International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 05 | May 2020 www.irjet.net p-ISSN: 2395-0072

IoT BASED PARKING ALLEVIATION SYSTEM

P Sai Ritvik[1], V Venkat Sai[2], K Pavan Kumar[3], Mr.V Ramakrishna Sharma[4]

[1,2,3]Sreenidhi Institute of Science and Technology, Ghatkesar
[4]AssociateProfessor, Dept. of Electronics and Communication Engineering, Sreenidhi Institute of Science and Technology College, JNTU, Telangana, India

---

Abstract – *Efficient and smart way to automate the management of the parking system that allocates an efficient parking space using internet of things technology. The IoT provides a wireless access to the system and the user can keep a track of the availability of the parking area. With increase in the population of the vehicles in metropolitan cities, road congestion is the major problem that is being faced. The aim of this paper is to resolve this issue. The user usually wastes his time and efforts in search of the availability of the free space in a specified parking area. The parking information is sent to the user via notification. Thus, the waiting time for the user in search of parking space is minimised.RFID technology is being used to avoid car theft.*

Key Words*: *Arduino, RFID, Intelligent Parking, IoT, GSM module, IR sensor, Traffic Congestion, Mobile Application.

1. INTRODUCTION

Smart city uses the information, communication and technologies to improve the operational efficiency for the people, helps in accelerating towards the improvement quality of life for citizens. Internet of Things (IOT), Automation, and Machine Learning are the upcoming trends which drive towards smart city model. Any city are often considered for smart city initiative, by introducing system like, smart parking system uses a mobile app to assist the drivers to locate parking slots, smart traffic management to monitor and analyze the vehicular flows,

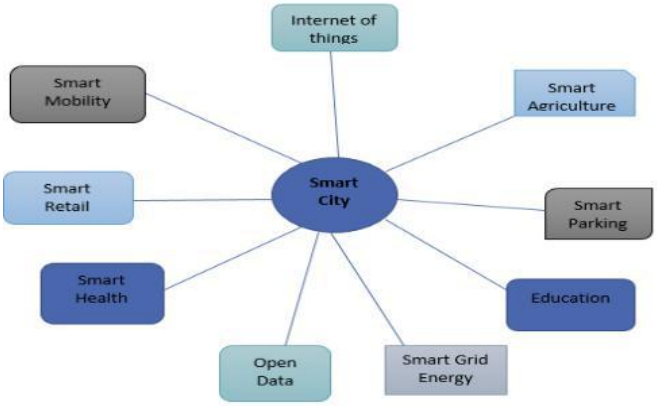

Chart 1: Smart City Components

sharing information electronically, scrutinize the environment changes enabled sanitation etc.

The figure1 .shows strategic component to develop smart city mission improvement, smart innovation, energy, smart transportation, smart traffic signal ,automatic street light, smart parking, smart innovation on thinking and etc.,.

Main purpose of smart parking system is to lessen time to identify the parking areas, hence to it reduces fuel consumption. Sensors would be deployed in the parking lot and through the mobile app, user books for the parking slot and allows online payment option as well.

Developing countries like India, face problem for giant free parking lot management. Conventional parking management systems use sensors and other communication module, but doesn't address solution for both open and closed parking lot. Mobile application that are used to find a parking slot use GPS connect through the Google map API to find free parking space location, but does not find the free parking slot location exactly. The main drawbacks of parking space detection systems are low accuracy, light and environmental condition. In this work, methodology to implement Mobile application to seek out parking lot use IR sensor to seek out vacant slot.

2. LITERATURE SURVEY

Intelligent parking [1] has proposed a system which used Google map application. Ultrasonic sensor and data collected are stored in cloud. Android application map gives client friendly information about vacant slot. Each slot has one LED display which help to seek out the proper parking place. IoT based parking system using Google [1] was proposed to allow the user to reserve the parking place. Mobile application, finds the current parking place. In this system IR sensor is used to find an empty place and is displayed at entry and exit gate. RFID tag issued to authorize an individual entry to the parking place. If the person is permitted signal is shipped to open the gate [2].

Advanced CAR Parking System [3] using Arduino and Raspberry PI to detect the free slots. This system uses web server for booking, Google Maps using GPS. Results are displayed in the mark graphically.

