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Smart Parking System using IoT and Cloud

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Abstract: ***An efficient and smart way to automate the management of parking system that allocates an efficient parking space using internet of things technology. The IoT provides wireless access to the system and the user can keep a track of the availability of the parking area. In this system, the user can easily view this availability by using a simple android application that monitors the real-time database and updates in a cloud database. This application will also provide the facility of payment for the toll fee.***
Keywords: ***NodeMCU ESP8266, IR sensors, LDR sensors, Servo motors, Flutter Android Development, Payment Gateway, MQTT broker***

I. INTRODUCTION

Internet of Things (IoT) has the availability to transfer data through a network without involving human interactions. The parking problem causes air pollution and traffic congestion. In today's scenario, parking spaces hard to search for in day-to-day life for people. According to a recent survey, there will be a rapid increase in vehicle population of over 1.6 billion around 2035. Around one million barrels of the world, oil is being burnt every day. Thus, a smart parking system is a key solution to minimize user's time and efficiency as well as the overall cost of the fuel burnt in search of the parking space.

II. LITERATURE SURVEY

The paper "Smart Car Parking System Based on Iot Concept" focuses on various Iot protocols like MQTT, coAp. It also concentrates on android and web implementation and Arduino micro-controller. However, some limitations should be noted. First, there is no implementation for toll fee calculation. Second, it includes unnecessary cost building components. [1]
The paper "Wireless Sensor Network and RFID for Smart Parking System" focuses on various types of parking systems that are currently available and implemented. It also concentrates on Zigbee technology and uses camera and LED screens. However, some limitations should be noted. First, it is complex and not cost effective. Second, it does not include a detailed software implementation. [2]
The paper "Iot Based Vehicle Parking and Toll-Fee Management System Using Raspberry Pi 3" briefly explains a smart parking solution without involving any human intervention. Also Toll-fee detection is done by maintaining a database. However, some limitations should be noted. First, it uses a camera to detect the number plate of the car and then process accordingly. [3]
The paper "Smart Parking System using Iot" focuses on Zigbee technology, RFID, GSM and Arduino micro-controller. It also concentrates on calculation of Toll-fee according to user distance. However, some limitations should be noted. First, Arduino microcontroller- no explicitly designed software, just shows the cloud implementation. [4]
The paper "Internet of Things Approach to Cloud-Based Smart Car Parking" focuses on Parking Service Providers (or PSPs) and Iot Middleware. However, some limitations should be noted. First, security and IoT Middleware connectivity. Second, congestion in parking slot.[5]
The paper "Smart Parking System Based on NB-Iot and Third party Payment Platform" focuses on Bluetooth, DSRC and Smart Car Parking cloud server. It also concentrates on the Third-party Payment Platform. However, some limitations should be noted. First, Bluetooth connectivity can be complex to handle. Second, too many communication technologies are used. [6]
The paper "Smart Parking System using Iot technology" focuses on Optical Character recognition (OCR) for text-image conversion. It also uses camera and ultrasonic sensor. However, some limitations should be noted. First, sensor decreasing battery life (they consume a lot of power) and also the sensors do not operate well under cover plate. [7]
The paper "IoT based Smart Parking System" is developed in Apache Cordova and Angular is framework. It uses PIR sensors, Raspberry pi and IBM MQTT server. However, some limitations should be noted. First, PIR sensors have low sensitivity and less coverage. Second, there can be connectivity issues. [8]
The paper "Automated Toll and Parking System" focuses on Arduino Uno, RFID and LEDs. However, some limitations should be noted. First, less RAM as compared to Raspberry Pi and external hardware is required. [9]

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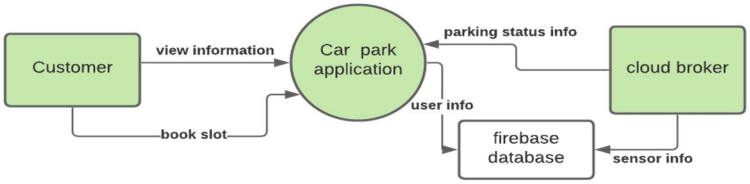
III. METHODOLOGY

A. *Methodology Flow*



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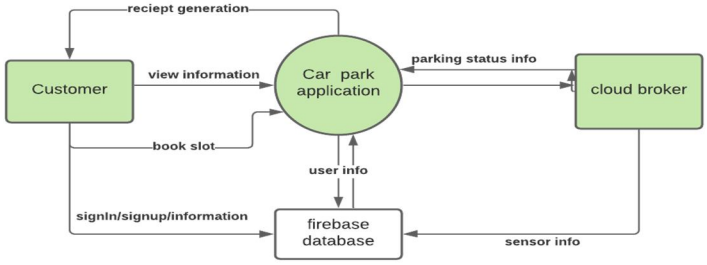

