



e-ISSN: 2278-8875  
p-ISSN: 2320-3765

# International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 11, Issue 3, March 2022

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 7.282

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# Smart Parking System Using Internet of Things (IOT)

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**ABSTRACT:** Recently the number of vehicle ownership has been increasing, hence it needs a large parking area. The shortage is how to look for the empty parking space in the large parking area and also the amount of illegal parking car that does not follow the rules of the parking space unit. In this paper, we proposed the smart parking system using the Internet of Things (IoT) that can be part of a solution for the parking problem. This system help in organizing the parking lot and help s the driver to reach their parking spots easily as they known which space is vacant. The parking space can be detected using an Infrared sensor that connects to the ESP12-E (NodeMCU) module that was programmed through Arduino IDE. Users can access parking space information using a smartphone via an application. Especially for users who have been registered before, they have a code for login the app as the requirement for security system and user parking convenience. The system can work with the purpose of the research appropriately

## I.INTRODUCTION

Internet of thing (IoT) has the ability to transfer data through network without involving human interactions. IoT allows user to use affordable wireless technology and also helps the user to transfer the data into the cloud. IoT helps the user to maintain transparency. The idea of IoT started with the identity of things for connecting various devices. These devices can be controlled or monitored through computers over internet. IoT contains two prominent words “Internet” and “Things”, where Internet is a vast network for connecting servers with devices. Internet enables the information to be sent, receive or even communicate with the devices. The parking problem causes air pollution and traffic congestion. In today’s scenario, parking space is hard to search in a day to day life for the people. According to the recent survey, there will be a rapid increase in the vehicle’s population of over 1.6 billion around 2035. Around one million barrels of world’s oil is being burnt every day. Thus, smart parking system is the key solution to reduce the waste stage of the fuel. The solution for the problems that is being raised.

The smart parking can be a solution to minimize user’s time and efficiency as well as the overall cost of the fuel burnt in search of the parking space. In this, the data is collected from the sensor and through analyzing and processing, the output is obtained. This data gets transmitted in the devices which extracts the relevant information and sends it to the Arduino device which gives the command instruction for the data to the particular devices simultaneously. Arduino sends the signal to the servo motor along with GSM module which further gives instructions and notification to the user. When the user enters in the parking area, RFID card allotted to the registered user is scanned by the reader module thus ensuring the security of the user identity. This enables the user to get the information of the available parking space as well as SMS notification to the registered user’s mobile number. It consists of three parts where first part is the parking area which include Arduino devices along with IR Sensor. The user interacts with the parking area with the help of these devices. The second section of the paper includes the cloud web services which act as a mediator between the user. and the car parking area. The cloud is updated according to the availability of parking area. The cloud service is administered by the admin but it can also be viewed by the user to check the availability. The third section of the paper is the user side. The user gets notified for the availability via SMS through GSM module. The user interacts with the cloud as well as parking area. The user gets the notification when the parking availability is full which saves the time for the user

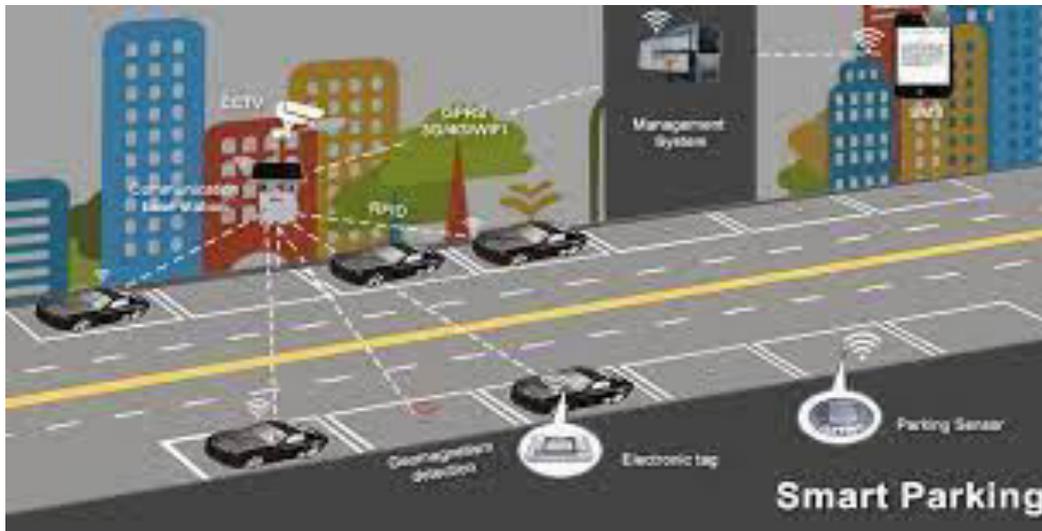


Fig1: Smart Parking

## II.SYSTEM MODEL AND METHODOLOGY

The sensors used in IoT based smart parking system stores and accesses data from remote locations with the help of the cloud these factors give raise to cloud of things (COT). The nodes could be monitored and controlled from any location the system that we propose provides information regarding the availability of the parking slots with the help of the mobile application the users from the remote location can book the parking slots.

