Parking slot availability check and booking system over IOT

Aditi Maharjan
aditimaharjan250@gmail.com
Computer Science and Engineering-
Internet of Things
Faculty of Engineering & Technology'
JAIN (Deemed-to-be University)
Bengaluru, Karnataka, India

Prabhesh Yadav
yprabesh4@gmail.com
Computer Science and Engineering-
Internet of Things
Faculty of Engineering & Technology'
JAIN (Deemed-to-be University)
Bengaluru, Karnataka, India

Mustafa Mansoor
mustafa.mm0000@gmail.com
Computer Science and Engineering-
Internet of Things
Faculty of Engineering & Technology'
JAIN (Deemed-to-be University)
Bengaluru, Karnataka, India

Basavaraju D.R
Assistant Professor
Computer Science and Engineering-
Internet of Things
Faculty of Engineering & Technology'
JAIN (Deemed-to-be University)
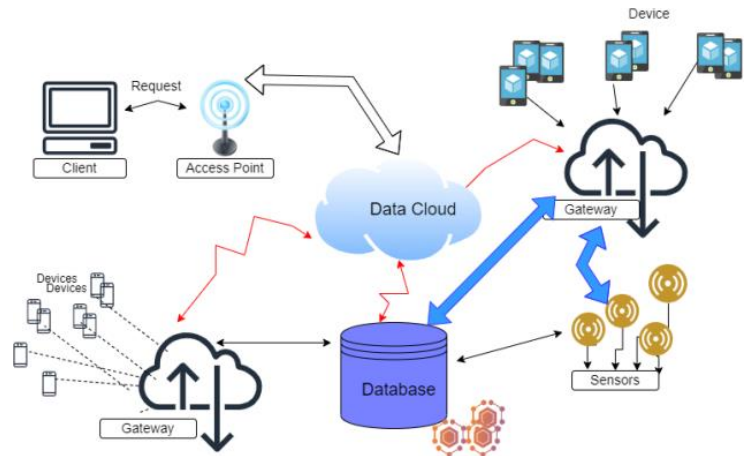*Bengaluru, Karnataka, India*

Abstract— IOT enables computer and internet-based monitoring and control of many devices. Parking is one of the main problems in the modern world, one potential answer to this growing issue might be the creation of a system that identifies and alerts the user. The proposed system identifies the parking slot in the parking area. The system will send the user an SMS notice and give them the option to reserve based on the availability. If there are no slots, the customer is notified which saves them time as well as fuel consumption. The GPS, which will provide knowledge on the place where the slot is accessible, will be one of the other important factors. Also, it will be equipped with a system for calculating vehicle arrival and departure times. This system would enable users to reserve a time slot in which they must even adhere to the predicted arrival time, making it simpler for other users as well.
Keywords- Parking, IOT, sensors, smart devices, infrastructural development.

Fig 1: Brief Working of Parking System.

I. INTRODUCTION

The Internet of Things (IoT) is a collection of tangible items; it includes all the embedded system that is to be use in day to day life. Each object has an embedded computing system that makes it individually recognisable, yet they can all work together within the current Internet infrastructure. The two key terms in the phrase "internet of things" are "Internet" and "Things," where it enables data to be sent and received across various devices. IOT can transmit data over a network without requiring human contact. IOT enables users to send data to the cloud while also assisting them in maintaining transparency. Our smart parking system project will use the internet of things to provide real-time parking spot availability.

Road congestion produced by car is an area of growing concern at a worldwide scale and is currently developing tremendously. As the vehicle are increasing in metropolitan cities, parking space are never vacant. All the city has working people with vehicle with them and all the people using vehicle needs a space to park their vehicle so there is always a cartage of the space to park vehicle or empty space. People are seen parking there vehicle.

A smart parking system generally gathers of moving as well as the parked vehicle using local small and convenient sensor we can make a better space for the vehicle to park. The area that is vacant can be easily modified using the internet of things to a smart place for the vehicle conveniently.

II. LITERATURE REVIEW

Research has demonstrated that locating parking places is a major issue in packed cities, contributing significantly to air pollution, traffic congestion, and fuel waste. If the drivers were aware of the spots' availability or lack thereof, these impacts may be greatly reduced. As a result,

we created a system that can inform a user about a slot remotely and reserve a spot for him to park his vehicle. The user can save time and gas by avoiding the specific parking spot if spaces are not available. We have thought about and investigated the few systems that have been created so far to address this issue. [1]

Research has demonstrated that locating parking places is a major issue in packed cities, contributing significantly to air pollution, traffic congestion, and fuel waste. If the drivers were aware of the spots' availability or lack thereof, these impacts may be greatly reduced. As a result, we created a system that can inform a user about a slot remotely and reserve a spot for him to park his vehicle. The user can save time and gas by avoiding the specific parking spot if spaces are not available. We have thought about and investigated the few systems that have been created so far to address this issue. [2]

