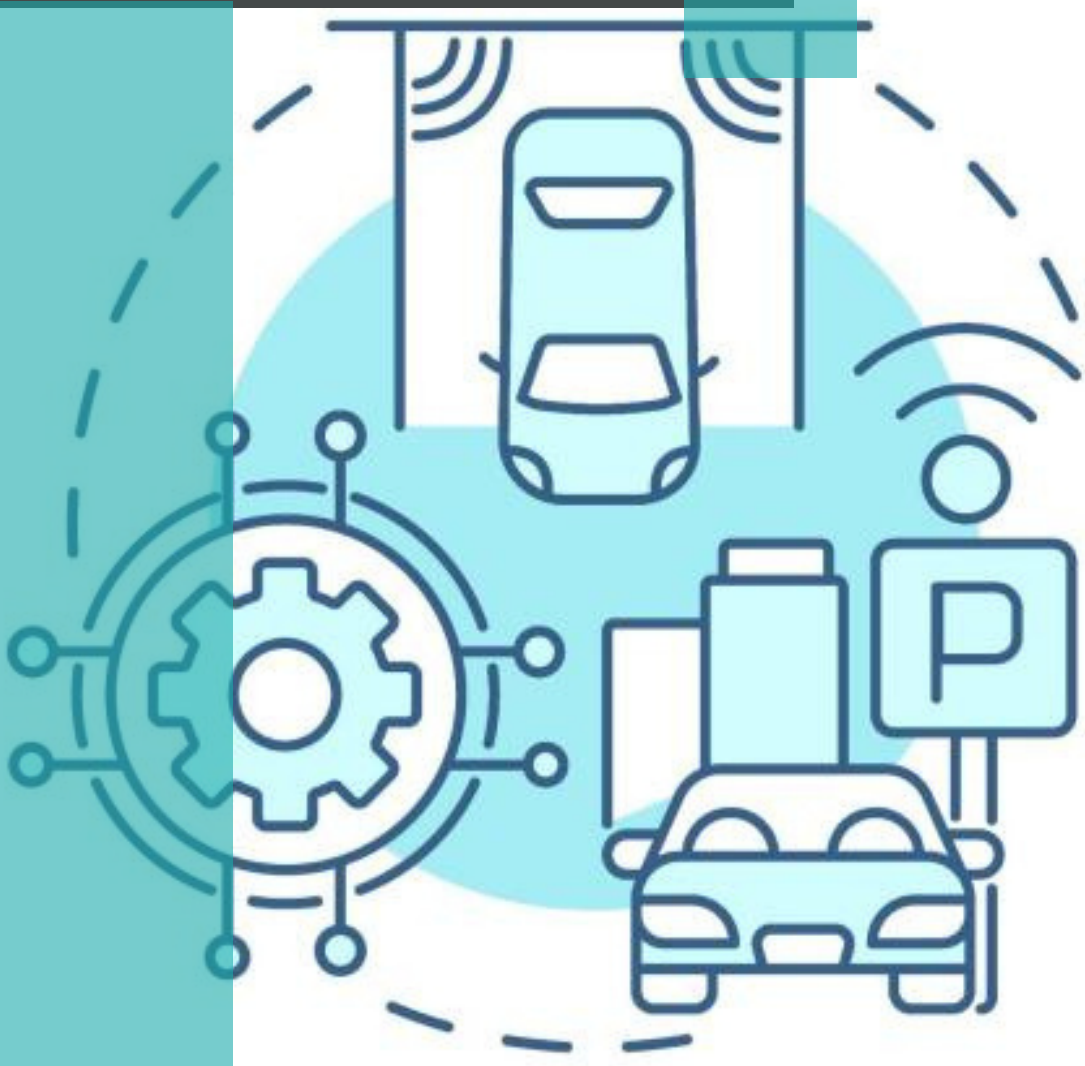
SMART PARKING SYSTEM

REPORT



Prepared By:
GROUP 7

TEAM MEMBERS

Prajit Kaushik – 21ucs151

Prajwal Sugandhi – 21ucs152

Prakhar Gupta – 21ucs153

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Objective

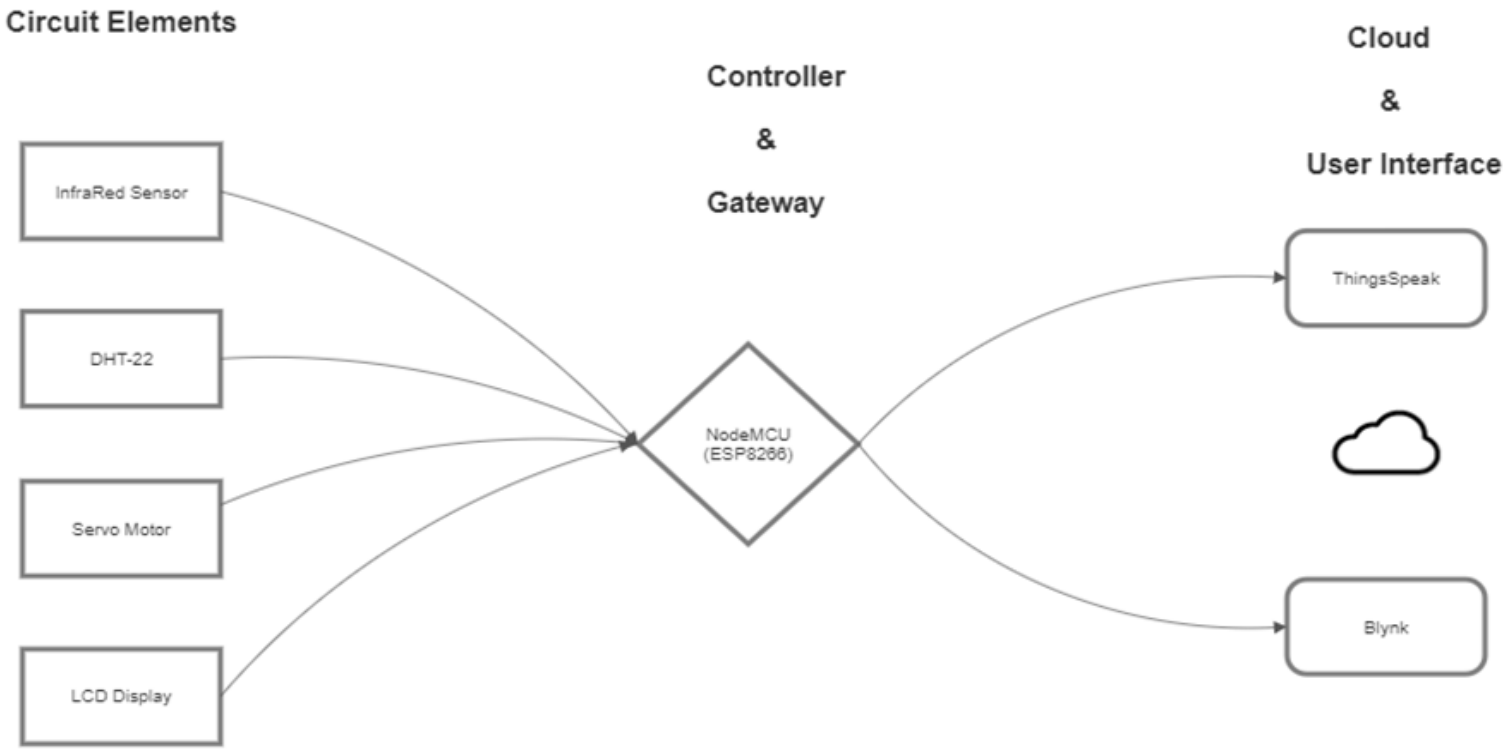
The purpose of this project is to create a vehicle parking management system that will keep track of when automobiles enter and exit the parking lot, keep a record of the vehicles there, and assess whether or not the lot is full and let the other drivers know about the empty slots. If the lot is completely filledthen it won't allow the driver into the parking space. Also keeping in mind the safety of the car parking lot by keeping a check on its temperature.

Vehicle parking places in parking lots are managed using a parking lot management system. A parking management system makes it simpler to manage the cars in parking lots. However, the3 number of car owners has grown since then. The passenger who is operating the car and the parking attendant who oversees the parking lot play the two key parts in the scene. The duty of car parkers and parking management officials is thus made easier by a parking lot management system.