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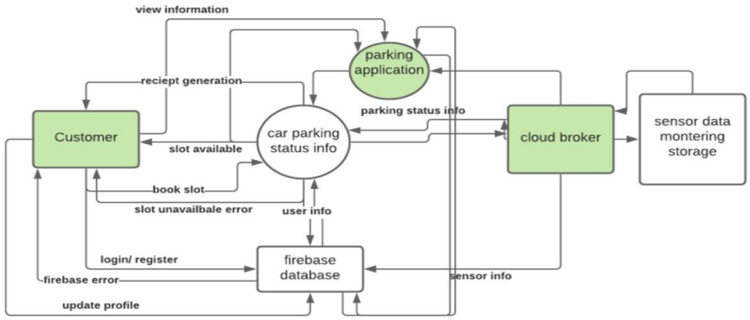

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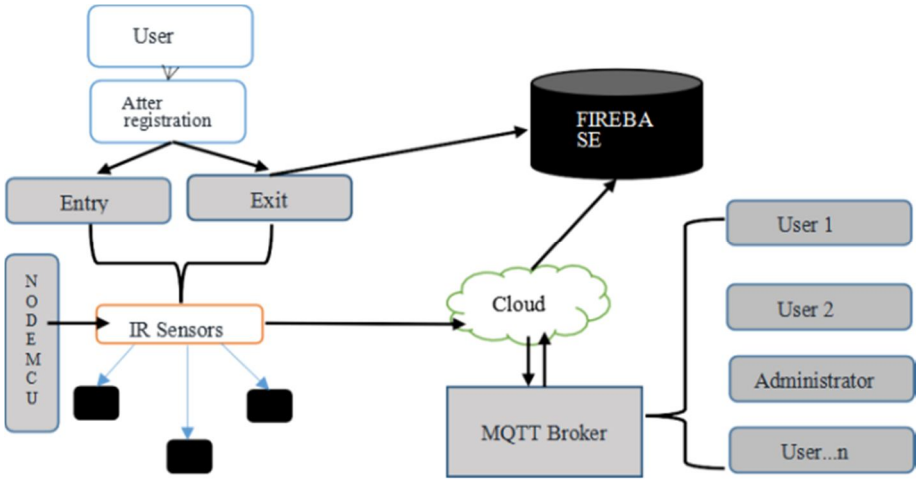
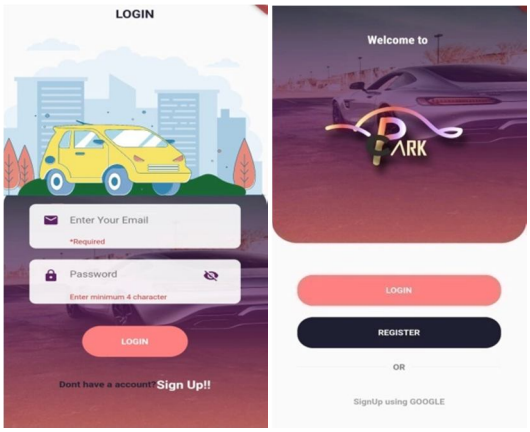
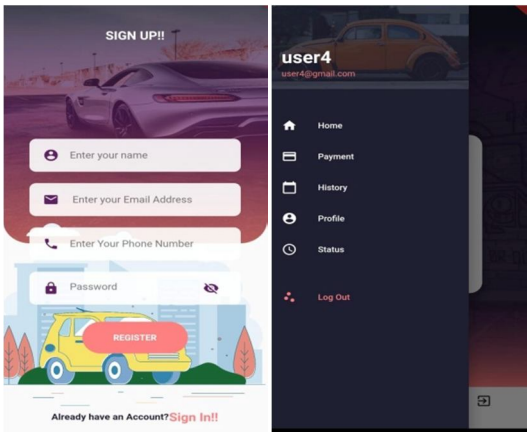
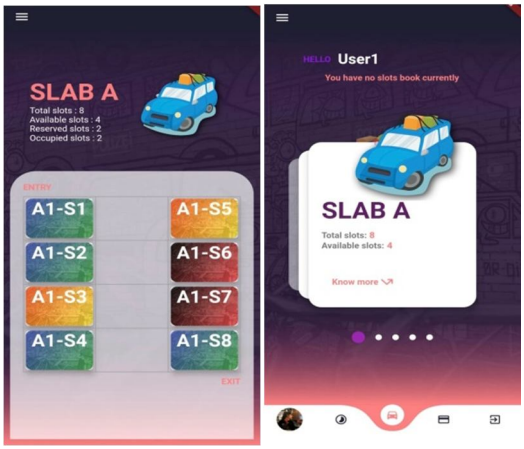
IV. DESIGN AND DRAWING



V. RESULT







VI. ADVANTAGES AND APPLICATIONS

A. Helps in reducing traffic pollution by minimizing emission of greenhouse gases.
B. Saving gallons of petrol and gasoline prices could result in major change in the society and economy.
C. Monitoring traffic congestion with IoT enabled services could contribute the most to SmartCity.
D. This could be implemented in a small budget.

