

Effective Implementation of Cloud Based Smart Parking System using Internet of Things

K Manoj Kumar, M Trinath Basu, K. Gopinath, Ravi Kumar Tenali

Abstract: *In this project, we will build a prototype for smart parking system which is an application of IOT. The idea behind this is, in many towns and cities there is a problem to park the vehicles. Due to heavy traffic and usage of vehicles space is not enough to park them in every place. There is a need for such a system where all parking locations available nearby, vacancy position and information through an application. So, based on these difficulties in parking in towns and cities we came with an idea where we use smart parking system in and around the cities. This smart parking system will alert the vehicle users about the location of the parking where the free area available, the distance from current location and the status of vacancy. So, that they can go and park at the respective location. With this idea the use of man power and roaming of the vehicles for parking can be reduced. By using the cloud based smart parking system we can see the number of slots empty in the parking so, that we can go there and parking vehicles in according to the allocated slots.*

Index Terms: IOT, Parking, Slots, Traffic.

I. INTRODUCTION

Web of Things is interfacing tremendous number of gadgets over a system by utilizing web, where every gadget will have its very own remarkable location. These gadgets are known as things. Web of Things is mix of remote sensor system, cloud and versatile application, where remote sensor organize comprises of sensors coordinated to the miniaturized scale controller in a system. The sensors measure the physical and ecological parameters around it and exchange the information between alternate hubs in a system. The microcontroller then goes about as an entryway and sends the sensor information to the cloud which will be utilized for future reason. The client for anyplace around the globe can get to the information in the cloud through the portable application gave to the client. Using sensors will facilitate parking tons to understand in time parking zone internal control. Nowadays, the parking drawback is over a nuisance. Parking managers and relevant researchers tried laborious to unravel that problem. Induction sensors are put in smart parking systems thus cars are often

counted simply within the entrance and exit and therefore the occupation of each single parking zone is often detected. Meanwhile, IR sensor fitted on the side of a car parking is used to detect cars and vacant spots. Thus, it is often a lot of economical to try and do parking survey in ground or underground parking applications utilizing sensors to gather data about working conditions joined with cloud facilitated examination programming that break down different information focuses will help office administrators end up unmistakably proactive about overseeing structures at pinnacle productivity. We principally discuss parking survey created in smart parking systems sensors. Parking survey can acquire parking designing knowledge that embrace parking facilities, parking utilization rate, parking characteristic index, etc. Parking survey will acquire the time data of free parking areas in smart parking systems. Therefore, parking survey is extremely vital for parking arrange conventionally, parking management and parking plan strategy making whereas it's important to each automobile driver too these days. Parking survey are often quite straightforward if a parking lot is under surveillance. In this case, parking survey can provide in time parking spaces of a parking lot which is important for on and off-street steering systems that modify drivers to seek out parking quicker, reducing carbon emissions. Magnetic detector has its obvious benefits in terms of value, size, weight, power consumption and installation compared with other sensors. Smart parking system with sensors makes use of wireless detector networks to get detection knowledge. The first type, private parking projects, originate from the peer-to-peer based sharing economy, where the concept is to rent out owners' spare facilities. The second type, off street parking, refers to municipal car parks or large fields that can accommodate hundreds of vehicles. The overall occupancy of off-street car parks can be easily monitored by applying entrance counters, acoustic or vision-based sensing techniques. Individual members can also be monitored using fixed sensors in each parking bay which can be used to guide drivers to available spaces. The parking availability can be disseminated via mobile applications (App). The third type, on-street or roadside parking, refers to parking spaces along public roads and is the focus of this paper. It accounts for a considerable fraction of urban parking and can be a convenient option for drivers. However, on-street parking spaces are not usually monitored. The reasons are twofold. Firstly, placing a sensor in each parking space is not a scalable solution when there are many distributed spaces to monitor

Revised Manuscript Received on 30 March 2019.

* Correspondence Author

K Manoj Kumar*, His Department of ECM, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India.

M Trinadh Basu, Asst.Professor, His Department ECM, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India.

K Gopinath, His Department of ECM, Koneru Lakshmaiah Education Foundation, Vaddeswaam, A.P., India.

Ravi Kumar Tenali, Asst.Professor, His Department ECM, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India.