This Project proposes the Smart Parking Lot Management System Goals of parking lot man- agement system include:

1. Have 2 parking slots
2. Show which slot is vacant and which is filled on LED screen.
3. Show vacant and available slots on Thinkspeak and Blynk.
4. Allow a car park only if any one of the slot is empty.
5. Establish a node to node communication between the parking spots.

BLOCK DIAGRAM



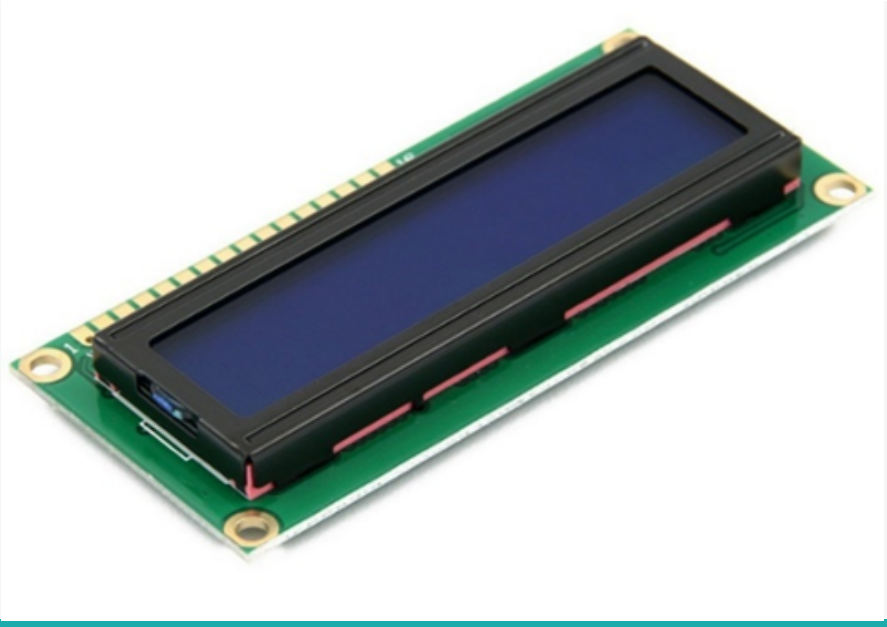
Functions of Different Blocks in Block Diagram

1. IR Proximity Sensor

A straightforward infrared sensor called an IR proximity sensor is used to find obstructions. It emits and detects its own infrared photons, making it an active infrared sensor. Only the IR Rays that are emitted by objects are detected by a passive infrared sensor. This sensor is used to detect the presence of the car at the parking spot. Also at the gate it detects the car presence which helps us to operate the gate.

2. Servo Motor

A small machine with an output shaft is called a servo motor. Sending the servo a coded signal allows for precise angular positioning of this shaft. The servo will maintain the angle of the shaft as long as the coded signal is present on the input line. This helps us to operate the main gate of the parking system.