Smart buildings have long been a pipe dream. With the evolution of technology, smart gadgets are becoming more prevalent in daily life, turning the goal of a smart city into a reality during the past few years. This article describes the implementation of a management system which makes use of RFID (Radio frequency identification) technology. In order to alert drivers, IR (infrared radiation) sensors are positioned in front of parking spaces. If there is no one in the parking space, the LED will flicker; if there is someone there, the LED will be off. When the car is parked, the RFID analyses the data, cuts the adequate amount, and uses IOT to send the owner an SMS with the position through GSM and GPS. [3]

A system with a PIC16F73 microcontroller, IR sensors, and a WI-FI module was suggested by Dr. Y. Raghavender Rao. Also, a controller and a WI-FI module are interfaced with a webpage that displays information about parking availability in the neighborhood. If the car is present in specific space, the IR sensor signals our website with the information. The users then use this information to determine if a parking space is available. In this manner, the user may learn if the parking lot is open or closed. [5]

Many of the earliest private parking lots were built by street railway firms in the 1920s in an effort to draw consumers. Their goal was to provide plenty of parking spot at their metropolitan terminals, making it simple to transition from a car to a train. The Hotel La Salle's parking garage at 215 West Washington Street, in the West Loop neighborhood of downtown Chicago, Illinois, was constructed in 1918, according to records. It was created by Roche and Holabird. Parking sensors were initially created in the 1970s as a tool for the blind, but it wasn't until 2003 that they were first incorporated into mass-produced automobiles. The first automobile with bumper sensors was the Toyota Prius, which was initially made accessible to the general public. Due to the widespread use of smartphones in urban life, virtually everyone may access the app. The idea of an automobile parking system has been adopted by several cities. Yet, such a system may be expanded utilizing IOT to increase the advantages and take use of the most recent technological advancements. This essay provides a quick overview of the Raspberry Pi-based smart parking system

that we want to create. The user may reserve a free space and view the status of slot availability in real-time. [6]

III. PROPOSED METHODOLOGY.

Automatic parking collects information on accessible vehicle space in a specific area analyses in now position of cars in respective spots. All these consist of low-cost sensors, now and here data collecting, and automated cashing networks that is to be accessed by mobile, enabling everybody to reserve parking in advance or to estimate parking availability extremely precisely.

The approach for collecting information rather than end time data. We have used IR sendor that is used to gather the information of the real time parking area vacancy and availability and for updated.
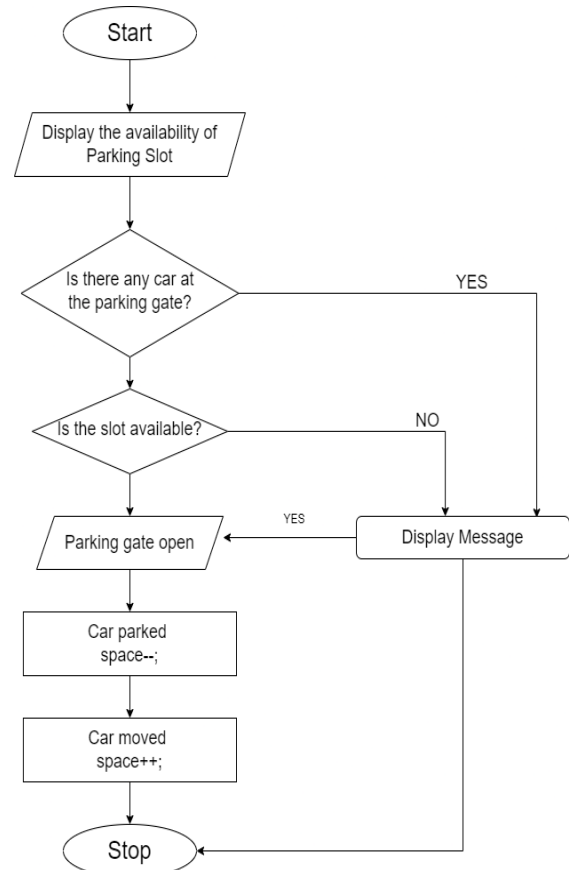

Fig 2: Flowchart of how the structure works

The vehicle owner can find the nearest parking spot which is available as per their convenience by our website or they can directly visit. When they go to the parking space there vehicle is inspected if it was booked before or not if yes it will be led to the designated space if not the system will check if there is any spot empty in our area. If there is a space or the space has been booked then the advanced monitory check is done and the vehicle information is taken and let them go inside the spot. The entry and exit of the vehicle is monitored by the IR sensors kept on the

entrance of the parking space which will calculate the total amount of vehicle entered and exited from the space. Each parking space has a connected IR sensor which will check if the space is empty or full and update the system accordingly. The count of the vehicle and the total spot occupied are calculate and checked for the better space and security of the vehicle.

