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Research Paper

Android based real time advance security for parking system in IOT

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Abstract

In recent trends traffic has become a major problem in most of the cities. There are limited car parking facilities and less road safety precautions observed. So, to address the traffic problems are being made in the field of IoT. This paper will present the basic idea of cloud-based parking system. Cloud will store and process the data between device and mobile. In cloud, stored files will be obtained from anywhere through the network connection. By using the latest technology called IoT for smart cities, we can book the parking slot of a vehicle from anywhere. We need to take registration details for reserving the parking slot and for security purpose we are generating an OTP. By using the OTP, we can book our slot through an android application.

Keywords: *Node MCU (ESP8266 12E), Ultrasonic sensor (HC-SR04), Android Application, Cloud.*

1. Introduction

Internet of Things is nothing but the applications performing and the things communicating with each other with the help of network access [1]. IoT is an advanced automatic in which all data is stored on the cloud with real time access to data. This preferment also includes sensors and routers for gathering and sending data across the internet.

Moving towards keen city application, advanced mobile parking may be a great instance to a normal subject from claiming how the Internet-of-Things (IoT) will be viably What's more proficiently utilized within our Everyday existing situations with provide different administrations on separate clients. Any subject might utilize as much versatile device, a workstation Hosting web with right the advanced mobile city requisition starting with anyplace in the universe with discover a nothing stopping spot in the city and get will recognize those which parking spot is at present accessible. Also, quick car recovery. Presently, car parking system may be in view of reservation basis, in any case this framework need a detriment as far as period also space.

This venture administration framework might be gathered under multi-parking oversaw economy which might a chance to be used to deal with both open air What's more indoor stopping territory what's more single parking management which as a rule focuses indoor stopping slots. The cantering What's more target from claiming this undertaking fill in lies looking into mono-parking administration engineering framework which meets expectations ahead ongoing premise. For these low-controlled preparing chips, ability to run software application mobile terminals, distributed computing, Telecommunication Networks (TN) [6], and correspondence conditions, for example, the Omnipresent Consumer Wireless World (OCWW) [7] grows quickly.

Such a technology can be used in all sectors of Computing, and Business Intelligence applications. This paper introduces you to the use of IoT on one such metropolitan area, that is, Parking System in smart ways using IoT and this can also be a major part of developing in cities or any. IoT is normally identified by real world objects, growing in many parts of the world, with limited storage and processing capability, which require dealing with regards to reliability, performance, security, and privacy, along with the correct management of the parking system facility.

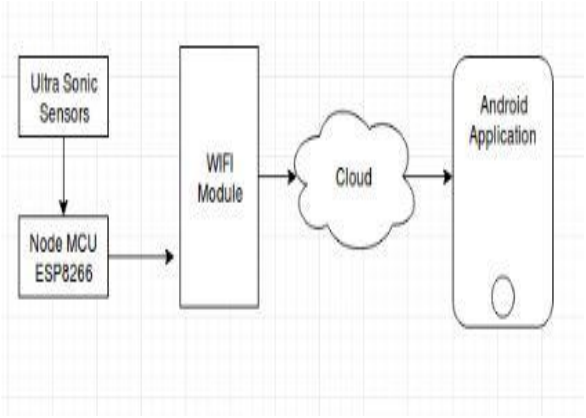
Parking system comprises the on-location asset of the IOT is used to the display and indicate the course of openness of each one parking slot. System organizations can't give new data about the parking facilities on the web as the stopping availabilities don't participate with the agencies. Positively, it will happen huge cars are not ready to ready to the ordinarily accessible parking spots. Thus, there is accessible for a framework, which can think about all appropriate data, to finding the parking spot.

When we visit the various public places like shopping malls, cinema halls and hotels during any events or weekends it will occur more parking problem. For parking the vehicle driver takes 8-10 minutes to park the vehicle in present days because he spent much time in searching the parking spot. Then we will reduce the parking problem and to secure the parking using the smart parking under Slot Allocation method with the help of an android application.

In cloud, stored files will be obtained from anywhere through the network connection. By using the latest technology called IoT for smart cities, we can book the parking slot of a vehicle from anywhere. We need to take registration details for reserving the parking slot and for security purpose we are generating an OTP. By using the OTP, we can book our slot through an android application.

