

Android Based IOT Parking System

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Abstract: Nowadays, the concept of smart parking have achieved great popularity. Since, nowadays lots of people have their own vehicles, therefore the number of vehicles are increasing day by day. While the number of vehicles are increasing, the requirement for parking lot will also be restricted. Therefore to find a free parking space has become a problem for the people. The purpose of this paper is to introduce a smart parking model to find a vacant parking space and also reduce the wastage of time. With the help of Internet of Things we can easily allocate the vacant spaces. For successful completion of the project we have integrated Arduino UNO, Ultrasonic Sensor, LED light and Android Application together.

Keywords: Smart Car Parking, IOT, Arduino Uno, Ultrasonic Sensor

I. INTRODUCTION

Now a days many cities are moving towards modernization. Peoples are moving towards modern trends and also vehicles can be purchased at economical rates.so most of the people having their own vehicles and they are used to travel through them only. Due to this the issue of finding space for parking the vehicles is getting increased. Due to this problem of parking, trouble in finding vacant spaces, quickly finding an empty space in a multilevel parking garage is troublesome, particularly on weekends or on some open occasions. stadiums and shopping centers are sometimes swarmed for particular time, and trouble in finding empty openings at this sport is a noteworthy issue for client. Inadequate car parking space leads to activity blockage and also disappointment to the drivers. Because of the lack of parking space the drivers roams here and there in search of the parking space and this creates problem to the public walking on the road which also leads to the accidents while driving in narrower roads.

In our project we are going to built an IOT based model which can be used to overcome such parking problem. In this we are giving the information that, is there any free parking space is available or not. This can be found by using their smartphone without having tool deal with the hassle of driving around for finding parking space. The intension of our project is to indicate the number of free spaces. In our project user firstly can check the availability of parking slots online through their smartphone. The microcontroller reads the sensor values of parking slots and then transfers this information online over IOT through wifi. The IOT server is used to translate this information and map it over into a graphical format. If the user wants to book the slots for particular time then they can do this and the space will be booked for that particular span of time.

II. LITERATURE REVIEW

With the IoT, Alsafery et al. [1] proposed a smart parking system solution for smart cities. Aside from providing information about the number of parking spaces and nearest parking spaces, their system included with roads traffic congestion status. They applied the machine learning algorithm based on data analysis and data processing from the specific data collected by their own. They use cloud web service to collect data from fog microcontroller distributed devices around the users, analyze and process the data, before passing the information about nearest parking space to the user. To collect the data, the system requires lots of efforts which are expensive and costly, while the machine learning algorithm shouldn't be too complex to analyze lots of data in a real time. The above implementation require most cost in terms of hardware and software.

Meanwhile, Fikri & Hwang [2] dedicated their application for disabled people. They propose to secure the disabled parking space by using Near-field communication (NFC) tag reader and alarm system.

Differently, Chandran et al. [3] recommended a parking reservation system using Android application. User can also book the parking space in advance. They installed infrared sensor to detect the availability of free space.



III. METHODOLOGY

Smart Car Parking System Using Arduino UNO which delivers a main edge stopping innovation called as Smart stopping. It is a framework that helps the driver to get an empty parking spot. By using ultrasonic sensors at each parking space, one can identify that the parking slot is empty or is there any vehicle parked in that particular spot. Good parking framework demonstrates the client as a good and cost effective approach and also guarantee the clients to find the vacant parking space precisely.

As the population increases in urban areas, the usage of vehicles has also increased. It causes issue of unwanted stoppage of vehicles in public places which prompts traffic and also contaminates the air. When we visit different public places like shopping malls, cineplex, multiplex or restaurants, etc during some special occasion or function or enjoying the weekends makes big traffic issue. It was noticed that driver needs almost 10 to 15 minutes for finding the parking area for their vehicles to be parked. It also takes more amount of energy for searching empty parking spot. Through this project we discovered that how to overcome the above issue with the help of Arduino UNO. The primary goal of our system framework is to discover how to get the vacant parking slots easily. In recent course, it was notice that moment experts from various cities have built a framework called Parking Guidance and Information (PGI). This framework gives information about dynamic data for empty parking space and occupied parking space.