Effective car parking system [4] was proposed which uses IR sensors, authentication is completed using RFID tag. ZigBee is used for communication. Android Based Smart Car Parking System [5].

Android based application the obtain information about available empty parking slot. The android application would have customer detail include area, state, vehicles number. Application having user enter and exit time and choosing a parking location. User details are stored in MYSQL database. LED indicates to display the parking slots are empty or filled. Camera is employed to capture the car number plate and convert the image to see whether the car is authorized user car or not [5].

3. SYSTEM ARCHITECHTURE

In metropolitan areas, people prefers cab or car as convenient to travel to shopping centers, theaters or hotels. Finding place to park vehicles in densely urban area would waste time and consumes fuel during checking out parking lot. Hence there is a need for assistive technology, which would communicate the availability of parking slots to the registered users. Mobile app would allow the users to register for the service and if the destination and estimated arrival time is specified, app need to find the free parking space and send the location to the user. User makes the web payment to book the parking slot. Figure 2, illustrates the architecture of smart parking system.

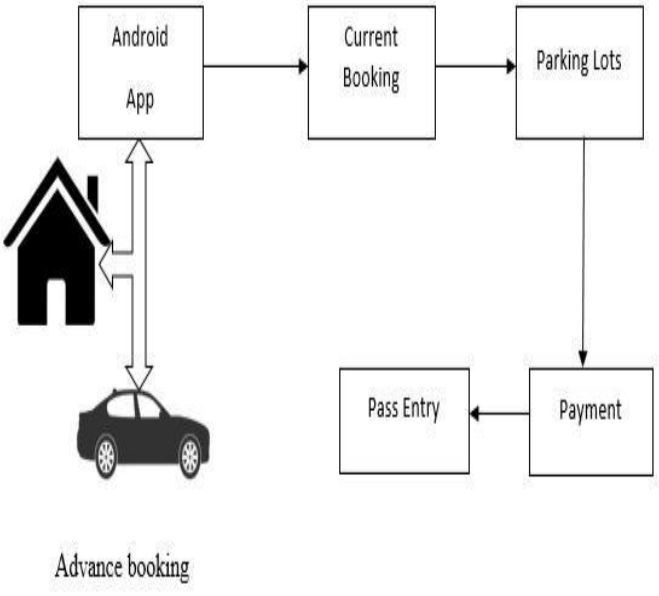

Chart 2: Architecture of Online booking for parking slot

For each parking region, Infra-Red (IR) sensors are deployed and these would detect the amount of parking slots, Number of free and booked slots are graphically displayed in LCD screen, WIFI module is deployed for communication between mobile app and sensors. Figure 3 shows a detecting of empty parking slot and communicating used Wi-Fi to Arduino.

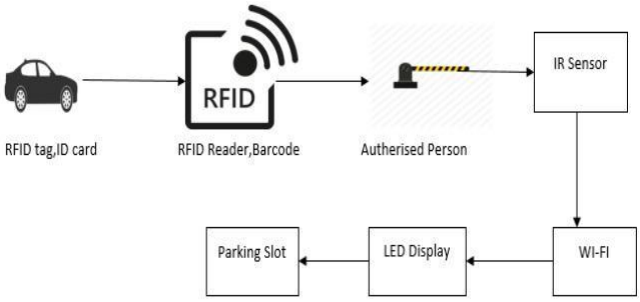

Chart 3: Architecture for deducting empty parking slot

4 .PROPOSED SYSTEM

The proposed system consists of phases. Each of the phase is explained below:

1. Development of Android app
2. Free Space Identification
3. Authenticating user vehicle
4. Classify parking slot
5. Navigating to parking Slot
6. Visualization in Server for Owner to Analyze

To enable a user to use the smart parking system, user need to register with user ID with vehicle number. User can set up the default payment option in his account settings. The android app is built for booking parking slot and payments. The application is employed to seek out the free slot and user got to specify the estimated time of arrival and parking slot usage start and end time. The IR sensors implemented to identify the parking slot is free or occupied. Parking slot is empty LED shows slot number N (empty), D (occupied).

After booking for free of charge parking slot, if the vehicle enters the doorway gate, it assumes that every car has inbuilt RFID card and RFID reader verifies the vehicle and is authenticated. The parking slot could also be allotted for tiny vehicle and enormous vehicle.