Similarly while booking online the person will check for the nearest parking spot if they find it they will check if there is any vacant spot for them or the parking area is full. These all the process will be carried out by a website. If they find the parking spot in their desired area they will book the spot online and reserve their seat there by filling all the required details that they are asked and making some advance payment. All the details given by the users online or offline while they arrive will be updated in the database where all the details will further be stored in cloud for safety. For proper error correction and detection database management system will be implemented will be check for any unwanted data's or any human errors and notifies.

IV. SIMULATION

- GUI WEB-PAGE

Better than using ancient technology user interfaces, hooding boards, or signals, our system the enables people to communicate with equipment using icons and aural indicators. CLIs (command-line interfaces), that need human to give instruction on a device, are thought to have a significant reading environment. GUIs were created as a countermeasure. Inside a GUI is use to carry out the use interface in the own way by manipulating the data in graphical way.

- Database management system (DBMS)

Database is use to collect the information of the people in the appropriate way so that the list of the people entering the space and exiting can be monitored in the appropriate manner. Database helps to manage the list in the appropriate order. Due to database the data's can be secured and private from the other harmful theft of data and a better security for the data. By normalization which is the part of database we can divide a huge data table to the smart and small values so that it can be handled properly, DBMS improves the structure of data Database provides a number of advantages like for the betterment of the text and the area of the way that the data's are to be stored by the functions for the database.

.

- Cloud Storage

Cloud storage refers to a method of storing digital data in logical pools that are hosted on "the cloud". This means that the physical storage of the data is spread across multiple servers, which may be located in different places. The responsibility of the cloud is to make sure that the data remains for all the people whenever they require, and that the environment is secure, supervised and operational. Users and companies can purchase or rent space from these clod for their data, including user data, organizational data.

In addition, cloud storage services can be integrated with other cloud computing services, providing a comprehensive solution for storing and managing data in the cloud.
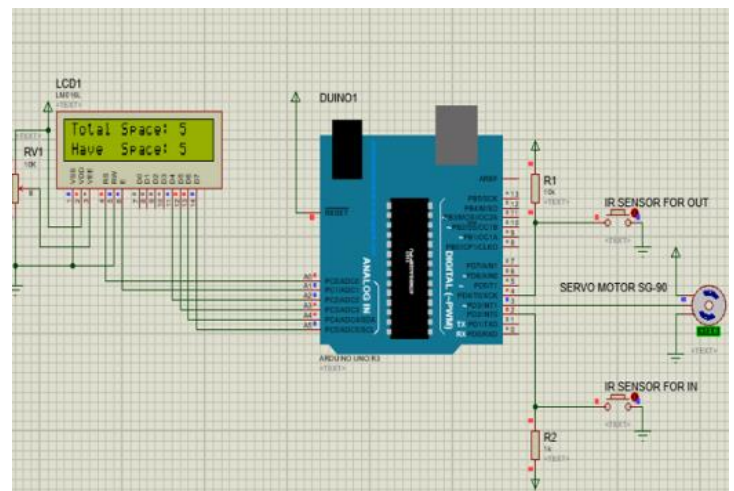

Fig 3: Simulation of Proposed Parking System

V. HARDWARE

- Arduino Board

Arduino is a platform that is open-source and designed for creating electronics projects. It includes a physical circuit board, which is programmable and often called a microcontroller, as well as an Integrated Development Environment (IDE), which is a software program in your device. The IDE is for writing and uploading code to the hardware or sensors.

- IR Sensor

An IR sensor is a sensor that used light to detect object present in its surroundings. It is used to detect the heat of an object and also sense its motion. Infrared detector or receivers are used to detect the infrared radiation and convert it into an electrical signal, which is processed by signal processing circuits.

- *LCD display*

LCD display is a liquid crystal display which consists of the electronic modulated optical device and a display panel used for emitting modulation of light by the help of liquid crystal by the process called as polarization.