The elements of the proposed framework are:

- Drivers find nearest vacant parking space.
- Very few drivers will stop their car to find parking, because of this the traffic get reduced.
- Avoids air contamination and a dangerous atmospheric deviation.
- Scalable, hearty and solid.
- Reduces the stress of the driver.

IV. IMPLEMENTATION

The project consists of three main modules.

1. Data Collection Module (DCM)
2. Data Processing Module (DPM)
3. Data Display Module (DDM)

1. Data Collection Module:

In this, we used wireless sensors to collect data. This wireless sensor comprise of ultrasonic sensors, Arduino UNO, power supply. We place this wireless sensor at each parking space to detect the vehicles. Whenever there is a car in front of that sensor, it cuts the ultrasonic waves from the sensor and the waves from the sensor and the wave gets reflected back to the sensor showing that there is a vehicle. These values are then uploaded on a cloud.

2. Data Processing Module:

Data processing module is the next module of our project. In this, the cloud gets the sensor values from the node and it processes it to display the availability and non-availability of the parking space. Cloud finds the vacant places and sends that to the android application. The coordinates of vacant places are useful for the next module to display the vacant places on android application.

3. Data Display Module:

In this system, data display module is the last and most important module. This is the user interface module, in which whatever we have did in the last two module is displayed as a output to the user. By this the vacant spaces can be easily viewed by the user. Android application maps the values from the cloud with the Google map and displays this information on the android app that is accessible by the user.

For this proposed system, it contains four slots. Each of the slots is having one wireless sensor node and one LED which indicates the place is available or not. When user enters into the parking area, LED indication will help to find the vacant parking slot. When the availability of the parking place changes, immediately the information gets updated in the cloud, then user can access that information through internet from anywhere. This information also changes the status of LED which will be helpful for finding right slot at the parking place.