Navigating to parking Slot

Android application having GPS location to navigate the allotted parking lot to booked user. It graphically navigates from current location to parking area location. Web page shows lane details date and time, booking time lane status, user detail and user feedback.

5. IMPLEMENTATION

A. Mobile App: Parking App

The mobile app is developed using Android bundle and Android Studio application platform is employed. Application Modules are Registration, Login, selecting date and timing or what percentage days, Parking slot selection, Price calculation and payment. App also supports current booking and advance booking option. If the booked vehicle doesn‟t enter parking slot within fifteen minutes of threshold booking is automatically canceled.

Chart 4: Register

Chart 5: Login page

Chart 6: Application options

Figure 4 & 5 depicts the screen shot of Android Mobile phone application login/Register page.

The figure 5 shows on the parking selecting the duration of parking start and end time and identify the supply of the parking slot.

Chart 7: Parking Duration

A. Identifying Free Parking Slot

Free slot identification is verified using Infra-Red (IR) sensors. The IR sensor used for each parking slot. The infra-red sensor detect the vehicle in infra-red waves reflected and covers short distance. A pulse of IR light is generated by the IR sensor and emitted by emitter. Detected message is going to be sent via WI-FI module to transfer the message to Arduino board and results are display in LED screen.

B. Authenticating User Vehicle

It is assumed that each vehicle has built in RFID tag and vehicle is authenticated by RFID reader. First time users need to register to avail the facility. Authenticated vehicle would get a pass for entry and slot number would be allocated.

C. Classifying Parking Slot

The parking slots may accommodate large or small size car. During authentication, user fills the user detail in the type of car.

D. Navigation to parking Slot

One of the unique quality of this application is navigation service allotted to parking slot. Mobile app would start navigating from the gate to the allotted parking slot. Google map is linked with GPS and app to provide path navigation to the parking slot.

E. Visualization

Owner of the parking center can visualize the booking details, bill details periodically. Webpage is created using PHP and parking information (user feedback, Parking ID, vehicle number, bill amount). At the back end, MySQL database is used to store the information. The web page contains local host and global host connectivity.

F. Experiment Details:

Arduino Uno is a micro controller, based on ATmega328P, 14 pin digital input/output pins, 6 analog pins, USB connection etc. Arduino IDE is used for programming and interfacing with the sensors.

In this diagram shows an overall working. The entire functioning is displayed.

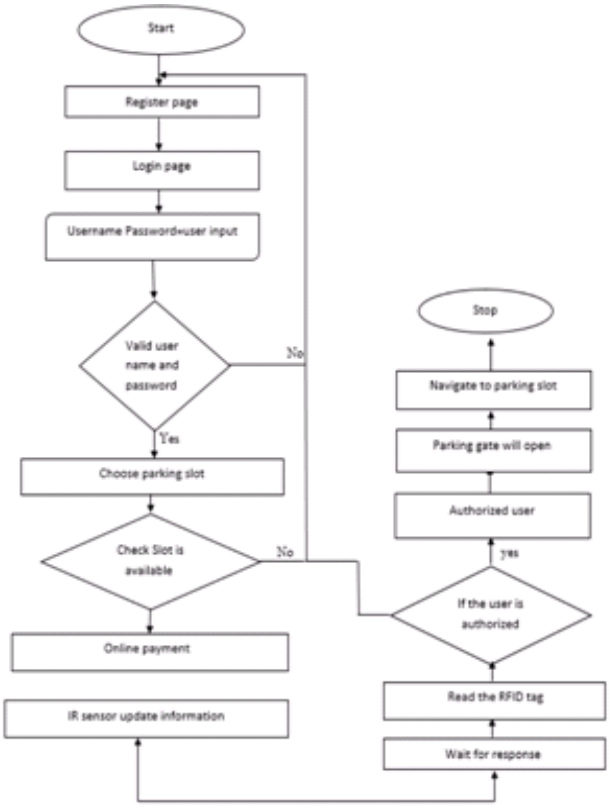

Chart 8: Flow chart for overall system

Chart 8 is the flowchart of overall flow diagram for IoT based smart parking management system. Every scenario is worked out and shown in the flow chart right from username- password entry to the checking of parking slot availability to the online payment and RFID tag authorization.