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2. Methodology



Block Diagram of Parking System

The above figure details area of parking where the system is execution along the way to the communicate will happened to the many devices. The central devices that transitive the parking way of this system are:

2.1. Node MCU (ESP 8266 12E)

Node MCU is an open source IoT stage as middleware solutions for building, integrating ang managing connected devices with the IOT and a single-board microcontroller. Node MCU was developed by ESP8266 Open Source Community. The Espressif ESP8266 offers a highly integrated Wi-Fi solution to meet the user's compact design and reliable Internet performance of the things industry. It can be applied to any micro-controller project as a Wi-Fi adapter via SPI/I2C/UART interfaces. It also integrates an TENSILICA MCU series L106 as a 32-bit processor and the memory is 4 MB. The protocol is 802.11 b/g/n Help. The operating voltage is 2.6 V at 3.3 V and the current is 80mA, the security is WPA and the network protocol is IPV4. User settings is the application for Android.



Fig.:1: Node MCU (ESP8266 12e)

2.1.1. Ai-Thinker

ESP-12E Wi-Fi chip is invented by Ai-thinker Team. The processor is ESP8266 in little sizes will be encloses of Tensilica L106 coordinates driving at low potential 32-bit microcontroller miniaturized scale with the 16-bit tiny process, on-board reception apparatus. The module underpins standards of IEEE802.11 b/g/n (2.4GHz), finish TCP or IP convention. Clients will utilize and combine the modules to a current gadget systems administration, or building a different system controller, Clock speed bolster 80 MHz, 160 MHz ESP8266 is high mixes of remote framework on chip's, intended for space and power impediment of mobile platform designers.



Fig.: 2 Ai-thinker (WIFI module-esp12e)

2.2. Parking sensors

Ultrasonic module is the HC-SR04 to provide 2cm-4m. The sensor can be used to measure the length of a space between the sensor and car. This device which detects, and it will utilize the electrical vitality and an artistic transducer to discharge and get mechanical vitality and they change over to sound waves. It is a non-contact measurement functions in the modules includes Ultrasonic transmitter, receiver and control unit. Four pins of the ultrasonic sensor that is GND, TRIGGER, ECHO and VCC.

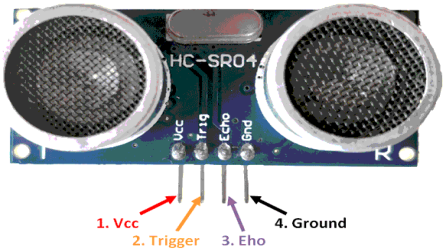


Fig.: 3 ultrasonic sensorhc-sr04

Ultrasound is a high frequency sound of frequency 40 KHz. The principle of ultrasonic distance is the same as that of RADAR. It performs best in 30 degrees angle. The essential standard of work is using Input/output will be activate for no <10us unusual state flag, the result will send 8 cycles of 40 kHz and determine there is an IF moment will be back, along unusual state, time of high supply IO length and the time for transmit and to return.

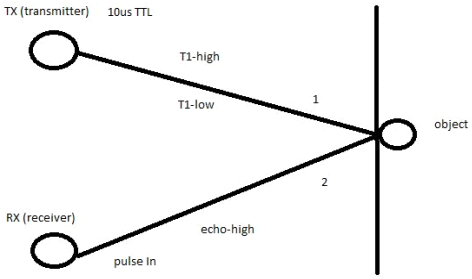


Fig. 4: Ultrasonic sensor working principle

It is generating to high frequency and the sound will calculate the time interval between send and receive the echo signal. HC-SR04 Ultrasonic sensor consists of a sender, receiver and a control signal. By using the ultrasonic sensor and send to the at least 10us TTL (Transistor-Transistor Logic) of high signal to the activate pin and to identify the pulse width are the pulse signal and sent again back to the applied of some calculation and to get the distance. If the object is 10 cm far from detect the signal and the speed of the sound is 340 meters per second, the sound wave should go around 294 micro seconds. In any case, it will get from the resound stick will be two-fold that the number because the sound wave acts to movement forward and bob the retrogressive. To get in centimeters of sound waves will the time of two (sender and receiver) signals is divide by 2.

Distance = (duration/2) * speed of sound (0.0343 cm/us).

2.3. Android Application

The android application is an interact for the users and the mobile. The app is expanded in Android Studio, Java, JAVASCRIPT and XML as a coding sources. Android Studio is integrated development in operating system for application development. The app is related with the HTTP server through a protected the any new channel for interfacing a WIFI arrange/versatile information of SSID and secret key to a two-factor approval. The mobile app is to give the data considering obtainability of parking ways and enables the user will booking an available space consecutively. Exchange the information happens in distinguish between HTTP server and the versatile application. Keeping in mind the end goal to amend correspondence both the Node MCU (ESP8266-12E) and mobile app must associate with a specific channel on HTTP server.