VII. CONCLUSION

A. The advancement of the internet of things and cloud technologies has given rise to new possibilities in terms of smart cities. Smart parking facilities have always been the core of constructing smart cities.

B. The system provides a real-time process and information on the parking slots. This project enhances the performance of saving users time to locate an appropriate parking space. It helps to resolve the increasing problem of traffic congestion.

C. Initialization towards a smart city.

D. The sensors used to detect the vehicle are the essential components.

E. Internet of Things stands out to be the indispensable technology implemented along with Cloud Computing.

F. Use of NodeMCU makes its cost efficient with easy installation and maintenance

G. This is project is user friendly, effective and efficient for parking without involving human intervention.

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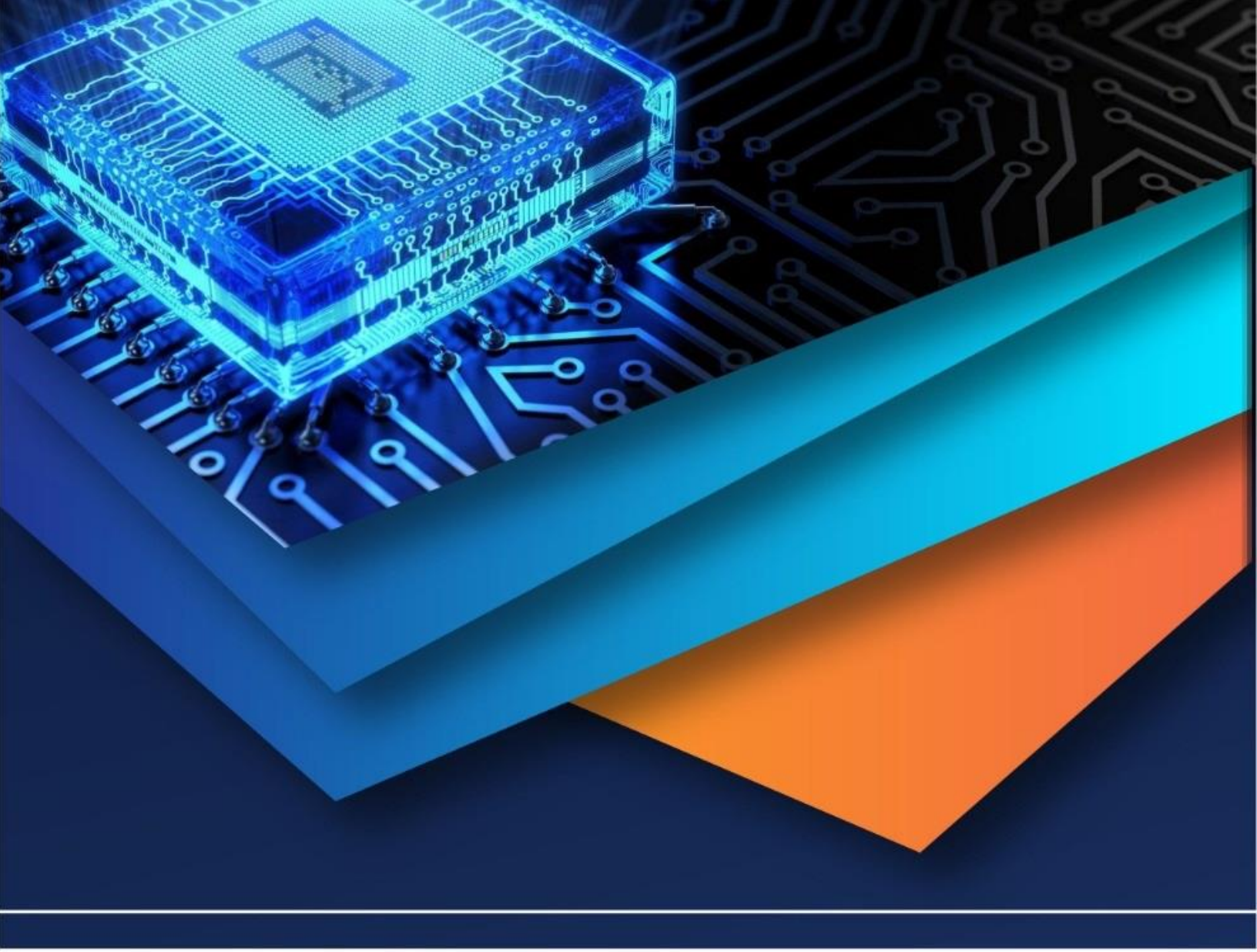

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