Arduino IDE is employed for communicating between sensor, WIFI module and RFID module. Implementation details are given in the next diagram, chart 9.

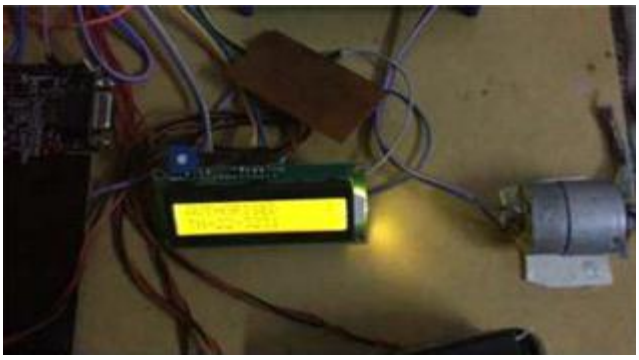

Chart 9: Communication from WiFi module to app

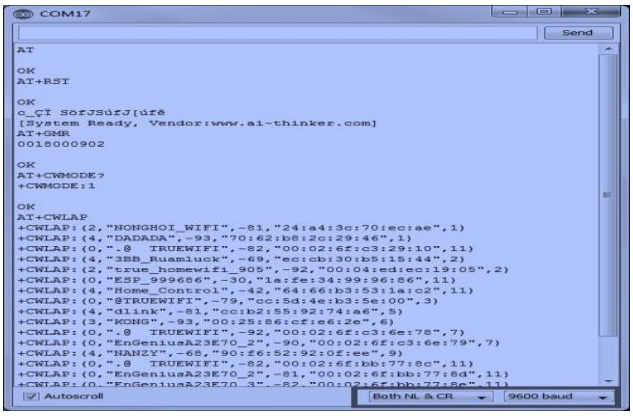

Chart 10: Authorized user

Chart 10 shows on RFID reader to check user if a user is authorized person or not.

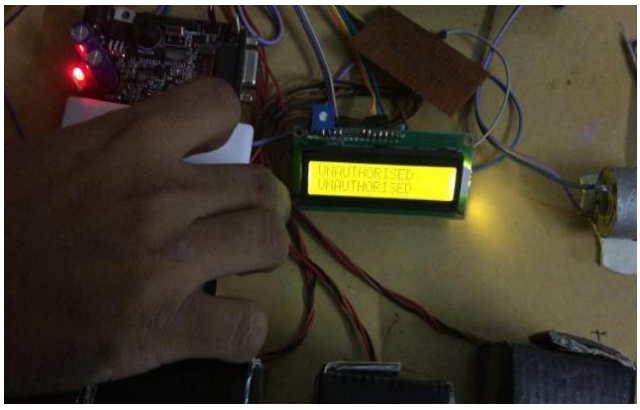

Chart 11: Unauthorized user

Chart 11 shows that the first time users need to register to avail the facility, otherwise they are not allowed to parking.

The following diagram illustrates how many slots are empty and how many slots are booked in the LED screen. Thus this makes it quite simple to use without any sophistication and is quite easy to grasp and user friendly.

Chart 12: Parking slots availability

6. 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.

REFERENCES

1. Supriya Shinde1, AnkitaM Patial2, pSusmedha Chavan3,Sayali Deshmukh4, and Subodh Ingleshwar5 "IOT Based Parking System Using Google", I-SMAC,2017, pp.634-636.

2. HemantChaudhary, PrateekBansal., B.Valarmathi," Advanced CAR Parking System using Arduino", ICACCSS, 2017.

3. Nastaran Reza NazarZadeh, Jennifer C. Dela,"Smart urban parking deducting system" ICSCE, 2016, pp-370-373.

4. PavanKumarJogada and VinayakWarad, "Effective Car Parking Reservation System Based on Internet of things Technologies ".BIJSESC, 2016, Vol. 6, pp.140-142.

5.Prof. Yashomati R. Dhumal1, Harshala A. Waghmare2, Aishwarya S.Tole2, Swati R. Shilimkar2,"Android Based Smart Car Parking System"-IJREEIE, Vol. 5, Issue 3, pp-1371-74,mar-2016.