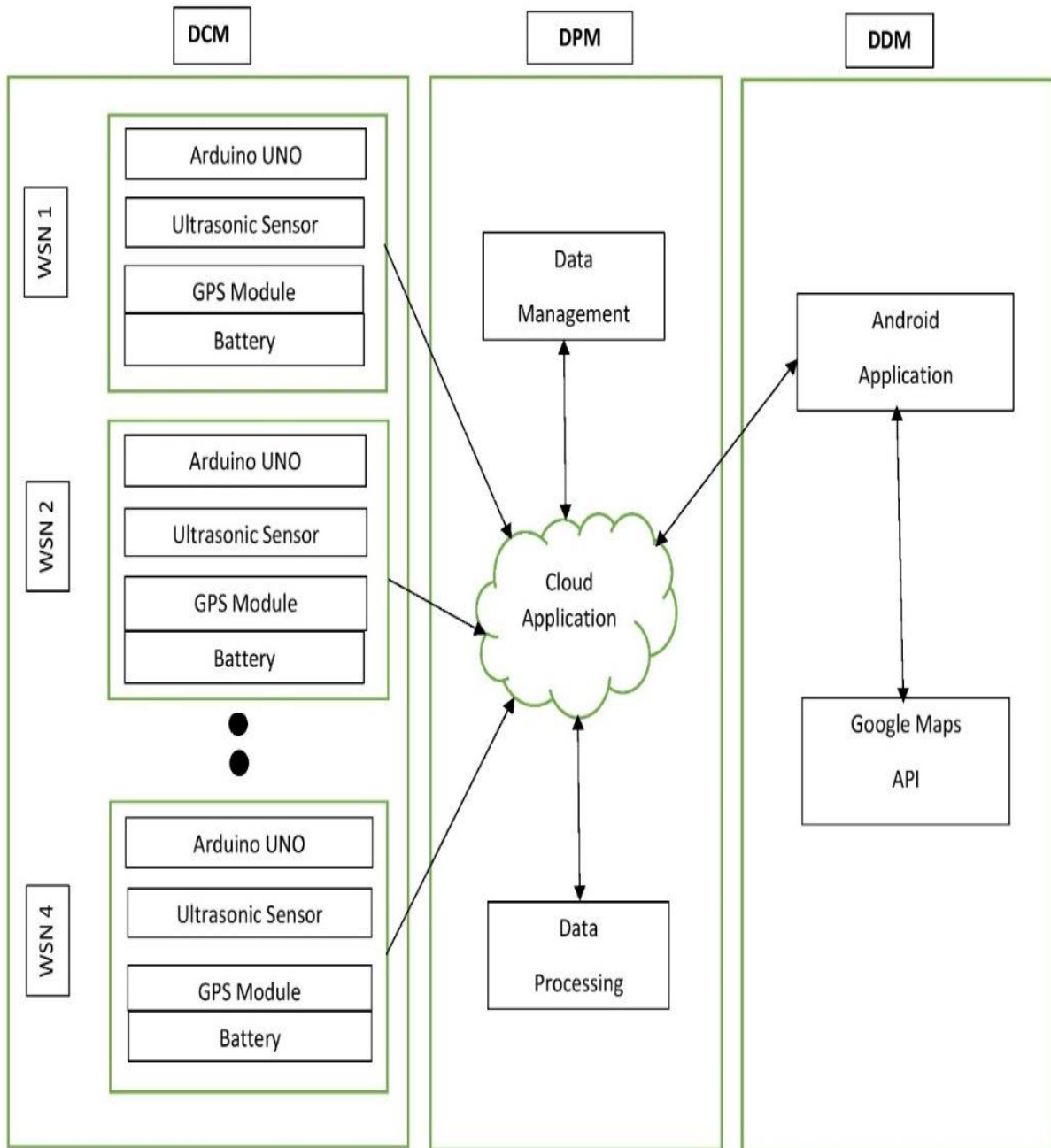


Fig. 1 Block Diagram

V. USE CASE DIAGRAM

We used use case diagram to show dynamic or behavioural diagram of the system. The functionality of the system is shown by actors and use cases. These are the set of actions, functions, and services of the system. In this case a system means something that will be operated or developed such as websites, android applications, etc.

In our System there are three actors namely Display, Car Driver and Manager. Work performed by them are shown below in the given use case.

Car Driver can perform the tasks like registration/login and check the parking status for the availability of space. If the space is available driver can park their vehicles in a parking slots. Once the vehicle is parked in the vacant parking space the database will be updated automatically. Otherwise it will show no parking is available.

