# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

**Impact Factor: 8.379**

# Smart Car Parking using ESP32 Micro-Controller based on IOT

**Vinod Kumar S[1], Dr. Prabhudeva S[2]**

PG Student, Dept. of Master of Computer Applications, Jawaharlal Nehru New College of Engineering,

Shivamogga, India

Director, Dept. of Master of Computer Applications, Jawaharlal Nehru New College of Engineering,

Shivamogga, India

**ABSTRACT :** According to the ongoing study of metropolitan areas, the increase in population produces high vehicle density on the roads. This causes annoying issues for drivers leaving their vehicles since it is hard to find a space to leave. In this proposed project, an IOT-based smart parking system is introduced for vehicles. Through the use of different sensors, a system that can easily manage parking system is proposed. By using this system, a parking space can be easily found and the parking status of a vehicle can be checked. Moreover, this system can be scaled to create unlimited locations and add slots to them. It is a muti-location parking system where one application can work for multiple locations at the same time. As a result of this parking system, users will be more likely to be able to park successfully and waiting time will be minimized. Additionally, this parking management system will simplify the parking process by allowing users to track their parking slots. An ESP32 micro-controller and multiple IR sensors are used to detect vehicles, while servo motors control the gate. In real-time, the status of each parking spot will be updated in Google's Fire-base database. This system also includes a real-time weather monitoring system which monitors the temperature, humidity, pressure, and rain of the environment along with the smart parking system. Using the Fire-base web API, the parking spot and weather status can be viewed on the website.

**KEYWORDS:** ESP32 microcontroller, multiple IR sensors, servo motor, weather monitoring system, humidity, pressure, and rain sensors

## I. INTRODUCTION

Smart technology and interconnected systems have revolutionized parking space management and environmental monitoring using Internet of Things (IoT) and web-based interfaces. Using the ESP32 microcontroller, IR sensors, servo motors, DHT11, BMP180, rain sensors, and Fire-base platform, a comprehensive IoT-based smart parking system can be developed, providing real-time access to parking spot availability and environmental sensor readings via a user-friendly webpage.

This system utilizes the capabilities of the ESP32 microcontroller, which acts as the core processor. With its wireless connectivity and low power consumption, the ESP32 enables seamless connection between IoT devices and Fire-base. With the integrated IR sensors, it is possible to monitor parking slot occupancy in real time. The ESP32 microcontroller sends this information to Fire-base, which is the interface between it and the web-based application.

Using a dedicated webpage, users can easily access and view the availability of parking spaces in real-time. Firebase ensures data synchronization between the ESP32 and the webpage, so users can see the occupancy status of parking spaces from the comfort of their devices. This streamlines the parking process, saving time and reducing traffic congestion.

To collect weather-related data, the system incorporates sensors such as the DHT11, BMP180, and rain sensor. The ESP32 microcontroller captures these readings and communicates them to Firebase, which stores and updates the information in real-time. A webpage connected to Firebase provides users with access to temperature, humidity, atmospheric pressure, and rainfall readings instantly. This enables users to make informed decisions based on current weather conditions.

## II. LITERATURE REVIEW

1. M.Dixit et al [1], deals with a simple smart vehicles parking system by using introductory factors like Arduino Atmega328p( micro regulator), IR Detectors, Servo Motor, TV etc. Parking, offered in promenades, shopping areas,etc., are handled with the help of a person which is veritably time consuming. Because of this, they created a straightforward vehicle parking system that uses IR detectors installed at parking spaces to descry the presence of situated vehicles, an TV display board that shows the number of vacant and engaged parking spaces, and an TV display board that shows the number of parking spaces presently available. The main function of the servomotor is to permit and enjoin vehicles in and out of inner spaces by opening and turning off the entry or exit hedge according to the data attained from the IR detectors which are present on the entry gate, exit gate, parking spots.

2. R.K. Grace and V. Saveetha [2], Explained the armature and design of Arduino grounded auto parking system. Authorization of motorist or stoner is the introductory rule used to situate a vehicle in a parking place. Authorization cards will be given to each stoner, which carries the vehicle number or other details.However, also the parking gate will open and the stoner is allowed to situate the vehicle in a parking place differently the stoner isn't allowed indeed if the stoner is an sanctioned person, If the stoner is authorized and space is available in the parking.However, also mobile announcement will be transferred to the stoner about parking, If a auto is allowed to situate. It solves the parking issue in civic areas, also provides security to a vehicle and an unauthorized stoner isn't allowed to enter into a parking place. It helps to situate vehicles in muti-floored parking also as it'll display which bottom has free space.

