Smart Campus Parking Using IOT

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Abstract - *Smart Campus is approach that combines the modern technology with the human innovation in order to use resources efficiently. There are many different individual smart solutions which altogether makes smart campus with some approaches, in which the main approach is the smart parking. Locating parking space in campus, especially during the peak hours, is clumsy for drivers. We have developed a prototype to ease the problem of parking in the campus. This project comprises of an on-site placement of Internet of Things (IOT) module that is used to look after and provide the status of availability of every single parking spot which helps the user to locate the closest parking spot and gives information of available parking spots in that respective parking lot. This system uses functional sensors in parking area which are used to get the real time status of the parking using the deployed active data processing units. To get the real time available slots we have used the Google firebase real-time database. The Django web framework is used to create the web application so that user can get the information of the free available parking slot in the campus using Wi-Fi or Internet. Proposed approach mostly focuses on controlling the time in searching the parking spots and it also avoids the additional travelling through full parking spots in a parking area.*

Key Words: **Smart Campus, Internet of things (IOT), Google firebase, Django web framework, Web application, Wi-Fi.**

1. INTRODUCTION

Finding empty parking spots is a common problem in many of the university's campus, especially during the peak hours. This problem appears in the campus as most of the individuals uses their personal cars, resulting in a high number of cars entering the campus for a very few empty parking spots. However, lot of the time is wasted in looking for empty spot which creates traffic jam. The condition becomes terrible when there are more number of parking spots in every lane. This not only causes slow traffic flow but also wastes fuel and time. The search process for vehicle's parking spot is very frustrating and along with that time and fuel are also wasted. There are many some reasons why we need smart parking:

- There is a prediction that the number of cars in the world till 2035 will be double by 841 million cars in year 2008.
- According to research, near about one third of the traffic jam in most of the developed areas is caused by drivers in search for parking spots.
- On an average, every driver uses nearly 17 hours per year looking for a parking spot.

IOT technology grows in many different fields of smart applications but this development haven't found boundary constraints in this technology. It provides capacity to tackle with many challenges, as its design is enable to capture sensors data for monitoring different points of interest in smart campus. Recently, researchers have explored the potential use of the IoT in public transportation services and urban computing. Several models have been proposed to provide drivers with real-time information about available car parking bays nearby.

2. LITERATURE SURVEY

IoT based smart systems has attracted most of the researchers towards it since last two decades. These types of different systems are mainly popular, because its wireless sensor network has many different advantages, which includes its flexibility, its power of intelligence, its feature of low cost, the speed of deployment, and sensing, as it made of sensor nodes. The following discuss WSN-based parking systems, which includes sensors that are capable to look after the surrounding conditions. It is extensively used in academia, because it is easy to install and configure, and the low price of the system as it uses crossbow products. This system is able to spot entry of car to the car parking area, and it navigates the driver to an empty parking spot through signs displayed over the screen to the driver. [1]

There are many different technologies used for this type of system. One of which is RFID (Radio Frequency Identification), this system is proposed below [7]. In

different research papers, this type of RFID solutions makes it possible to control and give access to parking easily to assigned driver, mainly in the initial stages. The main idea of RFID technology is dependent on the electromagnetic field caused, which is able to identify and track the tags attached to objects. This type of system mainly uses a software program for managing and sending changes in the availability of the parking spots, and for the managing of tasks which includes the selecting closest empty spot and transferring the data to the user.

Another technology is Global Positioning Systems (GPS) technology [5] which is able to locate and track the vehicle's exact location. In the smart parking domain, it offers accurate data which includes the location and information of available spots at particular location. System is deployed with server which is associated with buildings on the campus with parking lanes in the form of distances between the building. After getting the closet empty spot, the user transfers the data to the server with a message that the vehicle is parked. After that the server updates the data accordingly. When the user takes his car out and want to pay, server generates the parking fee automatically. This type of system is able to search empty spots in particular parking lot.

3. PROPOSED SYSTEM DESIGN

The system is designed by describing the architecture of smart campus parking system which consists of three main parts: the sensor node which is placed at the parking area to detect the car and Raspberry P. The second part will be the google cloud which acts as the mediator between the sensor node and the user web application. The third part is the user web application.

Every parking place has to install a sensor, so that the sensor device updates the status. The hardware mainly consists of the connection between the Raspberry Pi and sensor. The sensor is connected with Raspberry pi with the help of jumper wires. The System is complied using Raspbian pi operating system and the output from the sensor is received at Raspberry pi. The Raspberry pi gets the input from the sensor which it receives and then it is send to online cloud platform using internet.
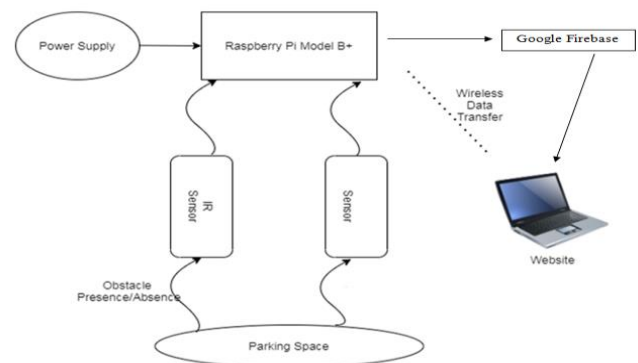

