IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 21-25

An Iot Based Smart Parking System

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Abstract: *Internet of Things (IOT) plays a vital role in connecting the surrounding environmental things to the network and made easy to access those un-internet things from any remote location. It's inevitable for the people to update with the growing technology. [1] And generally people are facing problems on parking vehicles in parking slots in a city. In this study we design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. And it mainly focuses on reducing*
3the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere
Keywords: *Smart Parking, IoT, NodeMCU, Ultrasonic Sensor, Arduino IDE, smart city, etc.*

I. Introduction

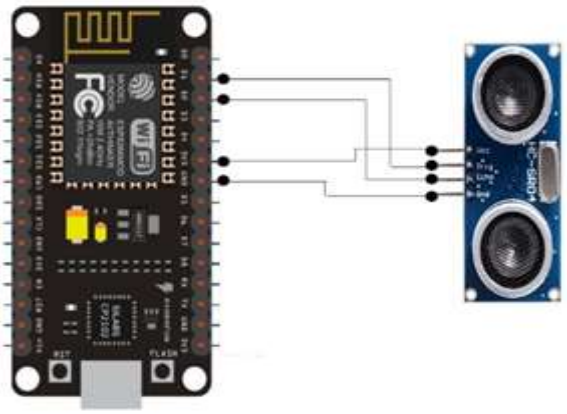
As evolving this latest burning technology Internet of Things, it promises to connect all our surrounding things to a network and communicating with each other with less human involvement. Still internet of things is in beginning stage and there is no common architecture exists till today [1] There is lot of researches and implementations are currently being going on in all the respective areas. Thus there is no guidelines or boundaries exists to define the definition of internet of things. So depending on the context, application the internet of things has different definitions. Shortly it is defined as the things present in the physical world or in an environment are attached with sensors or with any embedded systems and made connected to network via wired or wireless connections.

Implementation: -
Ultrasonic ranging module HC - SR04
Features: -
Provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules include ultrasonic transmitters, receiver and control circuit. The basic principle of work:
(1) Using IO trigger for at least 10us high level signal,
(2) The Module automatically sends eight 40 kHz and detect whether there is a
pulse signal back.
(3) IF the signal back, through high level, time of high output IO duration is
the time from sending ultrasonic to returning.
Test distance = (high level time*velocity of
sound (340M/S) / 2

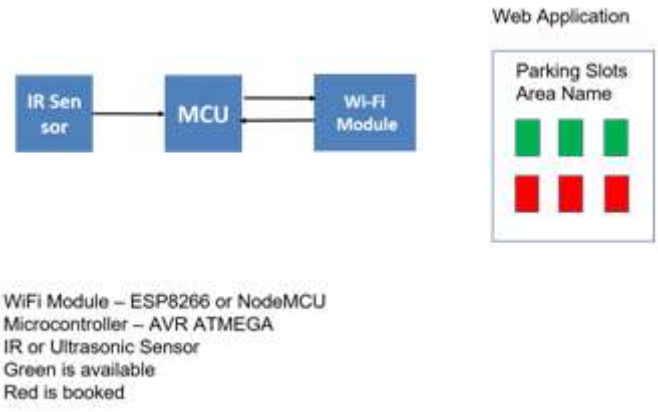
NodeMCU 1.0 ESP8266 12E
MCU ESP8266EX is embedded with Tensilica L106 32-bit micro controller (MCU), which features extra low power consumption and
16-bit RSIC. The CPU clock speed is 80MHz. It can also reach a maximum value of 160MHz. Real Time Operation System (RTOS) is enabled. Currently, only 20% of MIPS has been occupied by the Wi-Fi stack, the rest can all be used for user application programming and development.

Circuit Diagram: Below circuit diagram shows the interfacing of the ultrasonic sensor with NodeMCU Wi-Fi module. Ultrasonic sensor works on the concept of sound waves. The sensor measures the distance which can be used to check whether the vehicle is parked or not. The range of distance measurement varies from 2 cms to 400 cms. The status of the parking slot is saved in the database and the continuous monitoring is kept on the status. If the car is parked the slot shows red color and if the slot is available, it shows the green color. This is very easy method for parking a vehicle in the city. NodeMCU device is used to upload the distance on the server and the

database is continuously monitored to check parking slot. The more the parking slots the more the number of sensors used which can cover major part of the city.



System Design: - Flowchart



System Design: - Block Diagram

Survey:- Many cities viewed that the drivers had real time problems to find a parking space easily especially during peak hours, festivals season, etc. Even if the parking space is known, many vehicles may lead to small number of parking space which in turn leads to traffic congestion.

Many approaches had been made to overcome the difficulties of parking area and as a result many system and technologies are developed for parking.

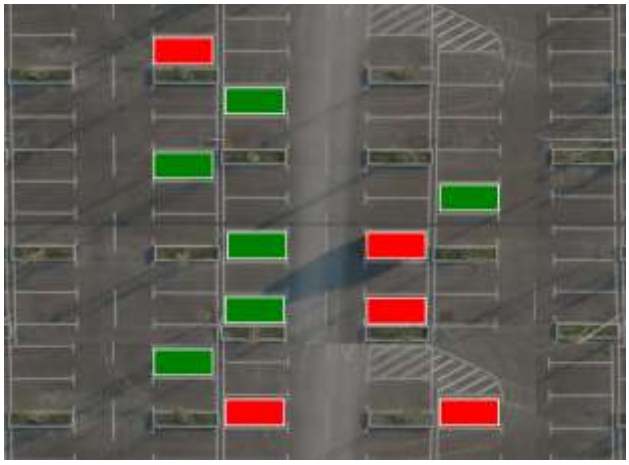
Here the author uses the idea of online booking parking system. The parking area is divided into different slots. Each slot is allotted by one IR or ultrasonic sensor. IF the slot is empty the slot will show the green color and the slot is booked it will be shown by the red color.

Working:-

Initially the user will visit the specified URL and the page open will be Parking Booking Form. The user will fill the details like vehicle type and the duration of parking the vehicle & will click the submit button. Then the user will come to know about the parking space available and the total cost of parking the vehicle. If the user is interested to park, the user will proceed by clicking on Click Here button just below the submit button.

The user will reach the registration webpage, here the user has to enter all the personal details and has to create its account. Once the account is created the user can now login and book the parking space at his/her name.

Once the personal details are entered the user now has to click on select location, here the user will be directed to the parking space image, and there the user can click on the particular parking space of his choice and pay the parking charges, the parking details will automatically be mentioned on the screen.



Each slot is connected to one sensor.

The software is created using HTML, PHP technologies. The database used is MySQL. The server used is XAMPP and checked on localhost.

II. Future Work

This system can be implemented using LoRa network. It will provide us the free local network to connect all the sensors in the city and upload the data on the internet using the common LoRa gateway installed. The sensors will collect the parking data of the users and the analysis can be done on that data. The analyzed result can be used for further improvements and research on the user behaviors.

III. Conclusion

This designed automatic smart parking system which is simple, economic and provides effective solution to reduce carbon footprints in the atmosphere. It is well managed to access and map the status of parking slots from any remote location through web browser. Thus it reduces the risk of finding the parking slots in any parking area and also it eliminates unnecessary travelling of vehicles across the filled parking slots in a city. So it reduces time and it is cost effective also.

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