# PARK GENIUS

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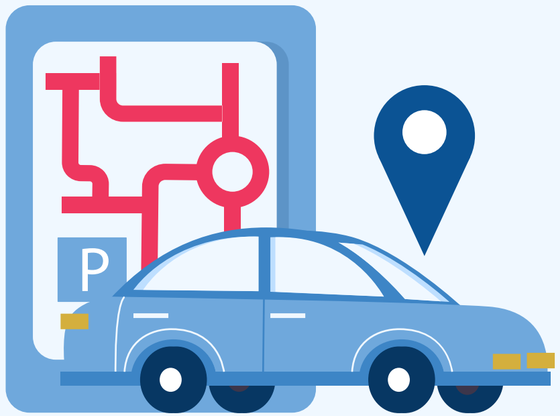
# PROBLEM

Efficient parking management is a growing challenge due to increasing vehicles and limited spaces. Traditional systems often lack real-time tracking and secure user authentication, causing congestion and inefficiencies.

Moreover, existing solutions fail to integrate seamless, flexible payment options, particularly for users without pre-registered access cards, further complicating the parking experience for both the management and the end-users.

# INTRODUCTION



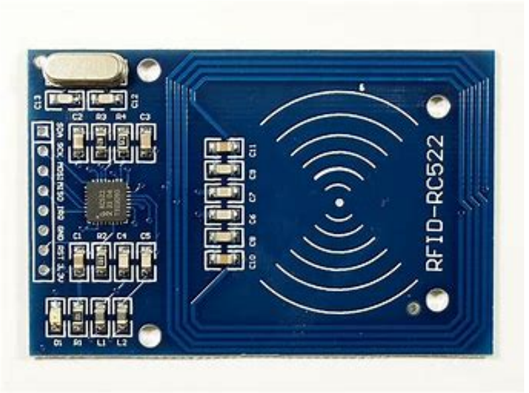

**ParkGenius** addresses the challenges faced by modern parking systems by leveraging RFID technology for secure vehicle access. Additionally, it incorporates Stripe payment integration to accommodate visitors.

# TECHNOLOGY USED

## HARDWARE

ESP 32

RC522 RFID Module



# TECHNOLOGY USED

## SOFTWARE

ARDUINO IDE

NODE JS

REACT JS

FIREBASE

HiveMQ

MQTT

# TECH STACK

**RFID Technology:** RFID tags on library cards allow quick identification when scanned by an RFID reader, enabling seamless access control.

**ESP32:** The ESP32 microcontroller processes RFID data and sends it to the cloud via Wi-Fi for real-time tracking.

**Google Firebase:** Firebase stores user data, including entry timestamps, providing a centralized, real-time database for access logs.

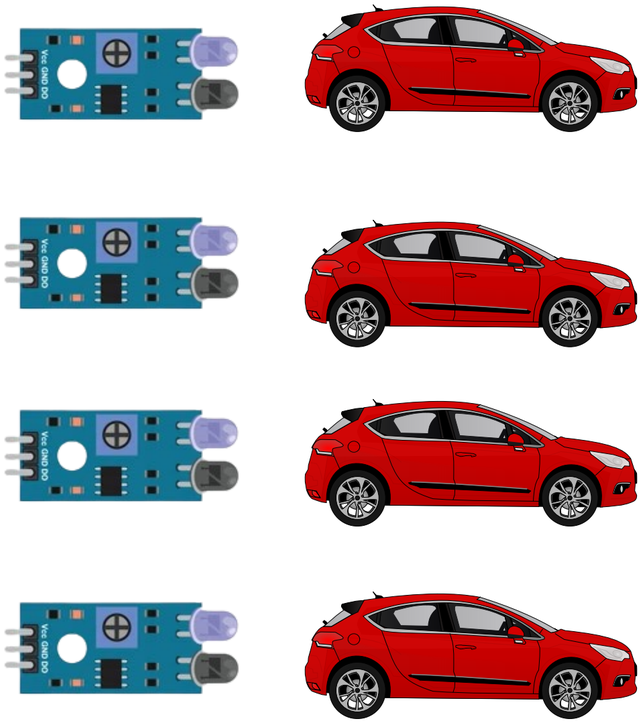
# TECH STACK

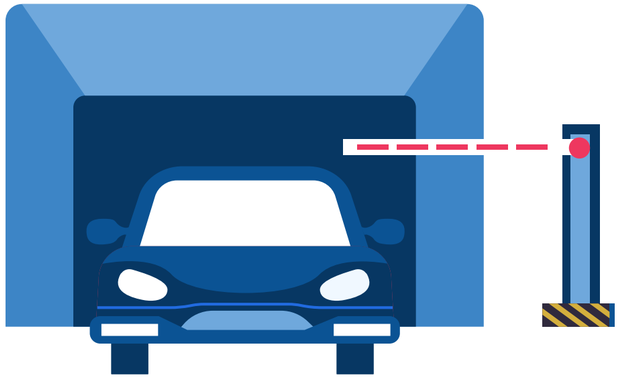
**React:** React enables the development of a responsive user interface for the parking management system, allowing users to view available parking slots and access real-time updates seamlessly.