Fig. 1 – Block Diagram

When the Raspberry pi gets the data from the sensor it sends the data to online cloud platform Google firebase. The data which is send to google firebase is to be changed so that the google firebase can accept it and can further transfer it to website. The output of the Raspberry Pi is not on same platform which the google firebase accepts, so to bring it on same platform there we have to make an algorithm which can be used to get the data to google firebase. The information of the parking slot which is required for the user is received after the algorithm which we process and the output is generated. We can get the real-time output using google firebase. Weather the slot is empty or full the data is displayed on the google firebase platform.
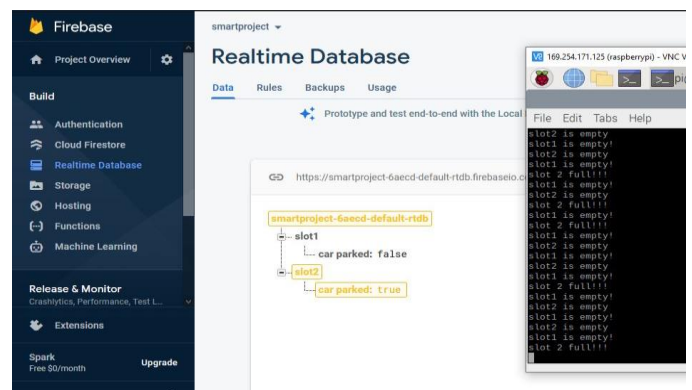

Fig. 3 – Google firebase real-time data

The most important part of the project was website designing as it was the part which will be used by the user to get the information of the available parking slot. The HTML language is used to develop the website will CSS for design and graphics. The connection between the website and Google firebase was developed using Django framework. The Django framework makes it easy to connect any cloud platform with our website to get the real-time data. The slot where displayed on the page so that user can get the information of the empty slot. It is developed using user point off view. The

website has a proper graphics and the slot which is similar to slot on ground. The website can be visible with the help of URL given to the user and then can be used to see the available slot for parking.

There are many applications of this proposed system such as, it can be used in open spaces and also in basement parking of campus. It can be used in Smart building containing many technologies integrated with it. Apart from the various application this system has many advantages also, which includes: Optimized parking spots, reduced traffic jam, reduced pollution cause by cars in traffic jam, it Enhances the user experience, it increases the Safety of your parked car, it transfers real-time data, it also decreases management cost.

4. RESULT

This designed smart Campus Parking solves the problem of drivers to find the empty parking slot. The system is able to access and to find the empty parking spot from different location using web application. As this reduces the time of searching the parking spots in the parking lot and it also resolves the useless travelling of vehicles across the full parking lots in a campus. The hardware placed in parking slot is also easy to access and managed by the administer.
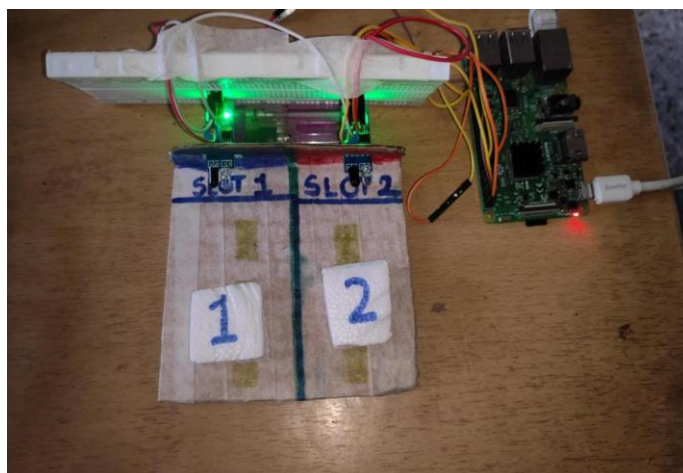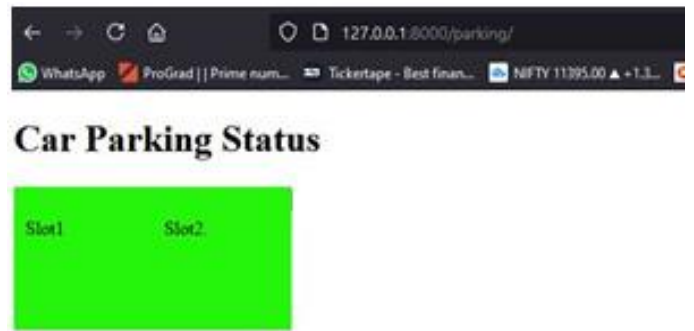

Fig. 2 – Hardware implementation

Fig. 3- Web application as seen in browser

5. CONCLUSION

This study mainly concentrates on the problems regarding the parking spots and aims to resolve it. So that the user is able to find a parking spot easily and also saves time of the user. It is well controlled to get the status of available parking spots from different location through web application. It resolves useless travelling of cars across the full parking spots in a campus. It also reduces time required for finding parking spot and it is cost effective. The large scale applications will be considered in our future study.

6. FUTURE SCOPE

The automated parking fee system for visitors and it would allow people to travel without cash. It can have many different expertize as managing multiple parking system and multiple slots at different location. It can also be used in many different application as per the requirement. We can interface the camera with the system to know the details of the car parked.

8. REFERENCES

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