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IoT BASED SMART PARKING SYSTEM USING CLOUD COMPUTING

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Abstract- **Internet of effects (IoT) plays vital part in connection and robotization of colorful physical bias, vehicles, home appliances and other effects. With the help of software, colorful detectors, selectors, these objects connect and change data. This robotization of bias enhances a person's standard of life and way of living, which is a need of future. In this design a we bandied a smart parking point which enables a stoner of find a parking position and a free niche in that parking space inside a megacity. Although important of the work has been done until moment to realize the Internet of effects (IoT) into practice, utmost of the work focuses on resource constrained bumps, rather than linking the being bedded systems to the IoT network. IoT allows objects to be tasted and controlled ever across being network structure. Our work then to give a system that helps to find parking niche using detectors. For reserving parking niche in advance in lower time we've produce a system that finds the free niche using ultrasonic detectors and lot niche to the stoner. This design focuses on reducing time wasted on chancing parking space hard and go on through the filled parking places. This system reduces the energy consumption and standard of living.**

Keywords**: IOT, Smart parking, cloud computing, Raspberry Pi, Sensors, RFID tag, ThingSpeak.**

INTRODUCTION

The forecast for the coming years is that urbanization will increase significantly as more people migrate to cities in search of a better quality of life. This will inevitably put a strain on existing city infrastructure, including the provision of parking spaces. The issue of parking is becoming a leading cause of traffic congestion, driver frustration, and air pollution. One way to tackle this issue is by implementing an Internet of Things (IoT) system for creating a smart parking solution that can identify and assign the closest vacant parking spot in a smart city. This innovative approach not only promotes convenience but also contributes to cost savings and environmental sustainability. The proposed system uses a progressive web app that allows users to log in using their Google account and find the nearest available parking space with just one tap. The system tracks the user's parking sessions using RFID tags, recognizing the user's entry and exit date and time, and automatically calculates the parking charges accordingly. The user's parking invoice is sent to their email, which they can pay later the system employs ultrasonic sensors to detect free parking slots, with each sensor acting as a slot within the parking space. However, the current intelligent parking system has some limitations, such as not providing an overall optimal solution for finding an available parking space, not addressing load balancing issues, not offering economic benefits, and not planning for vehicle-refusal service. With over half of the global population residing in urban areas, cities have become densely populated, leading to an increase in the number of vehicles on the roads. To address this issue, car parking systems have become essential in locations with high demand such as theaters, shopping malls, and other crowded areas. These systems can be tracked, controlled, and monitored remotely via computers connected to the internet. In the context of the Internet of Things (IoT), objects can be interconnected and exchange data through the internet. Our cloud-based smart parking system organizes parking lots, making it easier for users to find vacant parking spaces. By minimizing the time spent searching for parking spots, our system also helps reduce vehicle fuel consumption. To detect the availability of parking spaces, an infrared (IR) sensor is installed at each slot. The sensor data is then transmitted through the internet and can be viewed in real-time via a mobile application. This process involves connecting physical objects in the real world to sensors, which are then linked to a network via wired or wireless means. This paper proposes a solution that employs cloud server architecture in a manner that enables an unlimited number of parking slots to be added without requiring changes to the code. The associated mobile application can run on multiple platforms, including Windows, Android, and iOS. Furthermore, the proposed solution is cost-effective, adaptable, and versatile, as the code can be reused for multiple boards. With the advancements in sensor technology, numerous modern cities have adopted IoT-based systems for monitoring various aspects of city life. One of the primary benefits of IoT is the availability of vast data resources. The factors that make IoT and cloud computing suitable for this purpose include scalability, interoperability, power efficiency, availability, and storage capabilities. In this parking system, IoT is used to automate data retrieval, image analysis, and vehicle measurements. These devices can be traced, managed, and monitored remotely via internet-connected computing resources.