3. 16x2 LCD i2c Display

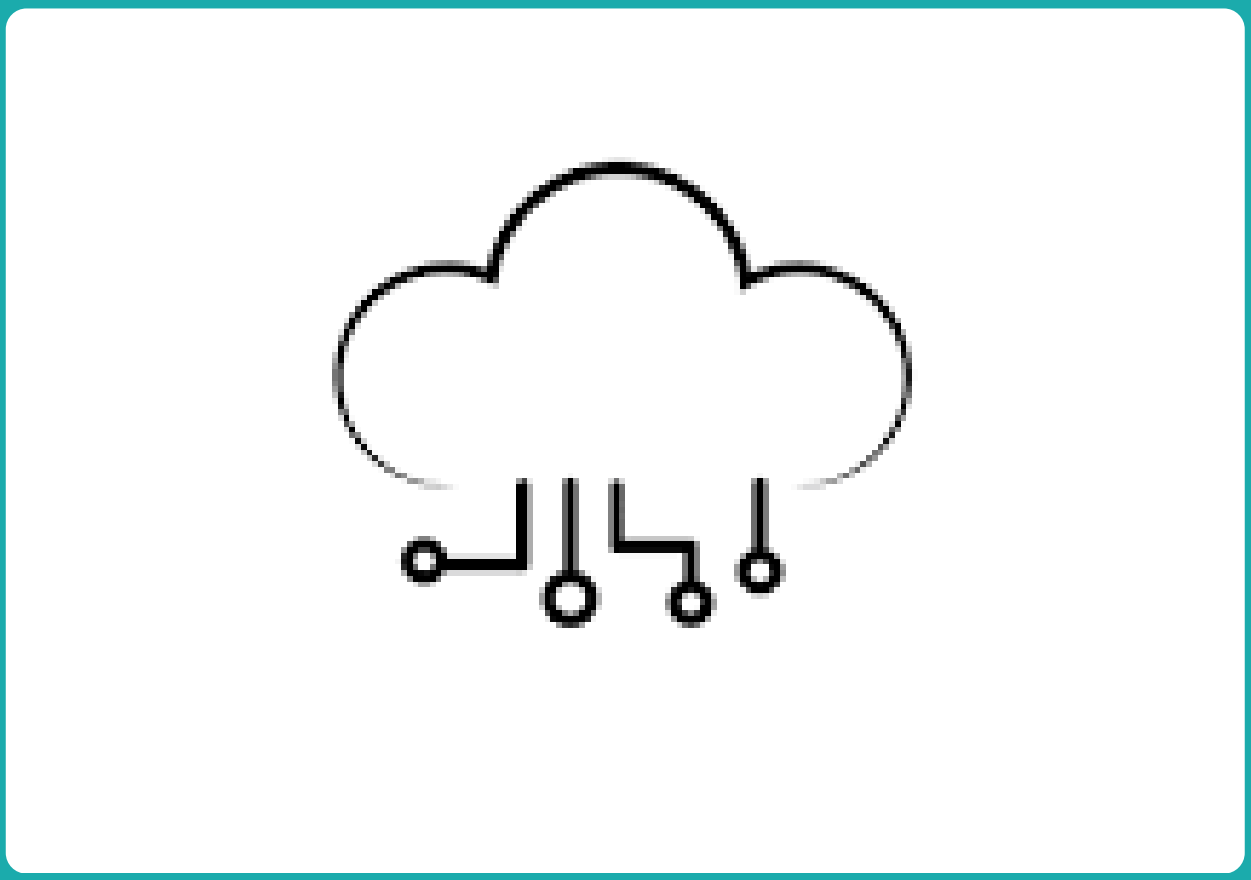
16x2 refers to two lines, each with 16 columns for a total of 32 characters. There are only 2 signal pins and 2 power pins required when using the Grove I2C connector. This display shows the present data of the slots at every time.

4. DHT-22 Sensor

The DHT22 is a temperature and humidity sensor that can be used in the smart parking system described in the block diagram. Its function is to measure temperature and humidity levels in the surrounding environment and provide this data to the NodeMCU board. If any car caught fire then its data helps us to take quick actions.

5. NodeMCU

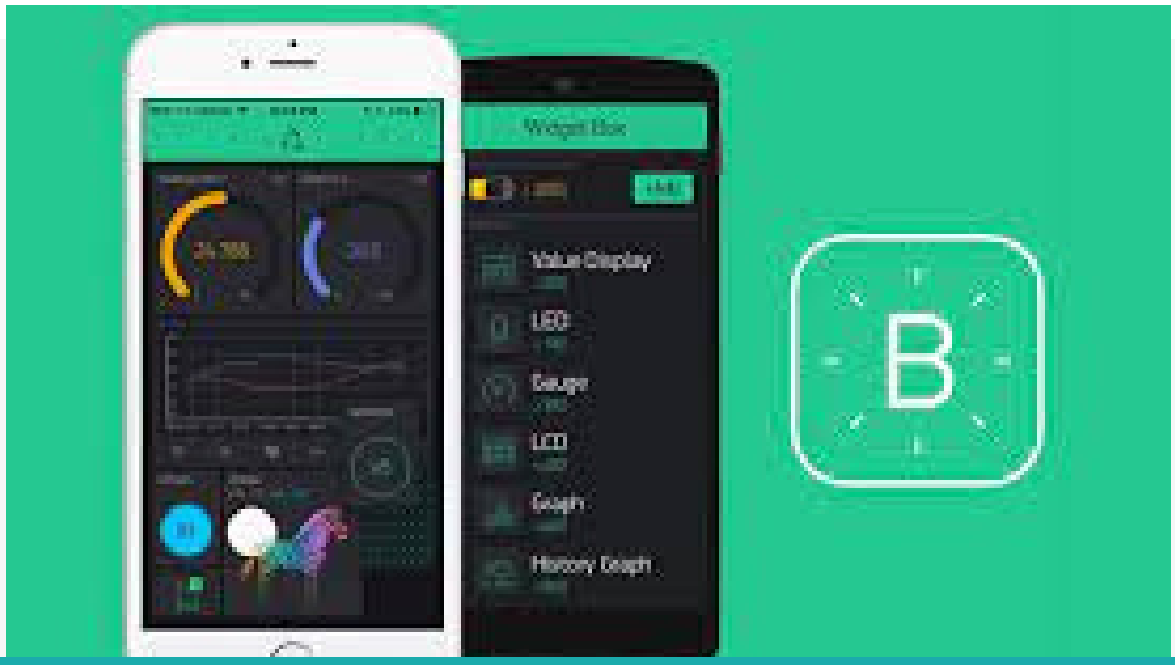
The NodeMCU is a development board that is based on the ESP8266 WiFi module. Its function is to act as the main controller for the system and to interface with the various sensors and other components in the system. It also acts as a gateway device between the cloud and the parking.