2.4. Cloud Computing

Cloud stages help to interface with the thing around us, so we can get to anything whenever and wherever in a client will neighbor way utilizing to change the entrances and in-manufactured applications [1]. Thus, cloud goes about as a front end to get to IoT's. Applications are support to gadgets like sensors have unique parts of huge stockpiling to capacity huge information, enormous calculation energy to empower the ongoing preparing information, and rapid system and long-go arrange. It is a high unwavering quality and versatility for parallel preparing of 'big data' [2]. It will enable the apps and data sources to contact with each other and maintain the data such the time at when the car was parked, time span for parks the car, sum pay by the user and method to be instalment.

Cloud will create a new channel and select how many number of parking slots/fields to select. For API key is enabling to this cloud. Programming interface keys empower you to compose information to a channel or read information from a private channel. Programming interface keys are produced when you make another channel. Two sorts of API keys are Write API Key is to compose information to a channel and Read API Key is to allow other people read key for the channel and view for private channel [10]. Data import/export are API requests is to update and the fields and GET a channel status updates. The write key will enable to private key and host to the cloud.

3. Literature Review

3.1. IoT Based Smart Parking System

The authors have discussed about the IoT based cloud coordinated circuit keen stopping framework. Using IoT based cloud integrated system monitor and to install the mobile app search for parking space to destination. When the user selects the slot and amount of time and confirms the occupancy successfully [1]. This is done eventually parking system in shopping malls. Below the stages that a car owner requirement to take after the instructions to park its car utilizing our parking framework.

- Stage 1: Install the android application on your cell phone.
- Stage 2: With the assistance of the versatile applications can for a stopping territory on you are goal.
- Stage 3: Choose a parking zone.
- Stage 4: Peruse along the different stopping openings accessible in that stopping zone.
- Stage 5: Select an opening to the car stop.
- Stage 6: Choose a time for which you might want to stop you are car for.
- Stage 7: Charge stopping accuses both of your wallet or your instalment card.
- Stage 8: When you should get effectively for stopped your auto in the chose an opening, affirm the inhabitants utilizing the mobile application.

3.2. A Cloud Based Parking Middleware Using IoT's in Urban Cities

According to the authors, the authors have initially could be three tiers are cloud tier is a Hadoop is an open-source design to share the performing of 'big data' on many systems using reduce the program languages [2]. It will high reliability and scalability for parallel performing of 'big data', OSGI web servers tier are based on web apps processing this tier, the web apps would be applicable to dynamic memory to from this tier. This process stages of the car parking OSGI packages are query service add to export package, implement service and query service HTTP response and another one is mobile apps tier are including Java classes like using google maps [1], GSM technologies are used for car parking services will issue the user with information about the ideal car parking slot facilities.

3.3. Automated car parking system controlled by Android application

According to the authors in the reference 5, the authors have initially described about the Automated parking is a method of easily to book the slot for sensing devices. Entering or leaving for the parking slot is controlled by a mobile application [5]. Those distinctions the middle and the other existing system is that we point with making our framework as less human's subordinate as conceivable by mechanizing the cars and in addition the whole parking slot, on the other systems require human resources (or the car holder) to park those cars themselves.

To propose and implement a smart-parking device by using on Internet of things and controlled by android application using ultrasonic sensors to choose automatic find free parking vacancy based on the system performance that makes the system cost and time efficient manner [8]. The parking slots which are accessible should be sensed and can be updated on server and that each user will connected with the server can identify free parking vacancy slots in a specific position.