3. B. Kalaimathi,V.S and Charumathi [3], An online booking system of networking bias grounded on IOT- cloud platform from where the stoner can get the information of parking places empty or full in the area of choice and the stoner can get the information of the number of empty places in that particular place and can bespeak a parking niche in advance. The proposed design is enforced using 2G GSM SIM800A module with ESP8266 Wi-Fi module, we've used Thing Speak open source software for the IOT platform pall database service through which an end stoner can use it to check the vacuity of the parking niche and book it consequently. Then a methodical auto parking system model is presented.

4. S. Begade and V.B. Dharmadhikari [4], An innovative algorithm that boosts the effectiveness of present pall grounded smart auto parking system and establishes a network armature grounded on the Internet of effects. This paper introduce a structure that helps druggies to find automatically a free auto parking space by using stoner's Global Positioning System. These simulation study shows that the proposed algorithm helps to enhance the probability of successful auto parking and reduces the druggies staying time.

5. P.S. Patil and Padaganu [5], A prototype module is developed to make it an easier experience of chancing a free parking space to all motorists. In these days it's veritably delicate to find a free parking space due to the adding number of vehicles in metropolitan metropolises. Arduino Uno, Ultrasonic detector, TV display, servo motors, push buttons, an Android operation are all integrated together to successfully complete this design. The Ultrasonic detector helps in determining the free space or is it enthralled space by measuring the object distance, stir and tasted data also gives information about of object length. determining of status of the situated vehicle or not substantially depend upon the length from which ultrasonic detector threshold is set.

## III. METHODOLOGY

**ESP32 Micro Controller** : ESP32 is a popular microcontroller developed by Espressif Systems. It's grounded on the Xtensa LX6 processor and features erected- in Wi-Fi and Bluetooth connectivity, making it suitable for a wide range of IoT ( Internet of Things) operations.

**Ir Sensors** : IR detectors, also known as infrared detectors, are electronic bias that descry and measure infrared radiation in their girding terrain. They're generally used in colorful operations similar as object discovery, propinquity seeing, stir discovery, and ambient light dimension.

**Servo Motors** : Servo motors are extensively used in robotics, robotization, and colorful other operations where precise control of position or speed is needed. They're rotary selectors that incorporate a feedback medium to directly control the angular position of the motor shaft.

**OLED Display** : OLED (Organic Light Emitting Diode) displays are a type of display technology that offers several advantages over traditional TV( Liquid Crystal Display) defenses. OLED displays are getting decreasingly popular in colorful electronic bias, including smartphones, TV.
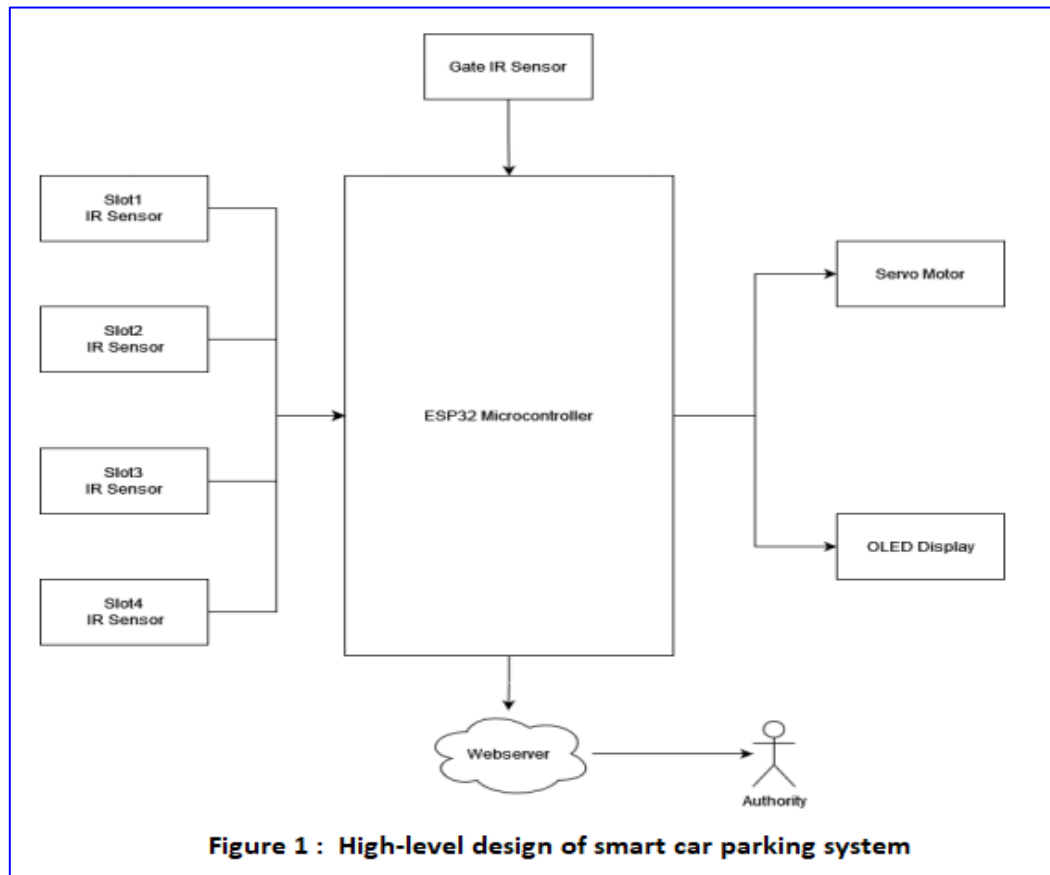