An algorithm is used to increase efficiency of cloud-based parking system and network architecture technology is used. This algorithm is used to find the lowest cost parking space. Considering the number of parking space available and also considering the distance of the parking space from the user. The user can directly access the cloud-based server and find the information on the parking space. The user can also install an application in their mobile phones to access this information. With the help of this algorithm, waiting time of the user to find a parking space can be minimized. Security aspects are not included in this paper.

A wireless sensor node along with smart phone application is being used to find the parking space. Since, wireless technology is used here the system has high accuracy and efficiency. In this system, onboard units are used to communicate with other vehicles. The user parks his vehicle in any one of the several bays available a mechanical lift lifts the vehicle out a ticket key and id are given to the user and it is only known to the user which is used to retrieve the vehicle. The user need not carry any paper ticket since anRfid card is given to the user. The technology used here is economical. Security features must be improved to protect the user’s privacy.



Fig 2: Node MCU



Fig 3: IR Sensor Module

## III.SYSTEM DESCRIPTION

It consists of three sections: first section is the parking area which includes Arduino devices along with IR sensor. The user interacts with the parking area with the help of these devices. The user cannot enter the parking area without the



help of RFID card. The second section contains the cloud-based web services which acts a mediator between the user and parking area. The cloud is updated depending upon the availability of the parking area. The admin administers the cloud services and it can also be viewed by the user for checking the availability. The third section is the user side. The user gets notification on the basis of the availability via SMS through GSM module.

Smart Parking uses sensing devices such as cameras, vehicle counting equipment, sensors installed in pavements, etc. to determine occupancy of the parking lot. Internet of Things wireless sensors detect the vacant parking spaces and transmit the data to help the drivers get an idea about the vacant spaces for parking.

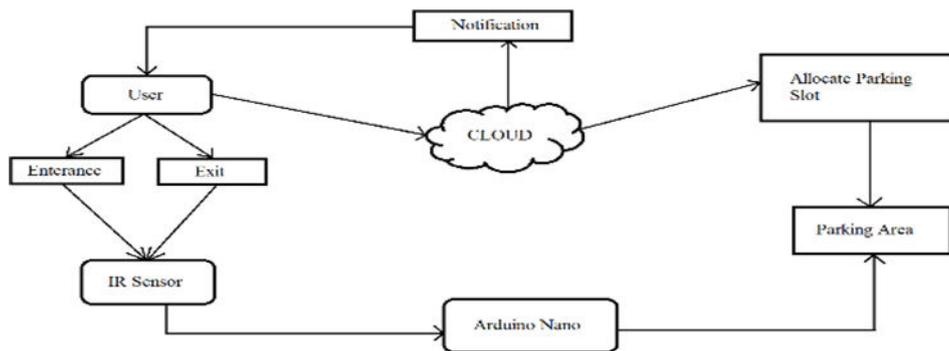


Fig 4: Architecture

**IV. RESULT AND DISCUSSION**

The demand of smart parking system is increasing significantly. This allows user to involve real time access of the availability of the parking space. The existing system in today’s world doesn’t contains the facilities of parking reservation and parking slot availability checker. The existing system was vision-based monitoring system [7] which estimates the number of the parking slots available in the area by counting the number of incoming and outing cars which consumes lot of time and efforts. The next existing system was sensor-based system which uses ultrasonic sound waves for detecting the presence of vehicles and then two-tier parking came into existence which used the concept of parking cars one above another. The result of the paper is to make the parking area connected with the world as well as reduces time and can be cost effective for the user. The result of this paper is to reduce car theft. This paper reduces overall fuel energy of the vehicle which is consumed in the search of the car.



