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Smart Parking System Using Wireless Sensor Network

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ABSTRACT

This is the specific abstract idea of wireless sensor based smart parking system in urban areas as an principalconcept of the Internet of Things(IoT). This specific concept will become fundamental type of cloud and IoT technological surface for urban areas due to its features. This work has been executed by using IoT and cloud with Wireless Sensor network(WSN). The principle point of this model is to give complete solution for providing of vacant parking spots by avoiding manual searching process.Smart parking system helps to minimise the traffic by finding the nearest availbility of vacant parking slots and helps motorists distractionThe availability of vacant space is detected by using Infrared(IR) Sensors using lighting technology of the sensor.

Keywords: smart parking, Internet of Things, Wireless Sensor Network

1. INTRODUCTION

Advanced technology has become the integral part of our life[1]. To satisfy the need of the society, almost in each work, we use the technology [2][3]. In current era computer science is major subject[4]. It has many real life applications such as cloud computing[5], artificial intelligence[6], remote monitoring[7], Wireless sensor network[8, 9, 10], internet of things[11, 12, 13], Neural network[14, 15], FSPP[16, 17, 18], NSPP[19, 20, 21, 22, 23], TP[24, 25, 26], internet Security[27], uncertainty [28, 29, 30, 31, 32] and so on. Technology is the mode by which user can store, fetch, communicate and utilize the information [33]. So, all the organizations, industries and also every individual are using computer systems to preserve and share the information [34]. The internet security plays a major role in all computer related applications. The internet security appears in many real-life applications, e.g., home security, banking system, education sector, defense system, Railway, and so on. In this manuscript we discuss about the protection of authentication which is a part of internet security.

As rapidly booming the population in urban areas almost every citizen using vehicles. It leads to the problem for parking spaces which causes heavy traffic, and much pollution. This is the problem we are facing in many cities today. Vehicle drivers waste most of their time for finding the available parking slots. This search may lead to almost 30% of traffic occurrence [35]. In further sections we are going to have a look at the demonstration of how to decrease these parking problems and to do efficient WSN and cloud-based parking service.

Traffic management system in many urban areas has been implemented and launched a new parking guidance which is Parking Guidance and Information (PGI) technology for good parking. This technology, convey us the transactional data about parking in smart cities[36]. The manual parking guidance system has several shortcomings such as,

- Extremely costly to maintain the parking system.
- Time consume to produce result.
- Duplication of data entry

To overcome and succeed with these problems we going with smart parking system.

1.1 Motivation

The principle aim of this work is to avoid the traffic in many areas. We can notice in television and social media and also in real-time how people struggling to find the parking slots. As population increased, we have got many problems such as

- Depletion of Natural resources.
- Rise in un employment.
- High cost of living

From that, parking problem is one of the biggest problems in our daily life. As per British Parking Association look into the normal time drivers spend scanning for parking spot is 5.9 minutes out of every day in this manner aggregate of (90.5 hours) four days out of each year. To reduce these problems here the proposed model focused on smart parking framework utilizing remote sensor arrange. Focus on solving parking problems [37].

2. SMART PARKING

In beginning periods various models like equal parking's, opposite stopping were utilized for stopping. Presently in the course of the last 15-20 years, traffic leads in numerous zones have been built a technology called PGI for good parking [38]. We proposed a smart parking system called IoT-Cloud Smart Parking (ICSP model) this systems train the drivers about the vacant stopping. Parking information will be noticeable in the portable application.

This ICSP model helps motorists to find the vacant spots to park vehicles with the assistance of Infrared (IR) sensors in each leaving openings, it will recognize the nearness of a vehicle, and the mobile application we used here is to indicate the parking status to motorists. Smart Parking framework is a made sure about and cost productive route to the drivers where precisely vacant parking spaces accessible.

The highlights of the proposed framework are;

- Wireless sensor networks module
- Collects data from sensors
- Check status of parking slot
- Sending stopping opening information to installed blynk server.
- Node MCU ESP8266 Wifi module
- Get stopping data from hardware devices
- Monitor and Send backto receivers mobile application.
- Central Blynk-Server
- Get parking opening data from wifi module
- Sends back the parking status to mobile application
- Mobile application
- Associate with focal Blynk server
- Get stopping data from blynk cloud.

This system apparently allocates sparking space to drivers [39]. Motorists can monitor the parking slots from within the range of parking to their mobile application. This process save their time and they need not to search by visiting each parking areas manually

3. PROPOSED ARCHITECTURE

Here in this part, the design and the framework of cloud-based smart parking system is discussed. And the components used, working process were explained.