4. Problem Statement

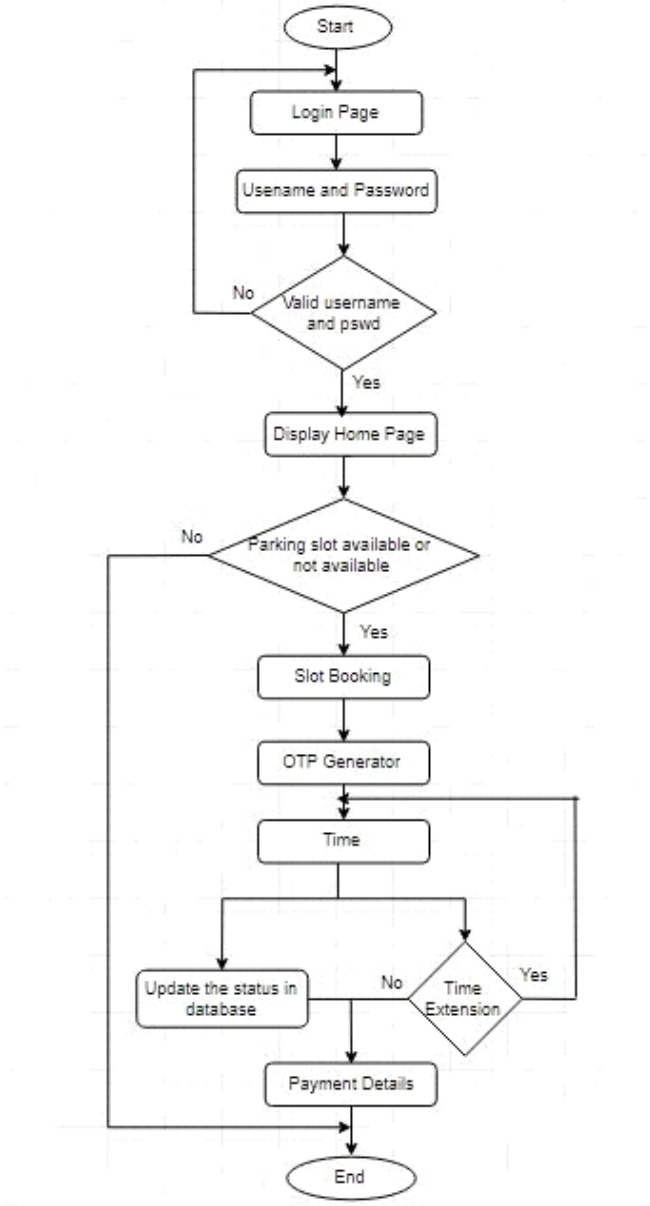
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5. Implementation of the work

In the foregoing section we would discussed about the block diagram and technology to support the application parallel to the parking device. This area we will discuss the usage and work of the framework in a true circumstance [1]. The principle procedure

is to book an opening, stopping a car in that space and to leave the stopping zone is clarified with the assistance of the accompanying stream diagram.

The working of this parking system at each stage it will check and affirm the getting a parking slot to park a car in accessible parking space. It will play out the parking system in the stopping zone in the school/shopping centre. Underneath the means that a car driver needs to take after the directions stop the car in stopping framework.



FLOW CHART

- Step1: Install the android application on your mobile device.
- Step2: To find a parking slot, register the details of our mobile app.
- Step3: Login the details for the user name and password to the mobile app.
- Step4: If it is valid for user name and password, to display the home page.
- Step5: To invalid user name and password and go back to the login page.
- Step6: Select a parking area for a slot.
- Step7: To check the different stopping openings accessible around there.
- Step8: Select an accessible stopping space.
- Step9: After booking the slots and to generate the OTP.
- Step10: To choose the date and time (hours), it will update the status in the database.
- Step11: The slot booking process is over and pay the accuses of your wallet/installment cards.
- Step12: In that parking slot time is over and choose the extension time (hours).
- Step13: When you should get effectively for stopped your car in the chose an opening, affirm the inhabitancy utilizing the versatile application.

The past segment we specified method to book an opening and stop the car in that given space is clarified with the assistance of following outputs.

6. Results

Parking slot assignment implementation using IoT based for car parking zones are as follows

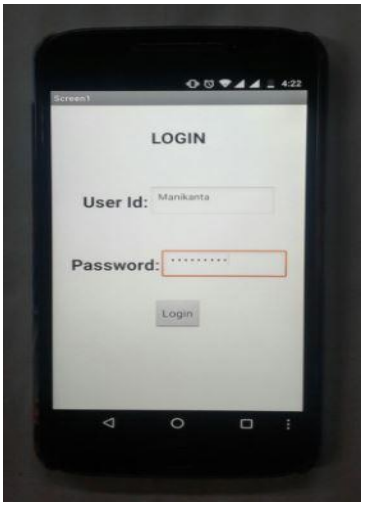


Fig. 5: Login Page in Android app

Here, the figure will show to login the details in android application.



Fig. 6: Slot Booking Page in Android app

Here, the figure will show the booking slot details in android application.