I. LITERATURE SURVEY

In some papers [1] the authors presented a new algorithm for real- time parking treatment planning. Their approach involved several way first, they converted the online problem of a parking system into an offline problem using an algorithm. Second, they developed a direct fine model to describe the offline problem. Third, they designed an algorithm to break the direct problem. Eventually, they estimated the performance of their algorithm using experimental simulations of the system, which showed timely and effective performance. The papers [2] didn't mention several important details, similar as the resource reservation medium, the system for assessing the coffers of the system, the approach for guiding vehicles to the parking space, and the medium for handling situations when service requests are denied. also, the papers didn't calculate the average waiting time and average total time that each vehicle spends in the system. In [3, the authors proposed a smart parking system (SPS) that utilizes UHF frequency, RFID, and IEEE802.15.4 Wireless Sensor Network technologies. This SPS can cover the residency status of parking spaces and companion motorists to the nearest vacant spot using a software operation. still, the paper lacks fine equations for the system armature, and the authors didn't produce a large- scale parking system. While the authors enforced the proposed armature, they didn't estimate the performance of the parking system in terms of its effectiveness and effectiveness. In [4], Hsu and associates presented an innovative system that includes a parking guidance service. The system allows druggies to reserve a parking space using their smartphones and internet access. Upon appearance at the auto demesne, the stoner can view the position of their reserved parking space on a chart displayed through wireless transmission. This is achieved using the devoted short- range communication protocol DSRC. The authors of [5] enforced an inertial navigation system (INS) to guide vehicles to their reserved parking spaces. The system provides real- time updates on the status of parking spaces to insure delicacy. To estimate system performance, the authors measured the delicacy of the INS in an inner terrain and estimated the perpetration of the system by considering the delicacy of GPS. still, the authors didn't estimate the performance of the parking services, didn't give a fine model of the system, and didn't consider the waiting time for each vehicle to admit service. In [6], experimenters proposed an intelligent parking adjunct (IPA) armature designed to address current challenges in public parking operation in smart metropolises. The IPA armature provides motorists with information about on- road parking vacuity and enables them to reserve the most accessible parking spot at their destination before departure. The system uses RFID technology, and when a auto premises or leaves the IPA parking spot, the RFID anthology and glamorous circle descry the action and shoot this information to the unit regulator to modernize the auto demesne status information. The study includes only simple fine equations for the system armature and doesn't produce a large-scale parking system.

II. Proposed System

Block diagram of the proposed system shown in the fig 2.1 IoT based flow of smart parking system consist of

- Detection Of Vehicle
- Payment through RFID card
- Display of available parking slot
- Sending Payment receipt and parking time through mail.

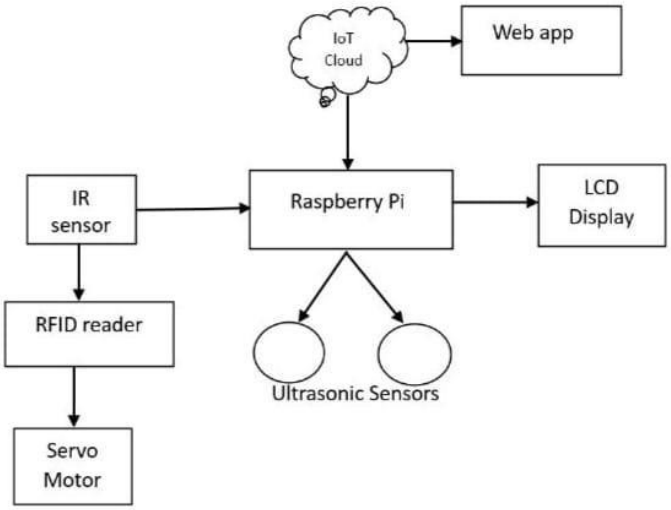

Fig 2.1 Block Diagram of the Proposed System

Infrared sensor used to detect the presence of a vehicle in a parking slot. It senses the presence of vehicle ane send information to Raspberry Pi. The Raspberry Pi can be used to process the sensor data and send it to the cloud for further processing. To make the payment process for parking convenient, an RFID card can be used. This card can be scanned at the entrance of the parking lot, and the amount for parking can be deducted from the user's account. After successful payment gate of parking is opened automatically using servo motor. The Raspberry Pi can be used to read the data from the RFID card and communicate with the cloud to deduct the parking fee. By using Ultrasonic sensor availability of parking slot is checked. The cloud can maintain a real-

