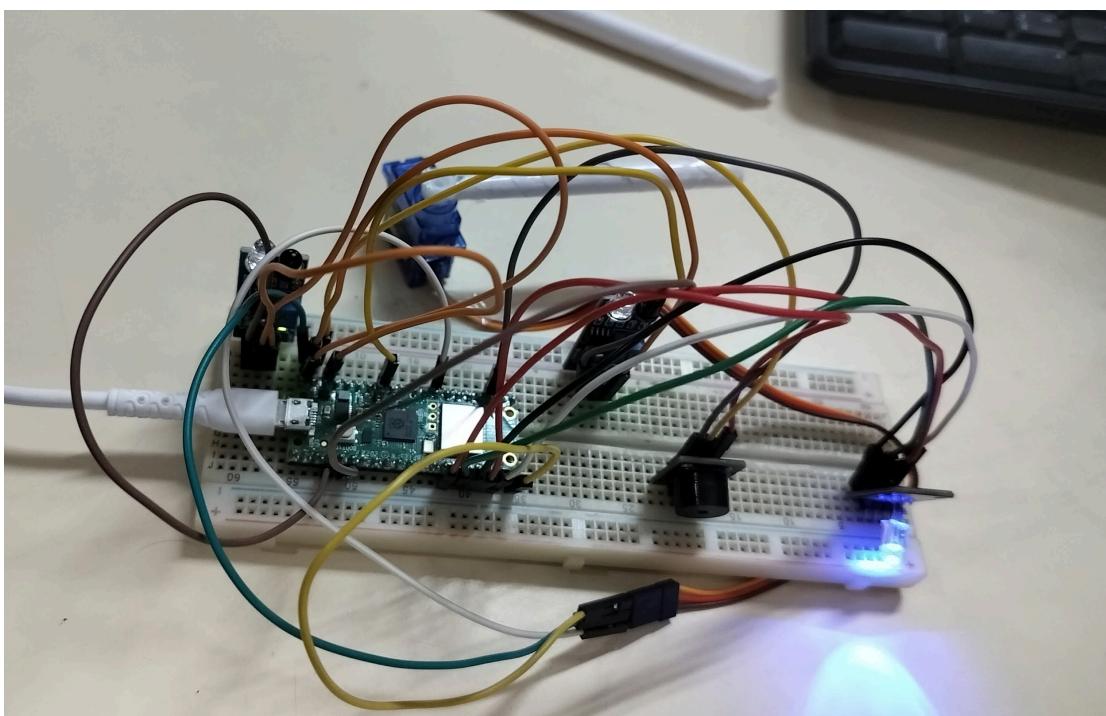


Fig 4 : Car Exit

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Shell > MPY: soft reboot
RASPBERRY PI PICO - PARKING SYSTEM
Car Detected at Entry
Car Entered. Slots Left: 3
Car Detected at Entry
Car Entered. Slots Left: 2
Car Detected at Exit
Car Exited. Slots Left: 3
Car Detected at Entry
Car Entered. Slots Left: 2
Car Detected at Exit
Car Exited. Slots Left: 3
Car Detected at Entry
Car Entered. Slots Left: 2
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Fig 5 : Slot Availability

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Car Detected at Entry
Car Entered. Slots Left: 2
Car Detected at Exit
Car Exited. Slots Left: 3
Car Detected at Entry
Car Entered. Slots Left: 2
Car Detected at Entry
Car Entered. Slots Left: 1
Car Detected at Entry
Car Entered. Slots Left: 0
SORRY :( Parking Full
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Fig 6 : Parking Full