3.1 Outline of designed architecture

Here this architecture defines the backend process of ICSP model.

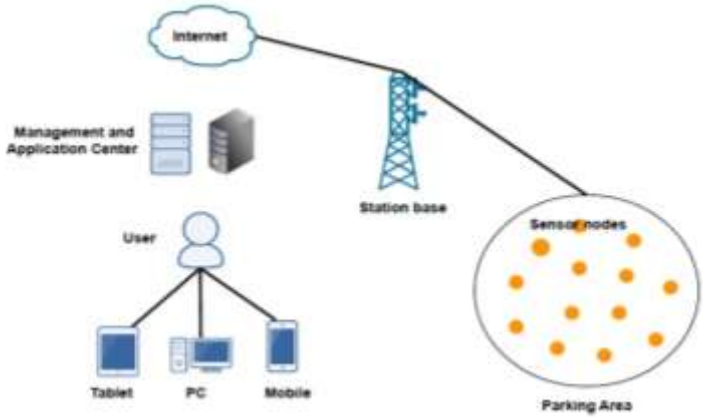

Figure.1. The engineering structure of Smart Parking Systems dependent on WSN

The framework of this ICSP model comprises of Wireless SensorNetworks (WSNs), Central Blynk Server, WiFi module, and Versatile Application of motorists for example, PDA, PC, work area.

3.2 Remote Sensor Networks

Remote sensor organize modules distinguish a stopping state to peruse the deliberate aftereffect of sensor continuously, and afterward send back stopping data to the client's portable application.Figure.2 shows the network connection.

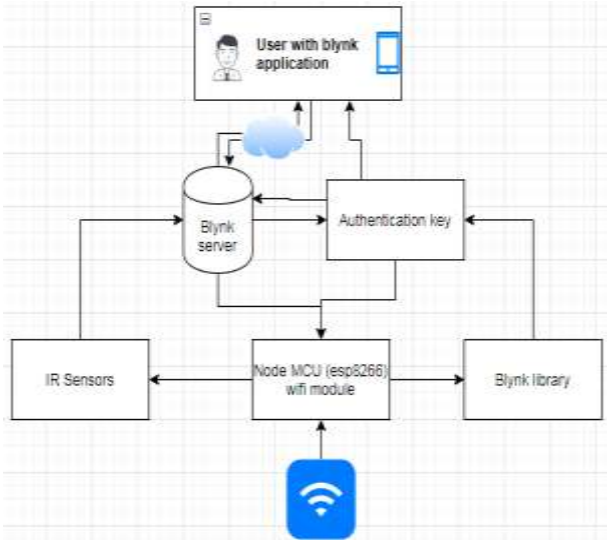

Figure.2. proposed system's wireless sensor network

With the help of authentication key which was generated from blynk server, wifi module is connected to blynk server and the driver can monitor parking slots by using mobile application which is installed in their mobile.

3.3 NodeMCU ESP8266 (wifi module)

NodeMCU is a open source high-level programming language based firmware created for ESP8266 model chip[40].

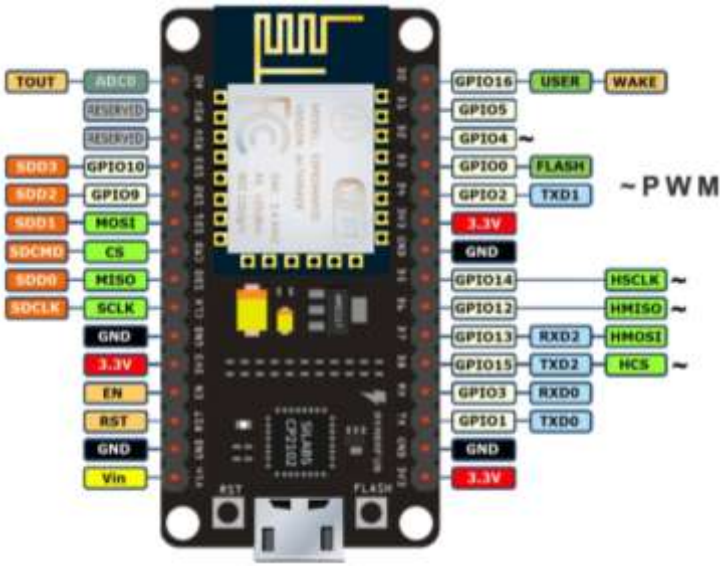

Figure.3.ESP8266 wifi module

NodeMCU Development Kit has Arduino and manypins on its board. It supports direct connections. Utilizing the conventions we can communicate with sequential gadgets like LCD, Real-Time Clock (RTC) chips, Global Positioning System (GPS), contact screen shows, SD cards and so forth. We can directly connect nodeMCU to our PC or Mac and program it like arduino uno.