Figure 1 : High-level design of smart car parking system

The proposed parking system uses IoT technology and the system involves the stoner who's driving his/her vehicle into the parking lot. First, when the stoner enters an available parking space, the IR detector detects the presence of his/her vehicle. The IR detector and OLED display are connected to ESP32 as a microcontroller. After the IR detector has detected the presence of the vehicle, the OLED screen displays the available vacant parking space for the other stoner to demesne the car. Parking niche details that's enthralled and free places are displayed in the Real Time database Google Firebase and can also see rain, moisture, Altitude, Pressure of terrain can be viewed on website.

## IV.SNAPSHOTS

Smart Car parking that showing four cars are parked in four slots modeled as in the **figure 2** below. In each slot there are IR Sensors which detects whether slot is occupied or free .
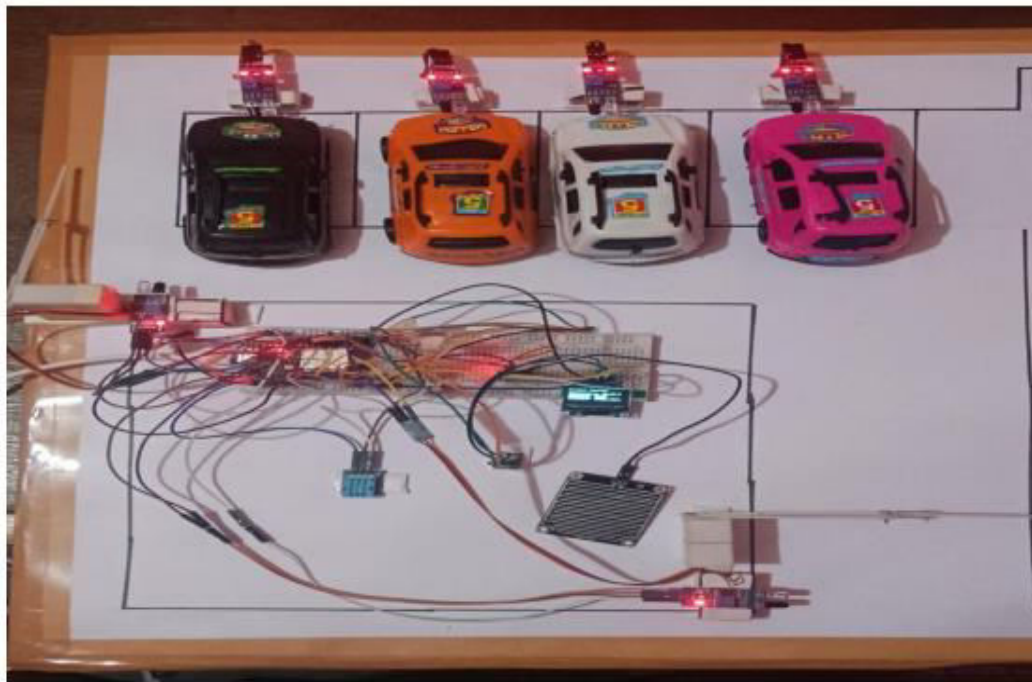
Figure 2: Parking Slots

The **Figure 3** shows the proposed system - the OLED screen that displays : Temperature, humidity, Altitude and pressure. Their respective sensors will simultaneously monitor the weather.