CLOUD AND UI

Think speak

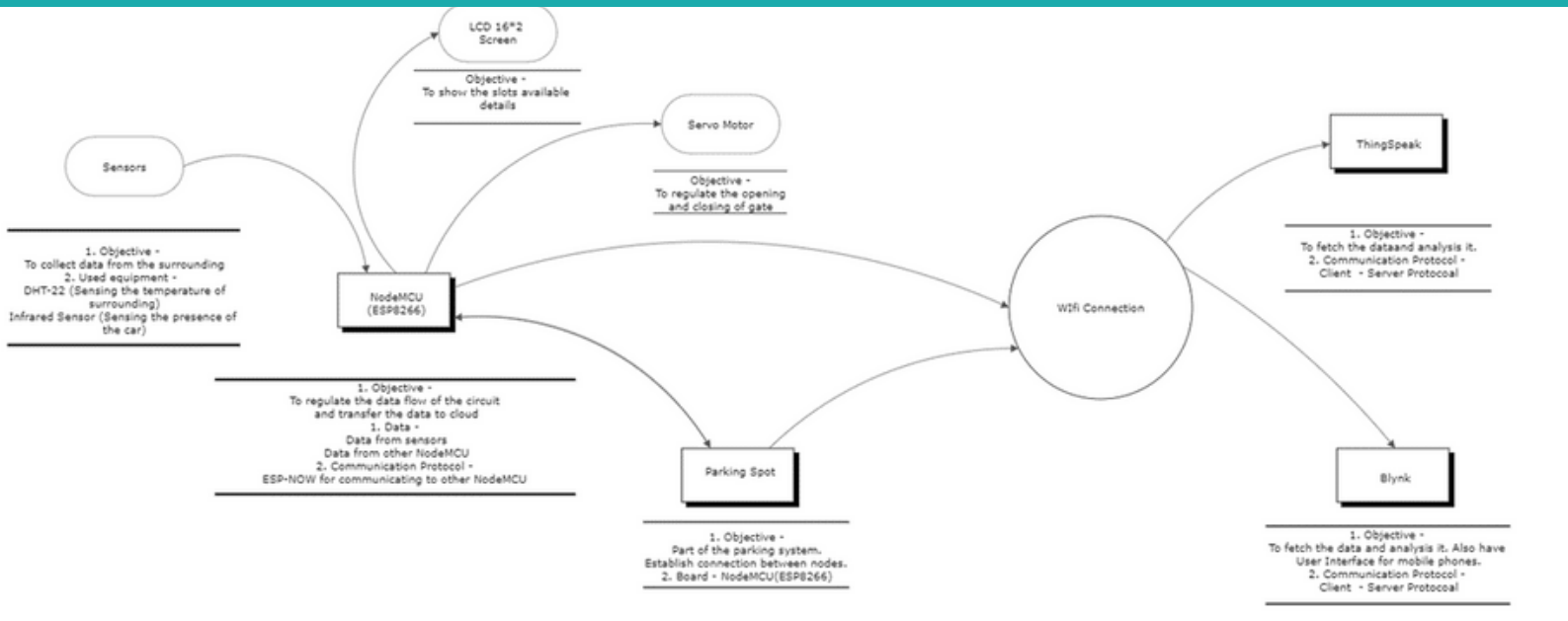
The NodeMCU board collects data from sensors like the IR sensor and DHT22 sensor and sends this data to ThingSpeak for storage and analysis. ThingSpeak provides a web-based interface that can be used to view and analyze this data in real-time, as well as tools for generating graphs, charts, and alerts based on this data.



BLYNK

Blynk is a cloud-based IoT platform that is used in the smart parking system. Its function is to provide a mobile app and a web-based dashboard for remotely monitoring the smart parking system.

DATA FLOW DIAGRAM



Implementation

We have implemented the smart parking system in the real life. We use IR sensors to detect cars, servo motor to regulate the gate, dht-22 to detect the temperature. For the User Interface lcd screen is used to display the available parking spots at location, Blynk and ThingSpeak is used for the cloud. We also used the ESP-NOW protocol for establishing the node-to-node communication.

Results

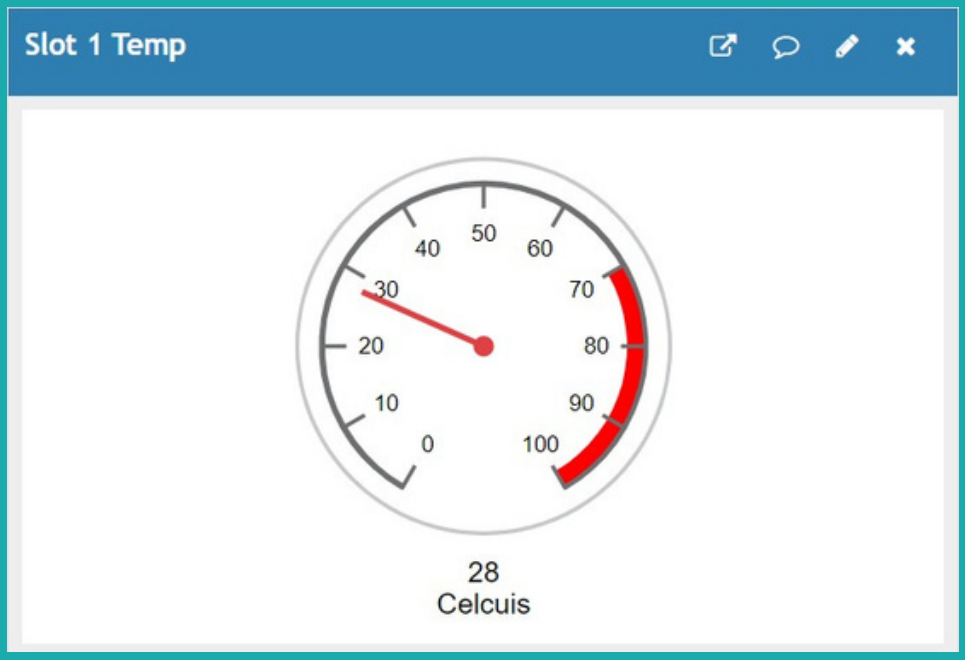
Once the automated car parking system is implemented, it will provide the following benefits:

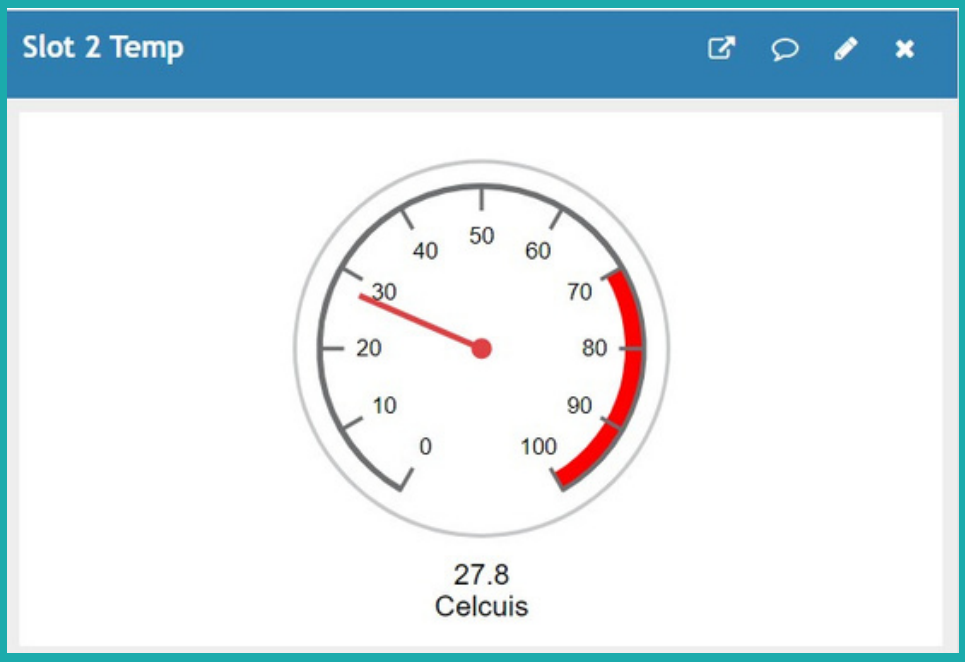
Efficient use of parking space: The system will ensure that cars are only allowed to enter when a parking spot is available, which will prevent unnecessary congestion in the parking lot.

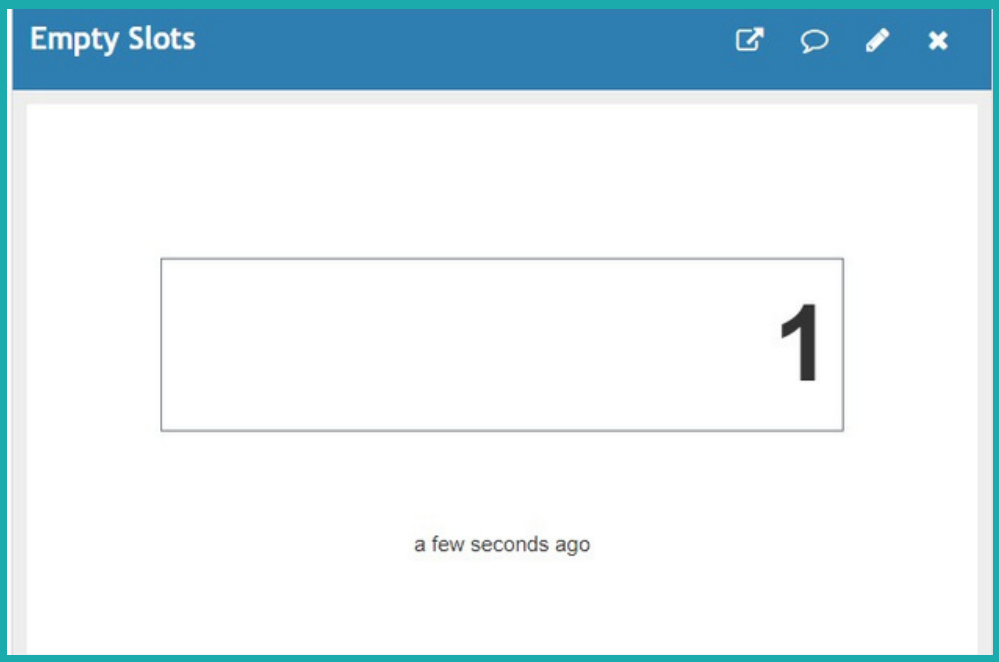
Real-time monitoring: The system will send data to the cloud in real-time, allowing parking lot managers to monitor the availability of parking spots and make informed decisions about parking management.

Reduced staffing requirements: The system will automate the parking process, reducing the need for human staff to manage parking operations.