Prerequisites for NodeMCU

- 2.5Volte to 3.6Volte power
- 600ma regulator
- 80maprocessing power

3.4 Blynk working process

Blynk is made for Internet of Things (IoT). It shows the status of the equipment in the versatile application.

There are three significant segments in this blynk platform:

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- **Blynk Application**: It permits you to make interfaces for your tasks utilizing different gadgets like LED, Buttons etc.
- **Blynk Cloud**: The major control & connections for mobile & other devices. We can either use built in cloud or private cloud.
- **Blynk Libraries**: It will turn on the association with the server and procedure every single approaching datum in all the popular hardware platforms [41].

Consider here when you press an on/off catch in the blynk application, the information will be made a trip to the Blynk Cloud, that data will be reflected in your equipment.

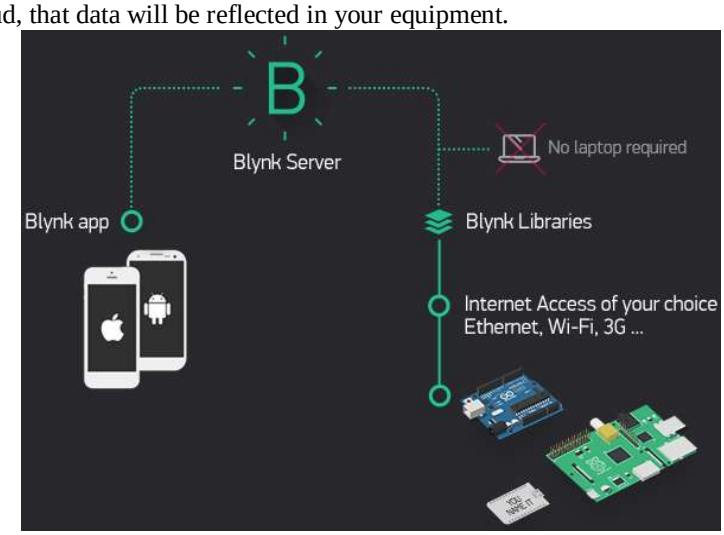


Figure.4. Blynk working process

Some Blynk Features are:

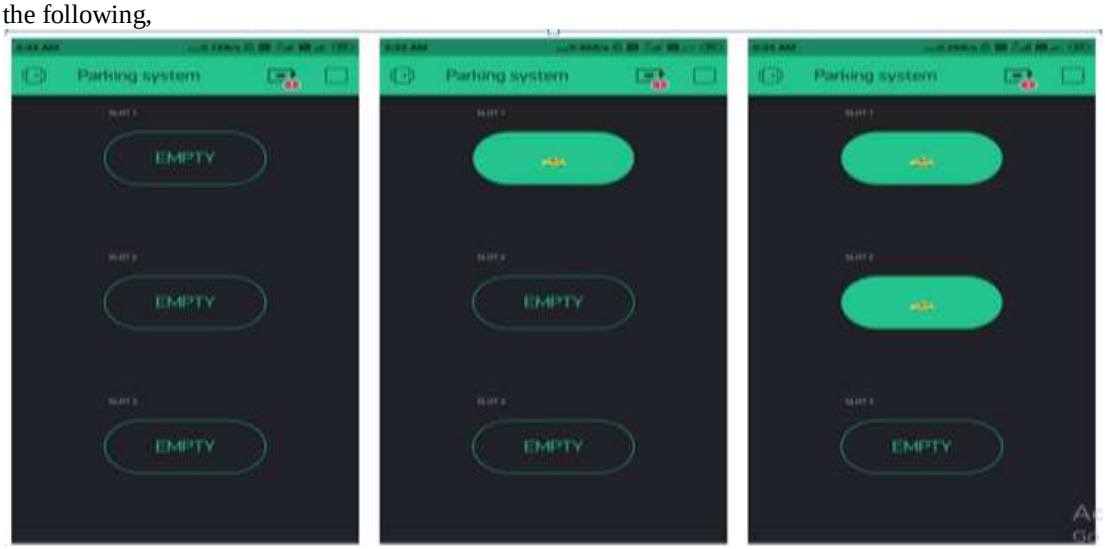
- Some Application programming data and UI for all gadgets can associate through Association with the cloud utilizing like wifi, Bluetooth, Ethernet, USB etc..
- Set of simple to-utilize Widgets like LED, Buttons and so forth.
- Very simple to associate and include new ranges by utilizing virtual pins.
- History information checking by means of Super Chart gadget.
- Hardware-to-Hardware direct correspondence by utilizing Bridge Widget like sending messages and so on.