- *Breadboard*

A breadboard is a connection board which has interconnected ports to which different sensors and actuators can be connected.
Servo motor

A servomotor is a kind of actuator that is used to control precise angular or linear position, velocity, and acceleration.
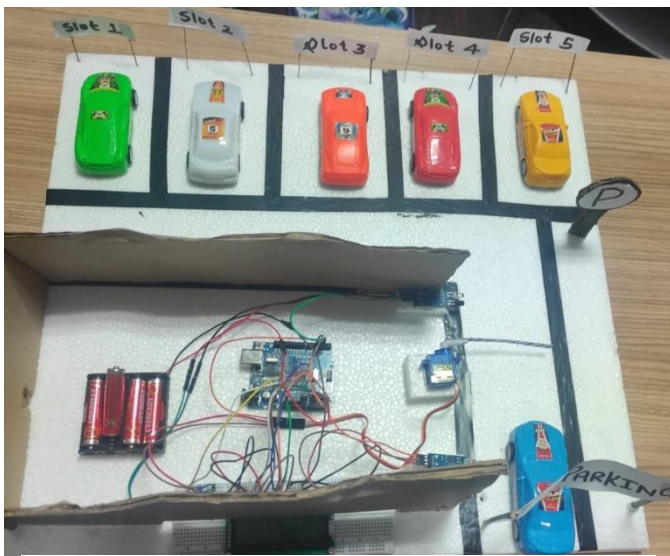

Fig 4: Hardware implementation of Proposed Parking System.

VI. ADVANTAGES

- Consumption of Less Fuel
- Minimize the Personal Carbon Footprint
- Reduce Parking Stress
- Reduce Search Traffic on Streets

VII. CONCLUSION

Implementation of Cloud based smart parking system using IoT has been developed. It gives an effective solution for the present day problems by reducing the waiting time and minimizing the cost through real time updating of the status of the Parking Slot availability with the help of the Internet. Overall, the implementation of these parking models we can be an effective solution to address the challenges associated with traditional parking systems.

VII. FUTURE SCOPE

The smart parking industry is constantly evolving, with new technologies being developed and integrated into parking solutions. For example, camera-based systems can be used to monitor parking spaces and detect whether they are occupied or vacant, while wireless communications can be used to transmit data between parking sensors and centralized management systems. Data analytics can be used to analyse parking data and provide insights into parking patterns and usage, while induction loops can be used to detect the presence of vehicles in a parking space.

Smart parking meters can also be used to provide more flexible payment options, such as mobile payments and real-time pricing based on demand. Advanced algorithms can be used to optimize parking operations, such as predicting parking demand and adjusting pricing to incentivize parking in underutilized areas. As the smart parking betterment we can acknowledge more advancement in technologies and results being developed to address the obstacles of parking in urban areas.

Moving Toward Automation

The future of smart parking is likely to be heavily influenced by the development of AVs. These vehicles are expected to be more efficient and effective at finding and utilizing parking spaces, potentially reducing the need for parking lots and freeing up more space in cities for other uses. However, as mentioned, the deployment of smart parking systems can come with challenges, including high acquisition costs and the need for on-going maintenance and updates. Additionally, there may be concerns around data privacy and security as these systems rely on the collection and processing of large amounts of data. When technology tends to evolve, it is necessary for stakeholders to tackle these problems and ensure that smart parking solutions are sustainable, accessible, and safe for all users.

REFERENCES

[1] Rico, J., Sancho, J., Cendón, B., & Camus, M. (2013). Parking Easier by Using Context Information of a Smart City: Enabling Fast Search and Management of Parking Resources. 2013 27th International Conference on Advanced Information Networking and Applications Workshops, 1380-1385.

[2] Yanxu Zheng, S. Rajasegarar and C. Leckie, "Parking availability prediction for sensor-enabled car parks in smart cities," 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Singapore, 2015, pp. 1-6, doi: 10.1109/ISSNIP.2015.7106902.

[3] Zhou, F., & Li, Q. (2014). Parking Guidance System Based on ZigBee and Geomagnetic Sensor Technology. 2014 13th International Symposium on Distributed Computing and Applications to Business, Engineering and Science, 268-271.

[4] Botta, A., Donato, W.D., Persico, V., & Pescapé, A. (2016). Integration of Cloud computing and Internet of Things: A survey. Future Gener. Comput. Syst., 56, 684-700.

[5] Ji, Z., Ganchev, I., O'Droma, M., & Zhang, X. (2014). A cloud-based intelligent car parking services for smart cities. 2014 XXXIth URSI General Assembly and Scientific Symposium (URSI GASS), 1-4. [6] International Parking Institute, "2012 Emerging Trends in Parking".

[7] Ballon, P., Glidden, J., Kranas, P., Menychtas, A., Susie, & Graaf, S.V. (2011). Is there a Need for a Cloud Platform for European Smart Cities.

[8] FastPark System website, http://www.fastprk.com.

[9] Chen, S. Y., Lai, C. F., Huang, Y. M., & Jeng, Y. L. (2013, July). Intelligent home-appliance recognition over IoT cloud network. In Wireless Communications and Mobile Computing Conference (IWCMC), 2013 9th International (pp. 639-643). IEEE.