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THANH NAM PHAM [1] The Internet-of-Things technology. This paper projected a system that helps users mechanically and a free car parking zone at the smallest amount price supported new performance metrics to calculate the user parking price by considering the space and therefore the total range of free places in every parking lot. Cristian Roman [2] As the scope of vehicles keeps on developing, leaving zones region unit including some built-in costs around the local area roads. Furthermore, due to the lack of data concerning road stopping territories, heuristic hovering inside the avenues not exclusively costs drivers' time and fuel, anyway, conjointly will expand town blockage. In the wake of the ongoing pattern to make advantageous, green, and vitality effective reasonable urban areas, basic methods received by prominent reasonable stopping frameworks zone unit audited, and accordingly the execution of the different methodologies are thought about. A versatile detecting unit has been created as another to the mounted detecting approach. Na Chena [3] The rising of canny sensors results in the rise and advancement of shrewd stopping. Stopping overview is a standout amongst the most critical things for the stopping directors and relating organizers or analysts. We talk about the issue of making stopping overview in keen stopping frameworks where parking spots, passage and exit are recognized to get the control of the stopping. Yacine Atif [4] Worries for stopping are getting from an optimistic standpoint bolster the urban center. These relentless stopping issues likely could be changed into new chances, brought by current patterns in meeting the all-inclusive associated time. This paper uncovers an exhibition accomplish make the closest to home land properties for stopping, to ease weight on open organizations, produce new wellsprings of income, and enroll new substances in the middle person advertise James W. Hong [5] The present endeavor systems are made of numerous kinds of interconnected systems. Moreover, associations utilize an assortment of frameworks and applications on these systems. Tasks and the board staff must give an effective, dependable and secure working condition to help an association's day by day exercises. Undertaking systems must be observed for execution, design, security, bookkeeping and blame administration.

II. METHODOLOGY

The proposed method uses NodeMCU as micro controller which is integrated with IR sensor, Gsm module, servo motor, cloud, mobile application. First the sensor will sense the date and send to the nodeMcU it acts as the gate way in between the sensor and the cloud the gsm module will generate the top if we want to select the slot, we select in the mobile application

• BLOCK DIAGRAM

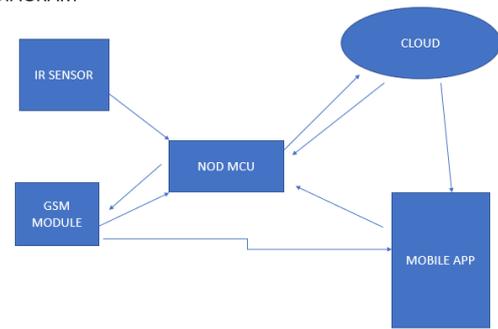


Figure-1. Block Diagram

A. NodeMCU

The microcontroller utilized in this strategy is NodeMCU which additionally goes about as Wi-Fi module that sends sensor information to the cloud by going about as a door. The principle reason for utilizing NodeMCU is it devours less intensity of 3.3v and it is less expense than other small-scale controllers/processors like Arduino and Raspberry bi. The restriction with NodeMCU is it has just a single simple stick, yet for our application that isn't an issue. Along these lines, utilization of NodeMCU is reasonable for this application. NodeMCU is associated with PIR sensor, Ph sensor, Soil Moisture sensor and it will get climate parameters from open climate map programming interface and sends the information to the cloud stage. The highlights like setting up a Wi-Fi association with only couple of lines of code, Plug and play mode, Programmable Wi-Fi module and Arduino like programming and equipment IO made NodeMCU an IoT Tool and best reasonable for different applications dependent on Internet of Things. It has a profound rest mode which devours less power and is valuable for low power utilization of an application.