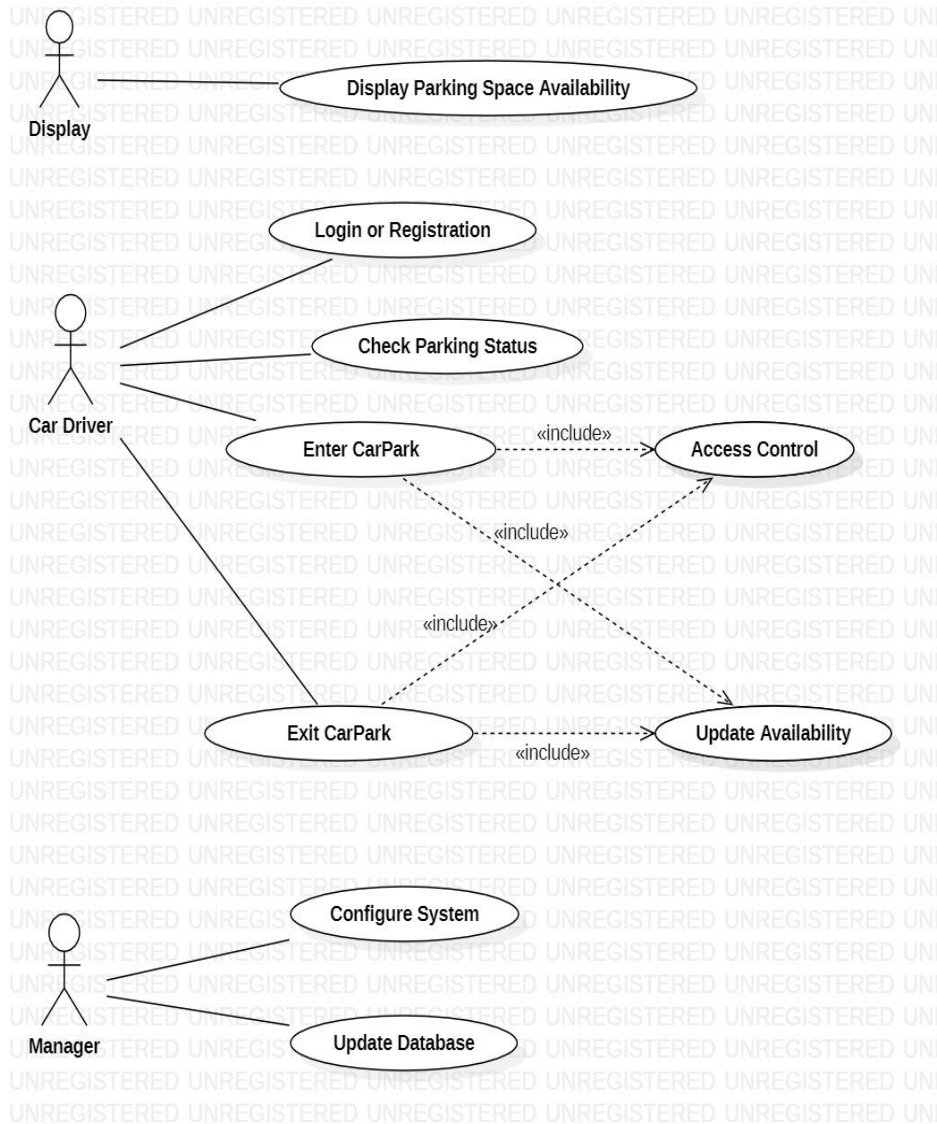


Fig. 1 Use Case Diagram

VI. CONCLUSION

This project detects the empty slots in parking area in various places of the city. This will help the driver to find free parking space in a minimum amount of time. It effectively reduces the average waiting time of users for finding vacant spaces. This proposed system provides the effective solution for finding the free parking space successfully.

In future, this project can be enhanced by including different applications, for example online payment. In future this system can be extended to public parking spaces like public streets where the lands are free for parking. This system will overcome the problems of time consumption.

REFERENCES

[1] Alsafery, W., et al. "Smart Car Parking System Solution for the Internet of Things in Smart Cities", in 1st International Conference on Computer Applications and Information Security (ICCAIS 2018), 2018, pp. 1-5
 [2] Fikri, R. M., Hwang, M. "Smart parking area management system for the disabled using IoT and mobile application", in Proceedings - 2019 IEEE International Conference on Internet of Things and Intelligence System, IoT&IS 2019, 2019, pp. 172-176
 [3] Chandran, M., Fadila, M., Nur Sabapathy, et al. "An IoT Based Smart Parking System," Journal of Physics: Conference Series, Vol. 1339(2019), pp. 012044



- [4] A. Ampuni, S. Fonataba, A. Fitrianto, and G. Wang, "Smart Parking System with Automatic Cashier Machine Utilize the IoT Technology," IEEE Xplore, 2019.
- [5] Yash Agarwal, Punit Ratnani, Umang Shah, Puru Jain "IOT Based Smart Parking System Using Android Application." Emerging Technology In Computing, Communication & Electronics (ETCCE) 2020.
- [6] "IOT Based Car Parking System" E&C dept. BLDEA'S V.P.Dr.P.G.Halkatti college of Engineering and Technology Vijayapur, India. IEEE Bangalore Humanitarian Technology Conference (B-HTC) 2020.
- [7] "IOT Based Parking Automation System". Computer Science Department V.E.S.I.T. , Mumbai, India. International Conference on Smart City and Emerging Technology (ICSCET) 2018.
- [8] "A Sustainable Vehicle Parking System." Department of Computer Science and Engineering Sathyabama Institute of Science and Technology. 3rd International Conference on Trends in Electronics and Informatics (ICOEI) 2019.
- [9] "IOT Based Smart Parking System." 5th International Conference on Intelligent Computing and Control Systems (ICICCS) 2021.
- [10] "IOT Based Parking Automation System." Computer Science Department V.E.S.I.T. , Mumbai, India. International Conference on Smart City and Emerging Technology (ICSCET) 2018.
- [11] "Smart Parking Model Based on Internet of Things (IoT) and Tensorflow." Computer Science and Engineering BRAC University. 7th International Conference on Smart Computing and Communications (ICSCC) 2019.
- [12] "Smart Parking Management System" Dept. of Computer Engineering Marathwada Mitra Mandal's College Of Engineering Pune, India. 5th International Conference on Computing , Communication, Control and Automation (ICCUBEA) 2019.