Fig 5: Blynk Board Selection



Fig 6: Adding New Project

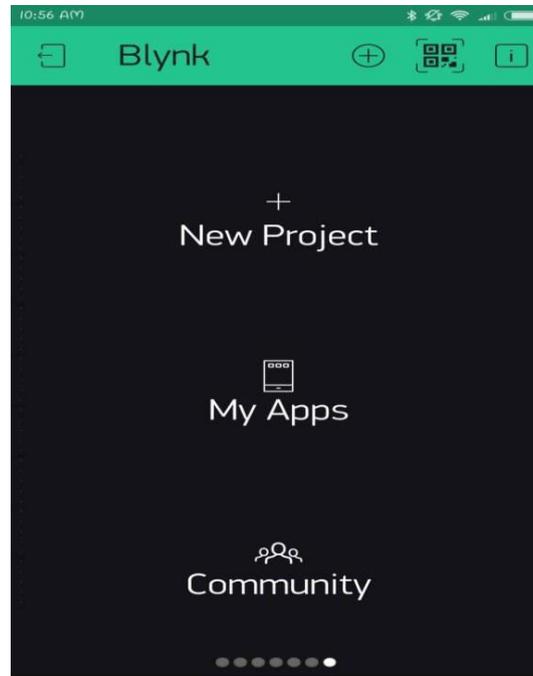


Fig 7: Blynk App Home Page

## V.CONCLUSION

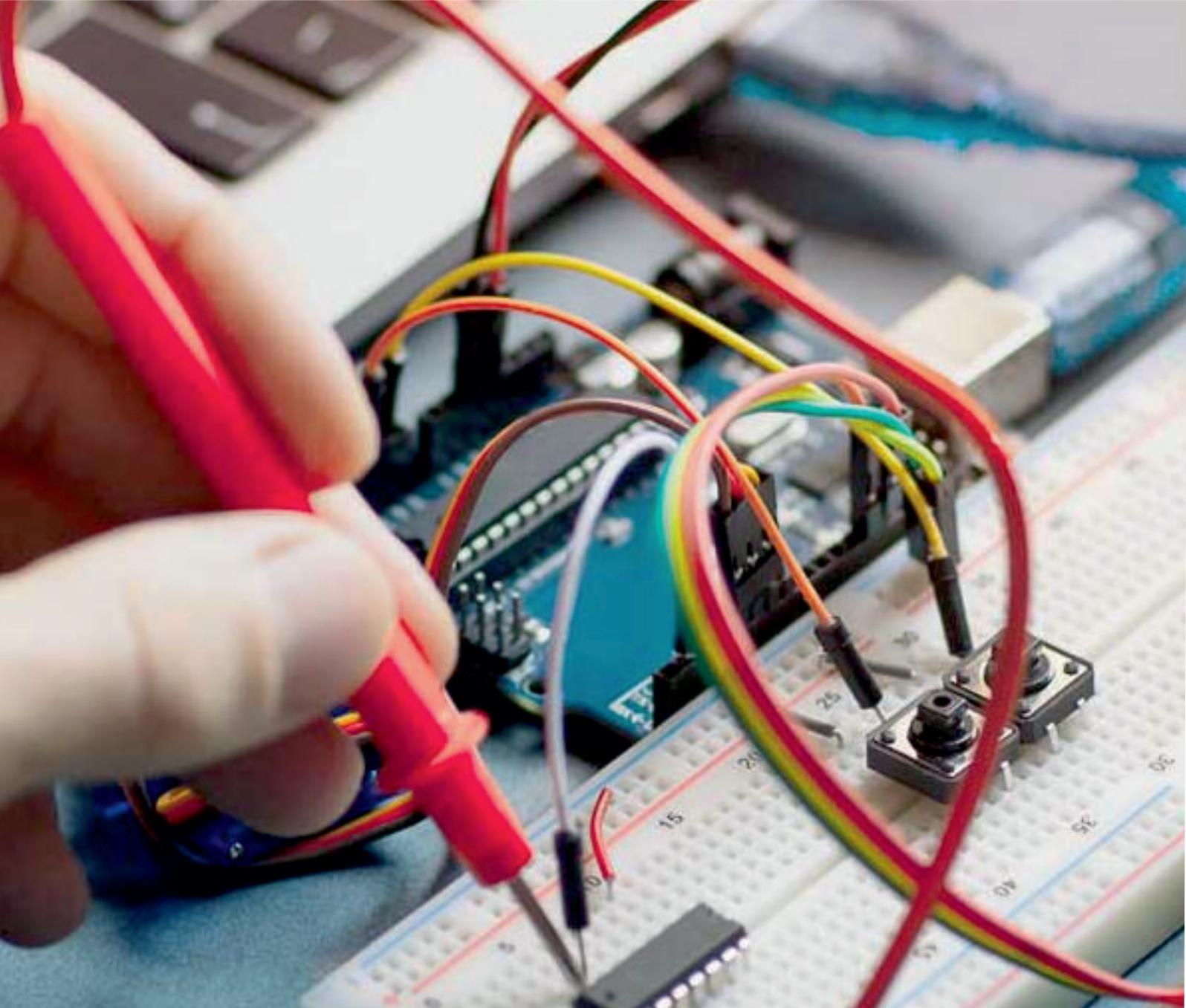
The concepts of smart cities have always been a dream. There have been advancements made from the past couple of years to make smart city dream to reality. The advancement of internet of things and cloud technologies has given rise to the new possibilities in terms of smart cities. Smart parking facilities have always been the core of constructing smart cities. The system provides a real time process and information of the parking slots. This paper enhances the performance of saving users time to locate an appropriate parking space. It helps to resolve the growing problem of traffic congestion. As for the future work the users can book a parking space from a remote location. GPS, reservation facilities and license plate scanner can be included in the future. The smart parking industry continues to evolve as an increasing number of cities struggle with traffic congestion and inadequate parking availability. While the deployment of sensor technologies continues to be core to the development of smart parking, a wide variety of other technology innovations are also enabling more adaptable systems including cameras, wireless communications, data analytics, induction loops, smart parking meters, and advanced algorithms. For example, in Boulder, Colorado, Park Plus is working on deploying a fully automated parking garage in the Western United States through Boulder's Pearl West mixed-use development. The company's automated parking system uses lasers to scan cars and a robotic valet to park the vehicles. Vehicles are transported by a robotic dolly that lifts and transfers them to storage racks. Using this system, up to 4 times as many cars can be parked in the same amount of space as a traditional garage (since there is no need for extra space in between cars). The automated system is expected to deliver vehicles within 3-5 minutes of a retrieval request.

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