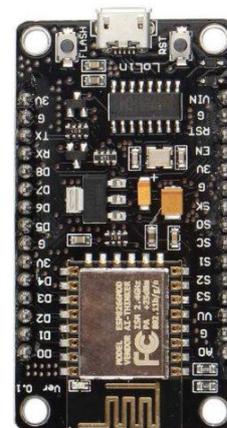


Figure-2. NodeMCU

B. Gsm module

This is a GSM/GPRS-compatible Quad-band telephone, that works on a frequency of 850/900/1800/1900MHz and which may be used not solely to access the web, however additionally for spoken language (provided that it's connected to an electro-acoustic transducer and a tiny low loud speaker) and for SMS s. Externally, it's sort of a massive package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides so that they can be soldered both on the side and at the bottom. Internally, the module is managed by associate degree AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the telephone itself. The processor is additionally accountable of a SIM card (3 or one,8 V) which needs to be attached to the outer wall of the module. The TTL serial interface is accountable not solely of communication all the info relative to the SMS already received and people that are available throughout TCP/IP sessions in GPRS (the datarate is decided by GPRS category 10: goop. 85,6 kbps), but also of receiving the circuit commands (in our case, coming from the PIC governing the remote control) that can be either AT standard or AT-enhanced SIM Com type. The module is furnished with continuous energy (between three.4 and 4.5 V) and absorbs a most of zero.8 A throughout transmission



Figure-3. Gsm module

C. IR Sensor

An uninvolved infrared sensor (PIR sensor) is an electronic sensor. They are routinely used in PIR-based development identifiers. A PIR development identifier used to control an outdoors, customized light. An indoor light switch outfitted with PIR-based inhabitancy sensor. A PIR-based development identifier is used to identify improvement of people, animals, or distinctive articles. They are ordinarily used in criminal alerts and normally impelled lighting systems. They are commonly called fundamentally "PIR", or a portion of the time "PID", for "dormant infrared marker".

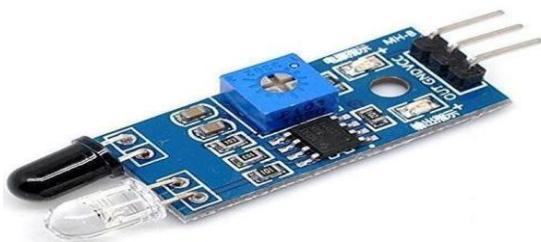


Figure-4. IR Sensor

D. Servo Motor

Servo implies miscalculation sensing feedback management that is employed to correct the performance of a system. It additionally needs a usually subtle controller, typically an avid module designed significantly to be used with servomotors. Servo motors area unit DC motors that enables for precise management of position. They are really DC motors whose speed is slowly down by the gears. The servo motors sometimes have a revolution cut off from 90° to 180°. A few servo motors even have revolution cut off 360° or a lot of. But servo motors do not rotate constantly. Their rotation is restricted in between the mounted angles.

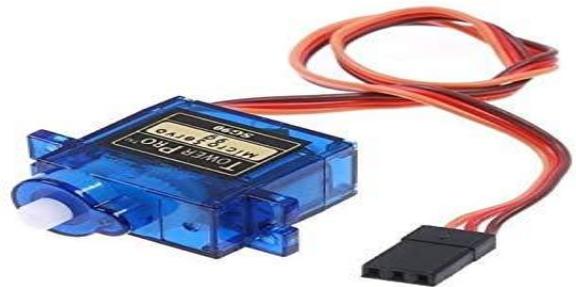


Figure-5. Servo motor

E. Cloud Platform

Cloud is utilized for capacity and examination of information. There are many cloud stages accessible as open source. Here Thing speak cloud stage is utilized where the sensor information is spared in the cloud. We can recover the information as exceed expectations sheet for future reference. The UI of this cloud stage is basic and easy to understand. Thing speak will give us the API keys which are useful recorded as a hard copy the information to the cloud and perusing the information from the cloud to the versatile application. By incorporating the Cloud stage to see the openings are unfilled are not in the stopping spaces



Figure-6. Things peak Home page

F. Mobile Application

The Mobile Application was created in MIT App creator. It gives intuitive system to the client in making of the portable application.



In the planner interface we will give the interface which is unmistakable when client opens the versatile application from the cell phone. In the Blocks stage rationale will be given which will act as needs be from the cloud and shows in the application. The Mobile application created in MIT App innovator can be gotten to in android portable by introducing MIT application and checking the standardized identification accessible in the site or by downloading the apk document of the undertaking created and introducing it in the android versatile.