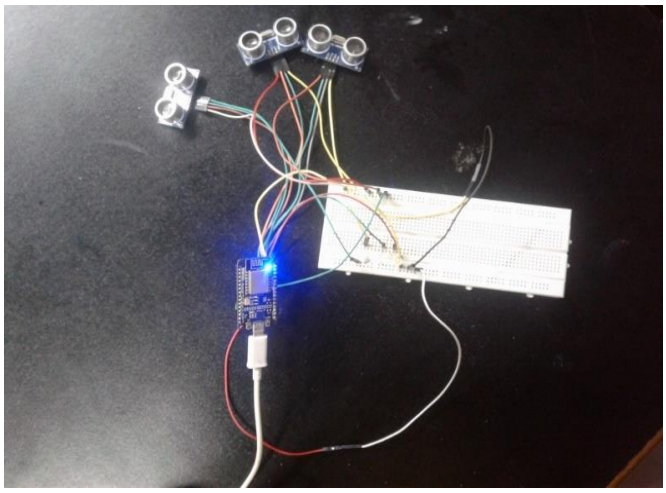


Fig.7: Empty parking slots

Here the parking shows as empty parking slot as LED will be off

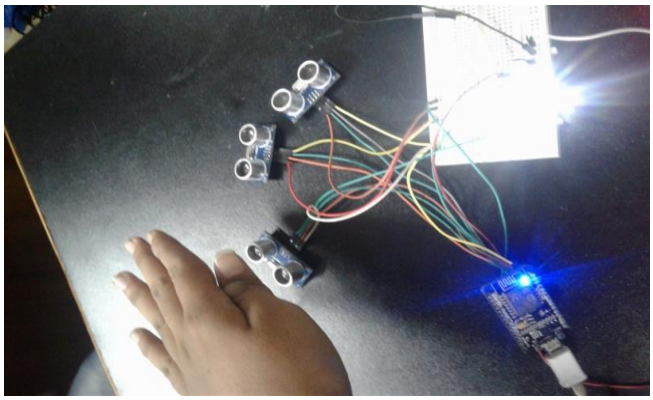


Fig. 8: Slot 1 will be filled

The figure indicates slot 1 will be filling, because LED is glowing.

7. Graphs

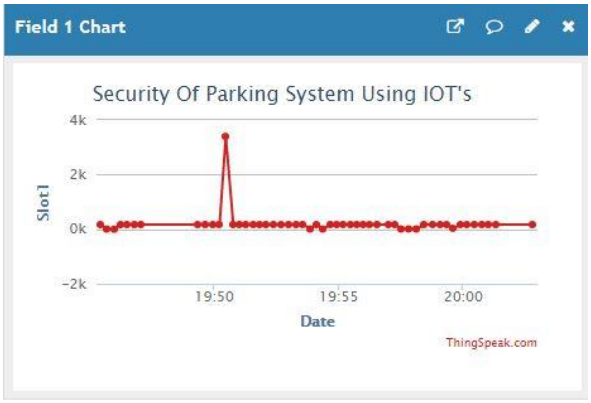


Fig. 9: Slot 1 will calculate to change the distances

The figure shows slot 1 will change the distances using date and time.

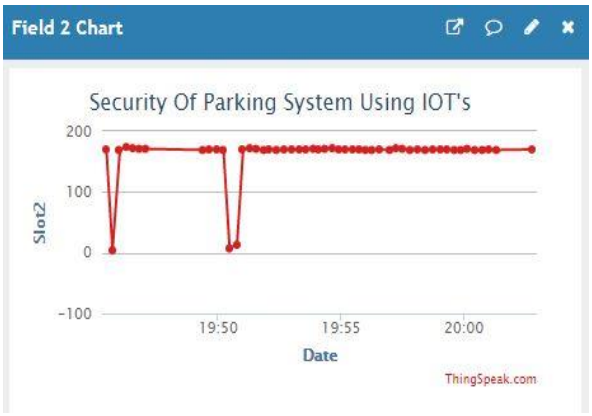


Fig.10: Slot 2 will calculate to change the distances

The figure shows slot 2 will change the distances using date and time.



Fig. 11: Slot 3 will calculate to change the distances

The figure shows slot 3 will change the distances using date and time.

8. Conclusion and Future Scope

The extension of IoT's and Cloud computing advance will grow the new prospects in the views of urban areas. Smart parking offices and movement administration issues frameworks have always been at the design of building the urban communities. In this paper, implementation Security of Parking System is using based on ultrasonic sensor nodes which the user can readily determine space availability to entering the parking place. If the number of slots will increase, the controller cannot handle through wireless sensor networks, need to be positioned to make the system will be more convenient. And we can implement the android application, When the parking is available slot booking will be access and this application security using an OTP to generate a password. Time will extend to the user for parking slot. To gather all parking spaces data in cities we can include that into the android application.

In future technology the changes can be implementing as per the requirements of the system. They are:

- System can be extended to multiple levels and many parking areas by making new information existing the changes in hardware setup.
- Security for cars, to use camera for image capturing (face recognition) using anti-theft mechanism.

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