Figure 3 : Measuring the environment

**The following snapshot shows (Figure 4 )** OLED display which display that parking slots are full  in four-slots model example and IR sensors which is placed in respective slots and  will detect that slot is occupied or not.



Figure 4 : OLED screen Shows slots are full

**Figure 5**: In case the parking slots are full, one can't enter the parking field they have to find another parking field. If the parked car will leave the slot, then the outside coming car allow the permission to enter the parking slot.
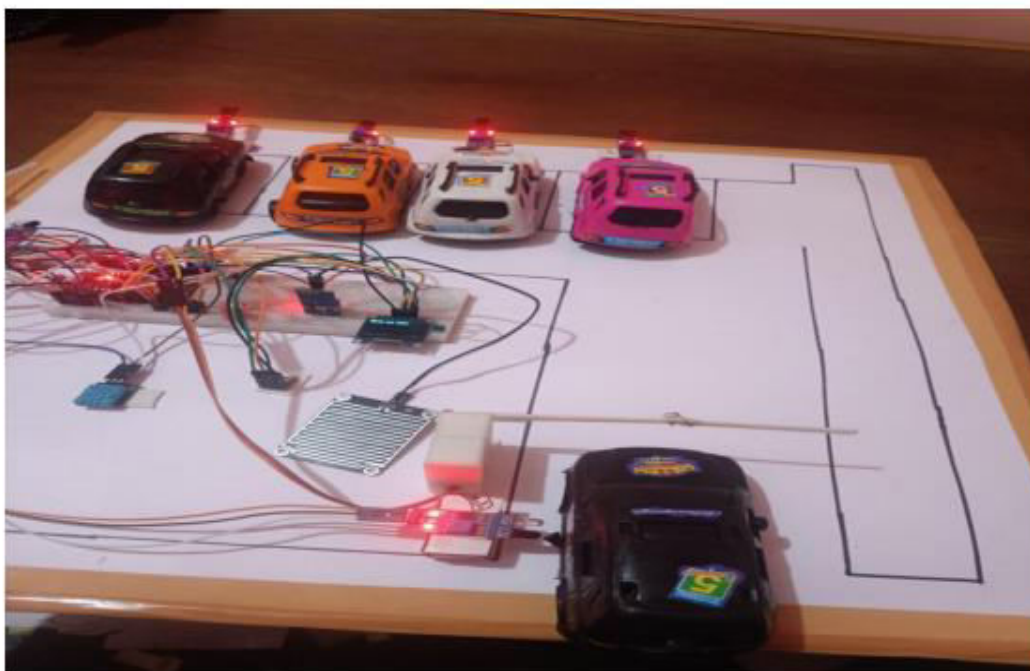


Figure 5: If slots are full gate will not open

**Figure 6** shows the Google's Firebase is a collection of back-end cloud computing services and application development frameworks. Which shows parking slots and will also give temperature of parking slots.
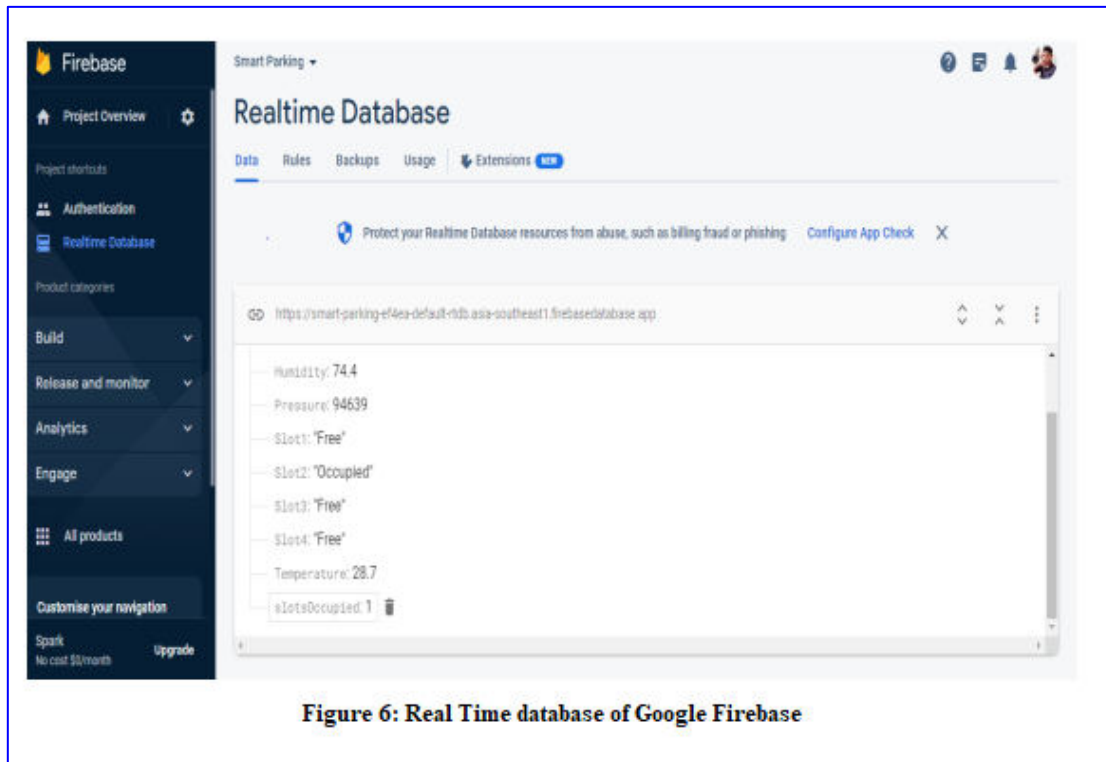