time database of available parking slots in the parking lot. This information can be displayed on a screen on the LCD Display placed in the parking lot and also on the user's device indicating the number of available slots and their locations. Once the user has made the payment and parked their vehicle, the cloud can generate a receipt and send it to the user's email address. This receipt can contain information about the parking fee, duration of parking, and other relevant details. Vehicle leaves the parking area.

IV RESULT AND DISCUSSION

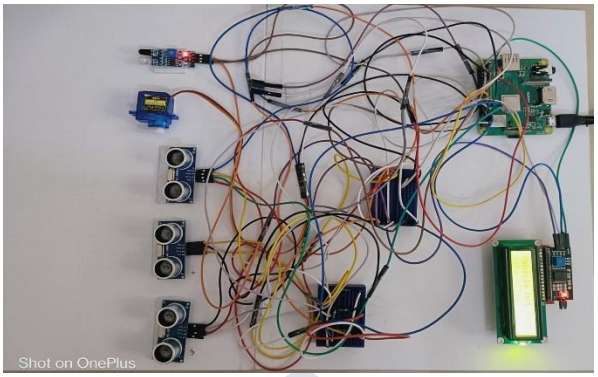

Fig 4.1 actual hardware of system

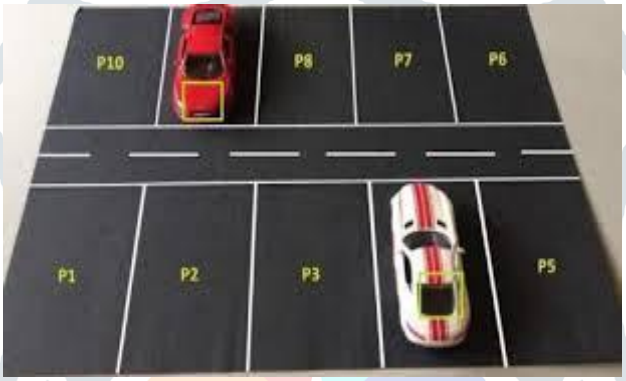

fig 4.2 parking lot

The utilization of this innovative concept allows for the frequent monitoring of parking spots to determine their occupancy status. Ultrasonic sensors installed in the parking spaces detect whether or not a spot is vacant, while an IR sensor monitors the arrival of vehicles. In the event that a parking spot is unoccupied, the system uploads this data to the cloud, allowing administrators to constantly monitor the utilization of parking slots.

This Smart Parking System results in a reduction in fuel consumption for vehicles, as it takes less time to locate available parking spaces.

Moreover, it discourages drivers from aimlessly circling around congested parking lots.

Ultimately, the implementation of smart parking systems represents a potential solution to the problem of pollution in urban areas. The present research introduces an innovative parking system that enhances efficiency by reducing the instances where users are unable to find a parking spot and minimizing the associated costs of searching for one. Through simulations and real-world implementation, we have confirmed the efficacy of our proposed architecture and system

V CONCLUSION

In this research, a parking system was proposed with the aim of improving performance by reducing the number of users who are unable to locate a parking space and minimizing the costs of moving to the parking space. Our proposed architecture and system were both successfully simulated and implemented in a real-world scenario. The results demonstrated that our algorithm effectively reduces the average waiting time of users for parking, and our findings were in close agreement with our proposed mathematical models. The simulation of our system achieved the optimal solution when a majority of vehicles successfully found an available parking space. As a result, the average waiting time for each car park for service was minimized, and the total time of each vehicle in each car park was reduced. In future studies, we plan to consider the security aspects of our system and expand the implementation of our proposed system to a larger scale in real-world scenarios.

VII. REFRENCES

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