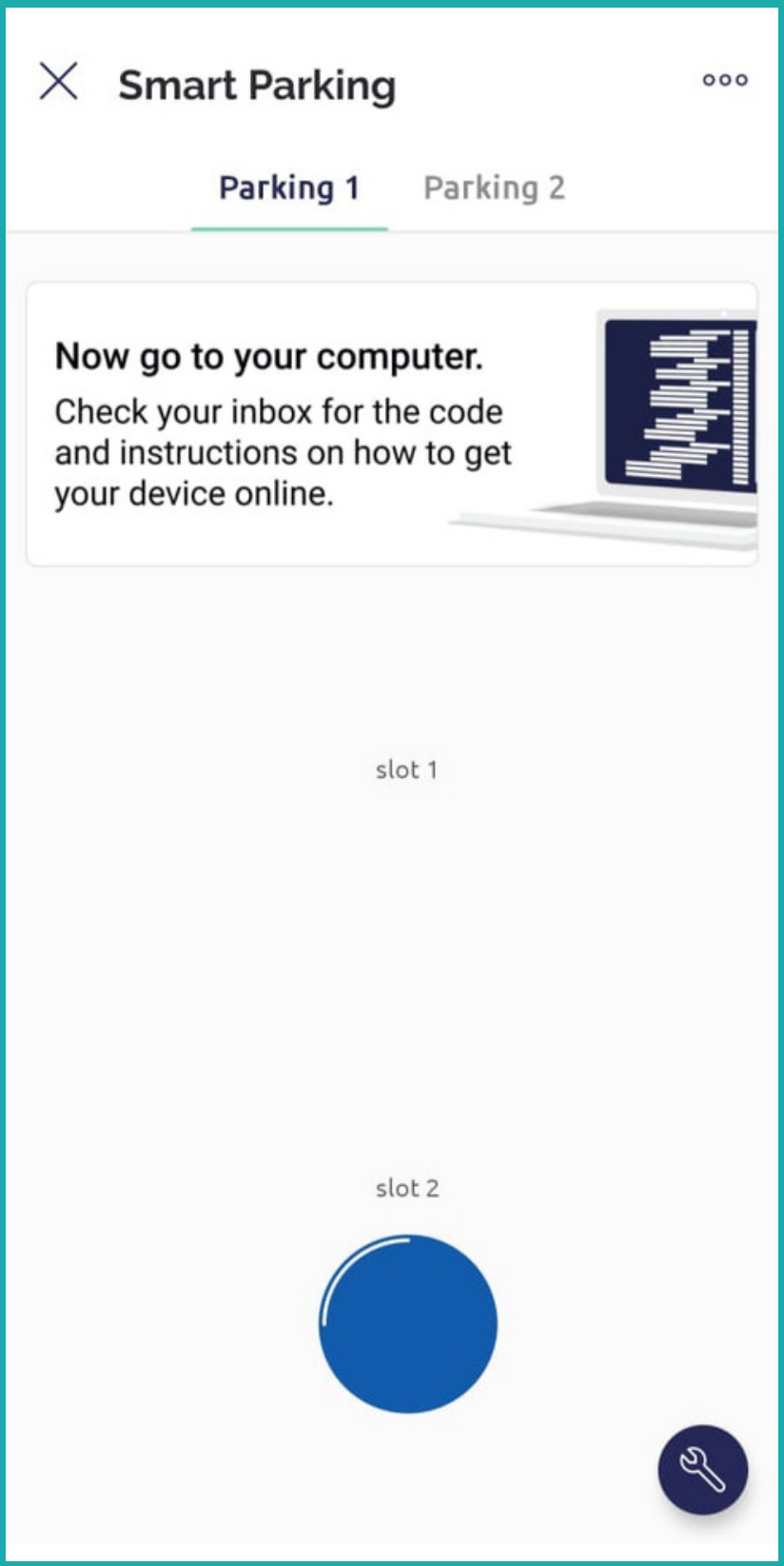
UI at Thingspeak



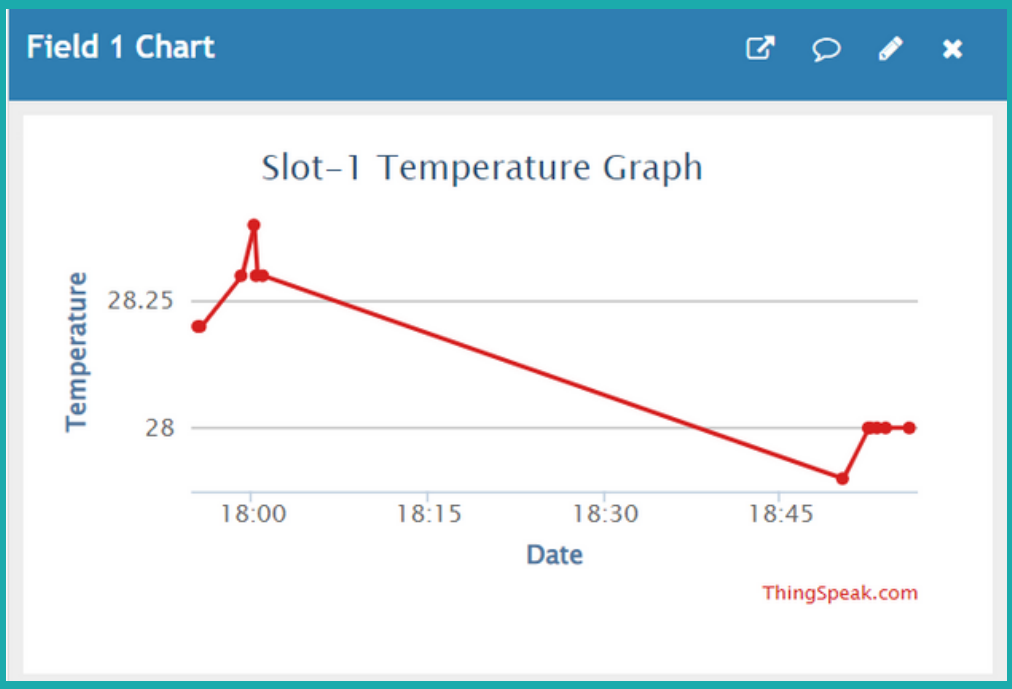


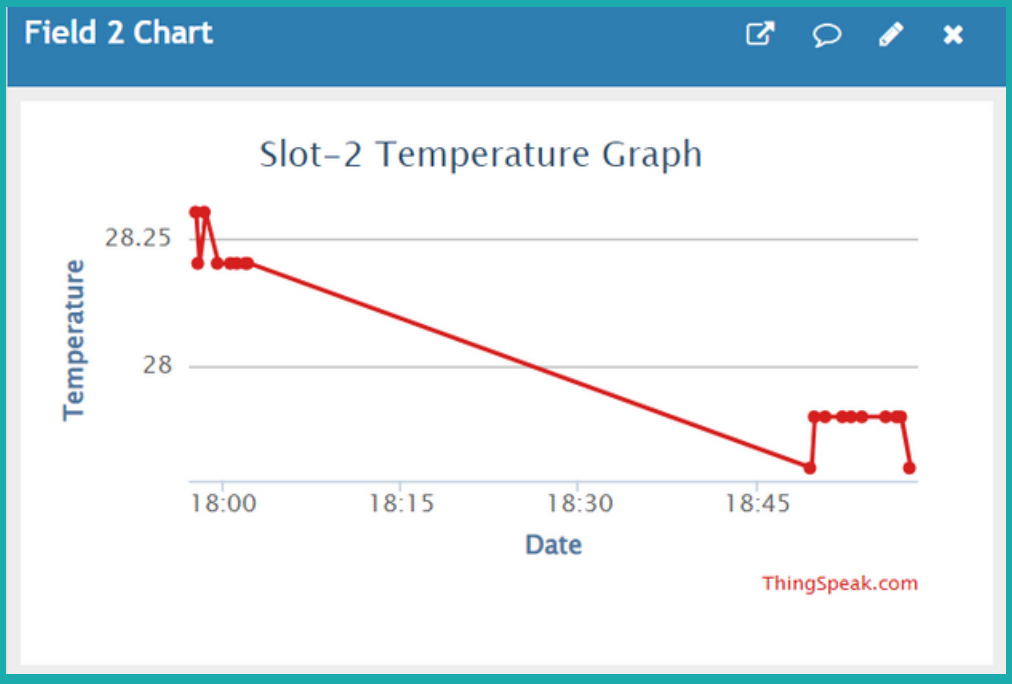

Empty Slots
1
a few seconds ago

UI at Blynk