Figure 6: Real Time database of Google Firebase

## V. CONCLUSION

In this work, a smart parking system designed using IoT technology offers multitudinous benefits and implicit for optimizing parking systems in civic areas. By using IoT detectors, connectivity, and data analytic, smart parking results can greatly ameliorate the effectiveness, convenience, and sustainability of parking operations.

Smart parking systems contribute to sustainability sweats by reducing energy consumption and air pollution. By minimizing the time spent searching for parking, these systems help lower vehicle emigrations and ameliorate air quality in civic areas and this is the most benefit because customers do not have the much time to wait for longer period. Also, optimized parking operation can reduce the need for constructing fresh parking structures, thereby conserving land and coffers.

## REFERENCES

[1] M.Dixit, A.Priya, G.Haldiya,and B. Kumar," Smart Car Parking System using Arduino," 2023 IEEE International Students' Conference on Electrical, Electronics and Computer Science( SCEECS), Bhopal, India, 2023, pp. 1- 6, doi10.1109/ SCEECS57921.2023.10063121.
[2] R.K. Grace and V. Saveetha," IoT Enabled Smart Parking using Image Processing," 2022 3rd International Conference on Electronics and Sustainable Communication Systems( ICESC), Coimbatore, India, 2022, pp. 1128- 1131, doi10.1109/ ICESC54411.2022.9885248.
[3] B. Kalaimathi,V.S. Charumathi,T. Aishwarya,M.A. Prasanna andS. Vijayakumar," jeer PI Grounded Intelligent Car Parking System," 2021 Smart Technologies, Communication and Robotics( STCR), Sathyamangalam, India, 2021,pp. 1- 5, doi10.1109/ STCR51658.2021.9588971.
[4] S. Begade and V.B. Dharmadhikari," Cloud Based Smart Car Parking System Using Internet of effects," 2018 Second International Conference on Intelligent Computing and Control Systems( ICICCS), Madurai, India, 2018,pp. 1100- 1105, doi10.1109/ICCONS.2018.8663164.

[5] P.S. Patil,S.K. Padaganur,M.R. Gokak,N.D. Almel,B. Ayyangoudar andK. Mirajkar," IOT Based Car Parking," 2020 IEEE Bangalore Humanitarian Technology Conference( B- HTC), Vijiyapur, India, 2020,pp. 1- 3, doi10.1109/ B-HTC50970.2020.9298002.

[6] V. Hans,P.S. Sethi andJ. Kinra," An approach to IoT grounded auto parking and reservation system on Cloud," 2015 International Conference on Green Computing and Internet of effects( ICGCIoT), Greater Noida, India, 2015,pp. 352- 354, doi10.1109/ ICGCIoT.2015.7380487.

[7] S. Subaselvi,V. Muhin,T.R. Mohanraj andC.N. Kesava Sai Raam," Rfid Based Automatic Car Parking System Using Iot," 2023 9th International Conference on Electrical Energy Systems( ICEES), Chennai, India, 2023,pp. 580-584, doi10.1109/ ICEES57979.2023.10110057.

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462  6381 907 438  ijircce@gmail.com

Scan to save the contact details