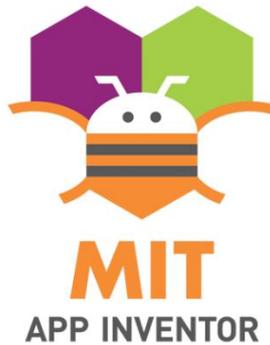


Figure-7. MIT APP Symbol

III. RESULTS AND DISCUSSION

This This image describes the storage of parking parameter and percentage in the vehicles where x-axis consists of time and date and the y-axis consists of the parameter that is sensed by the sensor. This data can be retrieved in the form of excel sheet for future analysis

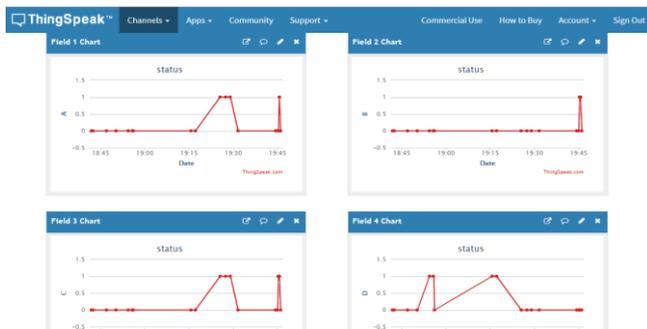


Figure-8. Cloud Image

This image shows the home screen and when we enter the user id and enter our password and press the login button, we will be able see the parking slots



Figure-9. APP Screen 1

After the login screen we will go to the screen 2 it contains the number of slots is empty and number of slots are full we can able to see in the slots I had given 2 colors for the parking slots one is red and the other is green. The red indicates filled and the Green indicates the slot is empty. We will press on the slot and enter our mobile number the it will generate the otp to our mobile if we enter otp our slot is booked will be redirected to otp generation

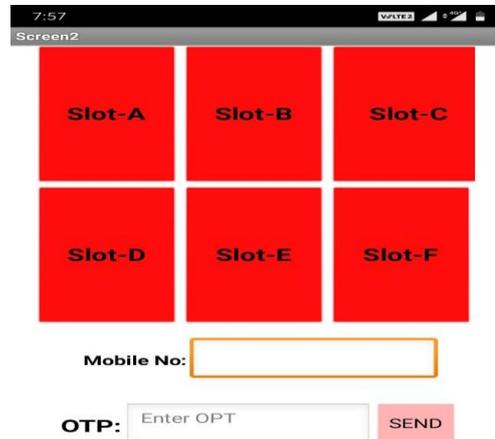


Figure-10. APP Screen 2

After the otp is generated by the gsm module we will get the otp as the message of entered the otp the gate will be open

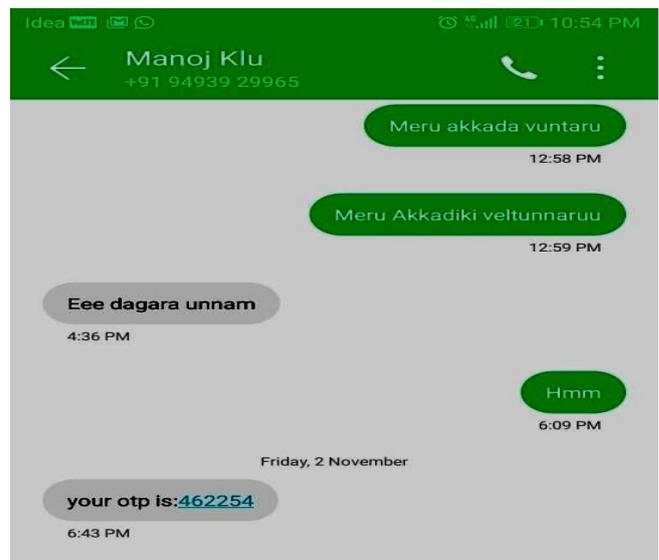


Figure-11. Otp Generation



Figure-12. Prototype

IV. CONCLUSION AND FUTURE SCOPE

This proposed system is very effective in the parking, parking parameters monitoring and predator detection. The prediction of the vehicles is very accurate due to the use of IR sensor. Due, to the prediction of the vehicles time will be saved. This is very useful for the people for monitoring the slots of the parking without going to the mall. This system is very much helpful for the people to not to roam here and there for parking. The developed system is of low cost and consumes less power due to the usage of NodeMCU as micro controller. The use of ir sensor in the parking does not show the difference whether vehicle is human or animal So, it is limitation of this system.

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