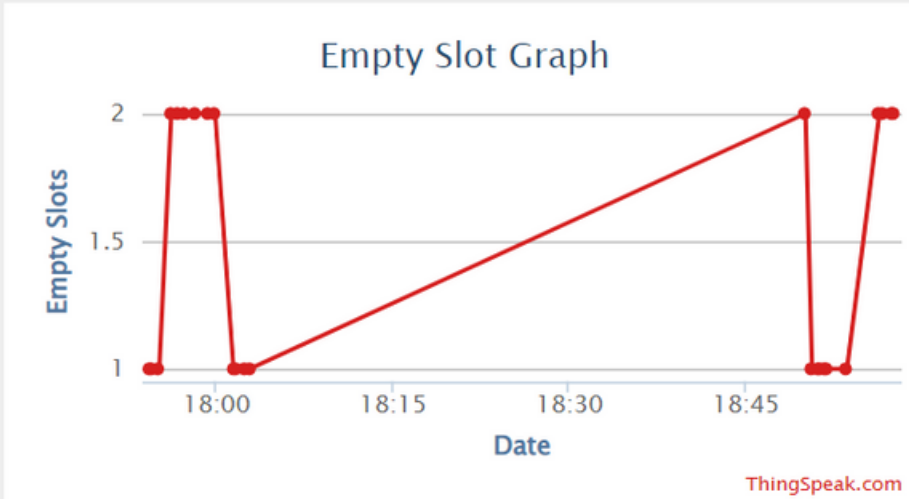

Smart Parking
Parking 1
Parking 2
Now go to your computer.
Check your inbox for the code and instructions on how to get your device online.
slot 1
slot 2