3.5 IR Sensor

Infrared [IR] sensor is an electronic equipment which is utilized to detect the items which are available in the environment. By utilizing this sensor the information object was recognized from identification LED and we can get result by the yield LED. That yield which we can screen utilizing portable application.

4. MONITORING RESULT

Space portion is executed utilizing Android Application called Blynk for the shrewd stopping, which are as per the following,



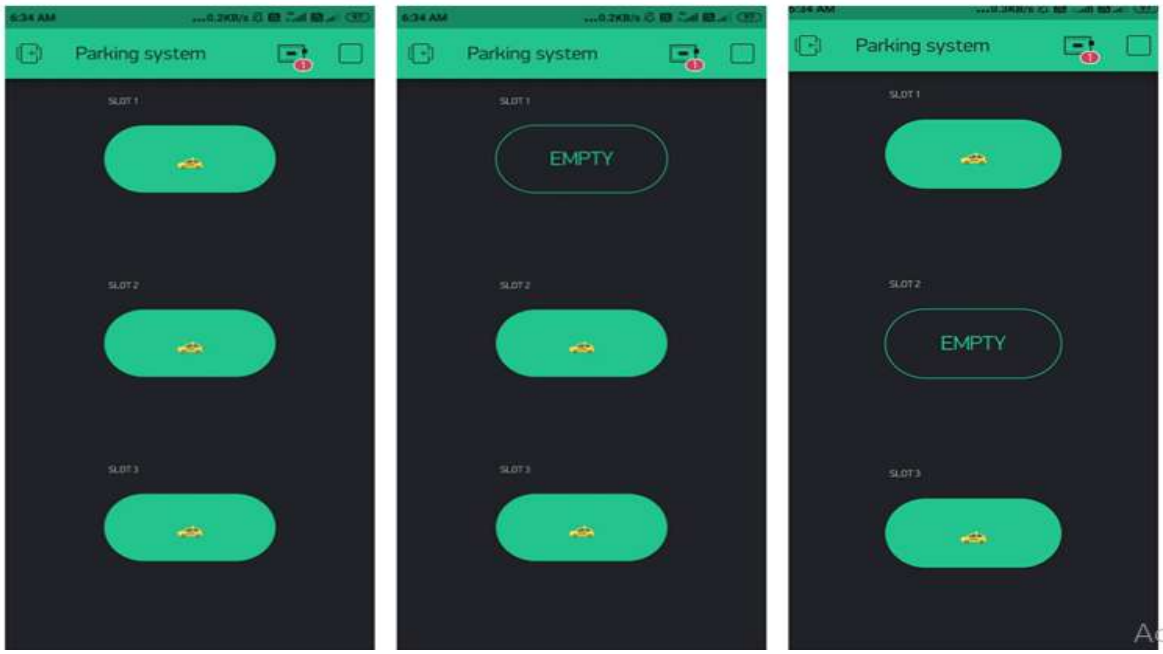


Figure.5. Output samples from blynk application

Here in this model we have made three spaces utilizing Android application in my versatile and refreshed to the Node MCU wifi module utilizing the web. At first every one of the three spaces are free it is demonstrated in the mobile application, LED EMPTY as indicating the stopping status free.

The slot1 is occupied so it is changed as Green color in mobile and accordingly if any car was parked the end user application will indicate the empty or available slots.

5. CONCLUSION

The proposed IoT-cloud based smart parking model comprises of remote sensor systems. Here i execute a framework that permits vehicle drivers to handily locate the empty parking spots. This framework comprises of remote sensor systems, Blynk cloud, wifi module and mobile application. In this framework, minimal effort remote sensors systems module are sent into each stopping opening furnished with three sensors. The condition of the stopping opening is distinguished by sensor hub and that were accounted for intermittently to the blynk server through the sent remote sensor systems. What's more, this data is sent to blynk server through Wi-Fi organizes progressively. Here the drivers can discover empty parking spot by utilizing their portable application. By this ICSP framework we accept this proposed design can satisfy every one of your prerequisites of cloud based shrewd stopping framework and the foundation of the versatile application, remote sensor systems can be a well utilitarian innovation to comprehend forthcoming smart parking works.

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