**Node.js :** Node.js manages backend processes, handling data transfer between ESP32 and Firebase while authenticating users and updating the logs.

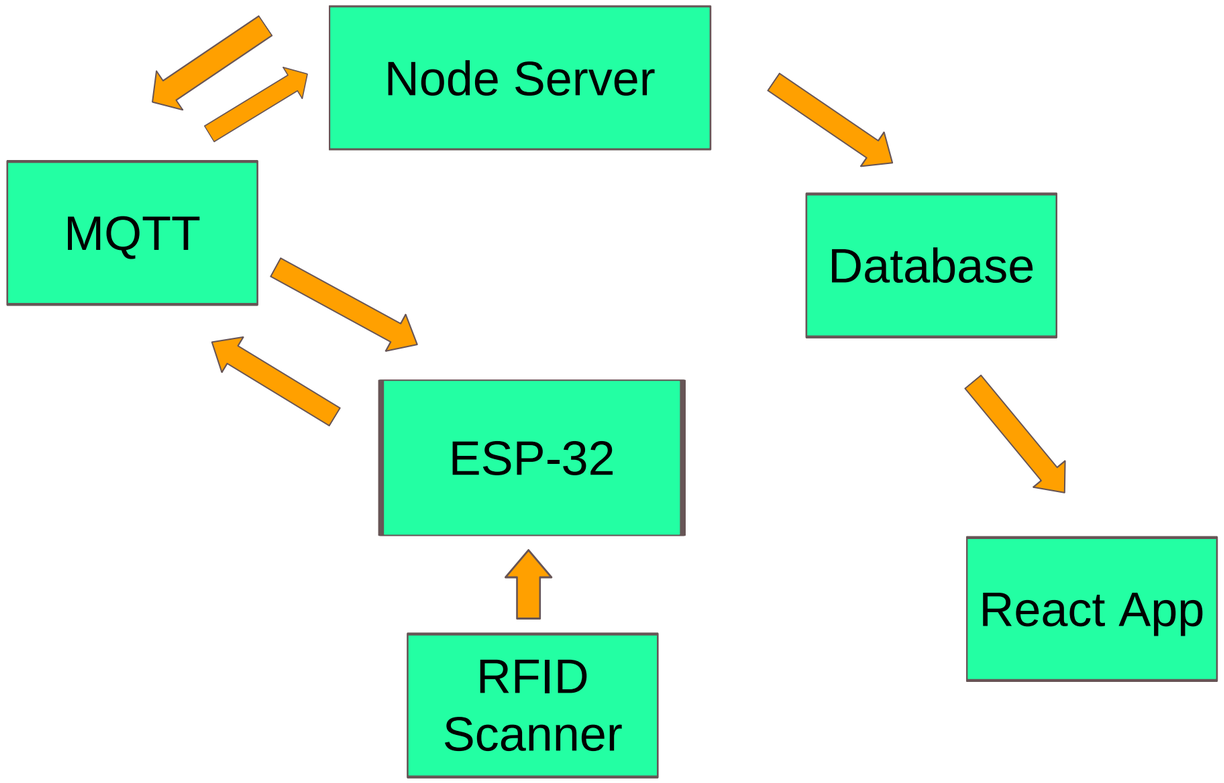
**MQTT :** MQTT facilitates efficient communication between the ESP32 devices and the web application, ensuring real-time data transmission for parking status updates and user notifications.

# IS IT SCALABLE ?





# HOW IT WORKS



# CONCLUSION

This IoT-based parking management system leverages RFID technology, real-time communication, and a dynamic database to streamline parking access and enhance user experience. By allowing users to check available slots and navigate to parking locations, the system reduces congestion and saves time. The integration of Firebase Firestore ensures real-time updates, making the solution both efficient and user-friendly. This project demonstrates the potential of smart technologies to address urban parking challenges, paving the way for future enhancements such as a mobile application and predictive algorithms.

# THANK YOU