Graphs showing data

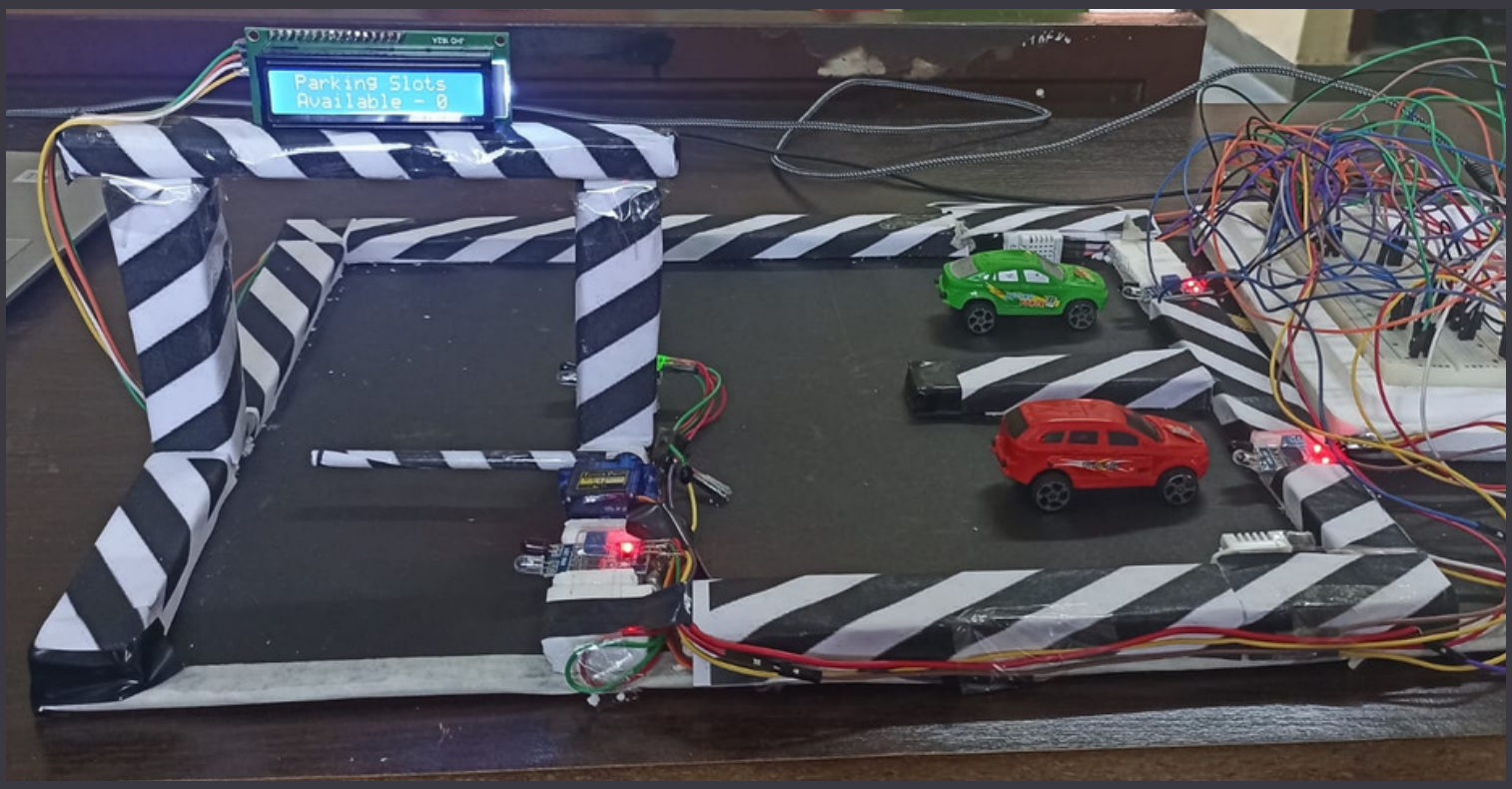


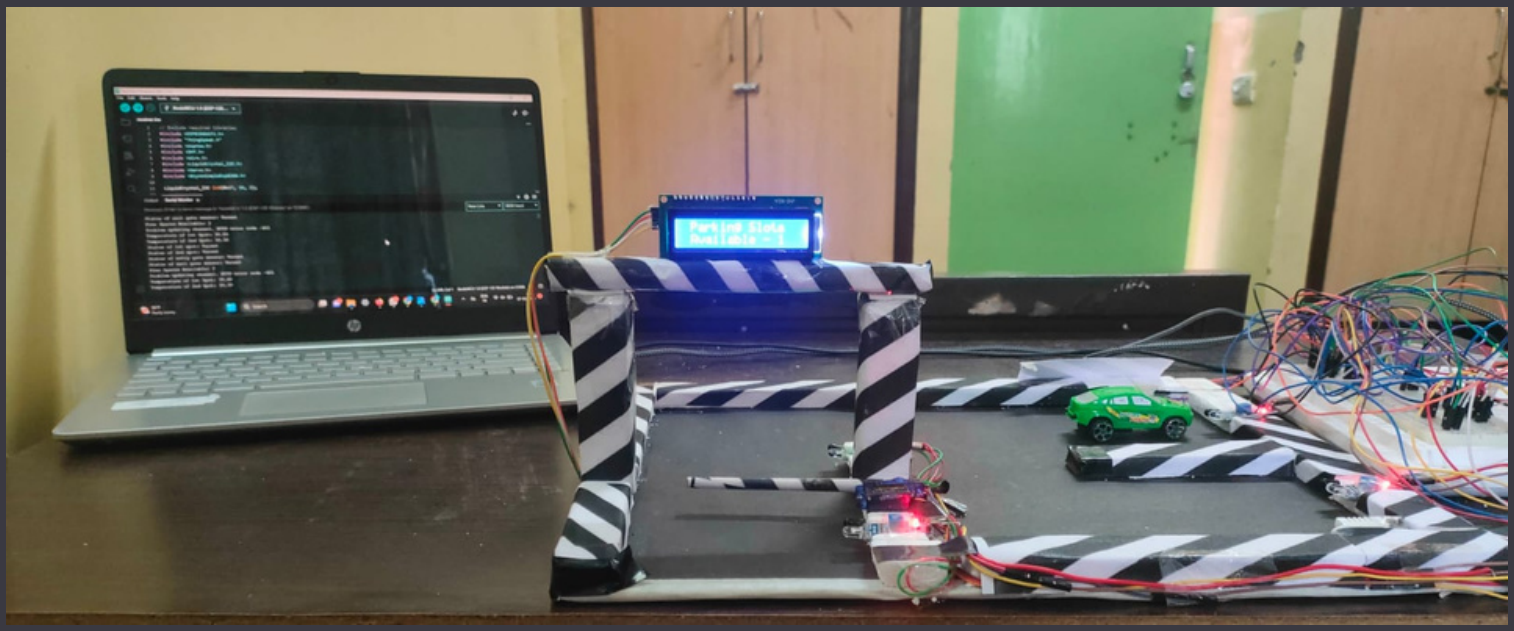


Field 3 Chart



Project Snaps





Conclusion

Our unique parking lot management project is intended to address day-to-day parking management issues. This system directs commuters to available parking spaces.

This model can be extended to multilevel parking system. The system can also reduce staffing requirements by automating the parking process.

FUTURE PERSPECTIVE

In the future, the automated car parking system can be further improved with AI-based algorithms that can optimize the parking process by providing personalized parking guidance to drivers. The use of cameras and GPS can further enhance the accuracy of parking spot detection and increase the efficiency of the system. As the user will be guided inside the parking itself to the specific parking spot. Additionally, extra features like reservation options and cashless payment methods can also be integrated. Also, the fire extinguisher will automatically be opened if any of the parking slot catches fire. By integrating these advanced technologies, the automated car parking system can be made more efficient, user-friendly, and sustainable.