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Smart Parking System to Reduce the Traffic Congestion

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ABSTRACT

The project is entitled SMART PARKING SYSTEM using Iot, the major motivation of this project is to reduce the traffic congestion in roads, multi-storeyed buildings, and malls due to the unavailability of parking spaces. The project displays the nearest empty slot if present concerning user location. Our project aims to make efficient use of parking spaces. We track vacant slots in the parking space and assign that to the user. Smart parking systems as described above can lead to an error-free, reliable, secure, and fast management system. In recent times the concept of smart cities has gained great popularity. Thanks to the evolution of the Internet of Things the idea of a smart city now seems to be achievable. Consistent efforts are being made in the field of IoT to maximize the productivity and reliability of urban infrastructure. Problems such as traffic congestion, limited car parking facilities, and road safety are being addressed by IoT. The proposed Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space. A mobile application is also provided that allows an end user to check the availability of parking spaces and book a parking slot accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the system in the form of a use case that proves the correctness of the proposed model.

Key Words: Internet of Things, NodeMCU WIFI module, IR sensors.

1.INTRODUCTION

The project entitled Smart Parking System is to manage all the parking facilities for a user. With the recent growth in the economy and due to the availability of low-priced cars in the market, every average middle-class individual can afford a car, which is a good thing, however the consequences of heavy traffic jams, pollution, less availability of roads and spot to drive the motor car. One of the important concerns, which is to be taken into account, is the problem of parking those vehicles. However, if there is space for parking the vehicle so much time is squandered in finding that exact parking slot resulting in more fuel intake and not also environment friendly. It will be a great deal if in some way we find out that the parking itself can provide the precise vacant position of a parking slot then it'll be helpful not limited to the drivers but also for the environment. Initially when the user is about to enter the location the LCDs the number of empty and filled spots and when the user is with their vehicle near the parking detection sensor, he/she would be thrown a notification on their mobile app of the parking slot number, where they should park their vehicle.

2. LITERATURE REVIEW

Searching for parking wastes significant amounts of time and effort and leads to substantial financial costs. This is particularly the case for people who are always pressured to be on time. Smart cities employ all kinds of modern technologies to manage and enhance resources effectively. Urban parking facilities are one of the essential assets that must be managed. We developed a smart parking management system (SPMS) as a modern solution to manage parking and save users time, effort and cost. In the context of today's modern life, it has become necessary to improve search methods for available parking and minimize the congestion that occurs at the parking entrance. Searching or booking available parking online earlier is a better substitute than searching at a parking lot where there is a possibility of not being able to find parking. Our smart parking management system was developed to:

Manage parking and solve problems efficiently using technology

Apply technical solutions to improve the smart cities concept

3. PROPOSED SYSTEM

The proposed system uses a variety of technologies that help manage parking. It provides essential services for users, including searching for parking, reservations, and payment. It is extended to cover more advanced services such as receiving notifications, statistics, and monitoring the parking state. The system is connected to sensors to detect occupancy and an automatic number plate recognition (ANPR) camera to control access

4.COMPONENTSNEEDEDFORIMPLEMENTATION

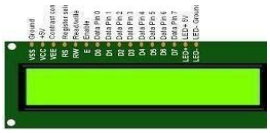
4.1 Node MCU

The NodeMCU as shown in Fig 4.1has assimilated TCP/IP protocol that can give any microcontroller entrance to the Wi-Fi network that supports 2.4 GHz Wi-Fi (802.11 Wi-Fi standards).NodeMCU is capable of either connecting to an existing wireless connection or hosting an application over HTTP protocol. Each Node MCU module comes pre-programmed with an AT

command set firmware which means one can simply link this up to your Raspberry Pi device and get about like a Wi-Fi shield. The reason why we use node MCU is that it is more cost-efficient for Arduino uno, Arduino we have to use an ethernet shield which provides us secure ethernet connectivity whereas all these features are provided by node MCU and it also comes with an

updated feature of wi-fi, where you can power or connect your system by Wi-Fi.

4.2 16*2 LCD Display



An LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 LCD is a very basic module commonly used in DIYs and circuits. The 16×2 translates to a display of **16** characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix. The 16*2 display is used to display the number of vacant and spilled spots. It also gets updated on the display LCD when the vehicle parks or unparks the vehicle.

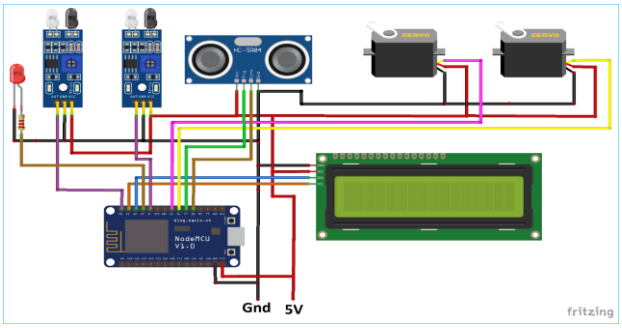
4.3 IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herschel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was the highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five

degrees Kelvin) gives off infrared radiation. We are using three IR detect sensors in our project, one IR detect sensor is used to sense the vehicle near the parking sensor and the other two IR detect sensors are used to send data to the node MCU which is the brain of our system whether a vehicle is parked in that slot or is unparked.

4.5 System Architecture

The below diagram shows the pin diagram of our model. It consists of one node MCU, one DC motor, one 16*2 LCD, and three IR sensors. The node MCU is the brain of our system which powers all the other devices. The 16*2 LCD is powered by node MCU by connecting jumper wires from the display to node MCU. The DC motor is also powered by node MCU connecting its pins to node MCU. The IR sensor consists of three pins, where two pins refer to the power supply and ground and the other pins refer to the pin which is going to be connected in the Node MCU. On successfully connecting all the components in the given figure now have to connect the Blynk app. While using the Blynk app we have to specify the widgets used in our Android app and the PIN to which they are connected to node mcu in the actual model so that the mobile app will react exactly to the inputs provided in the model.



5. RESULT

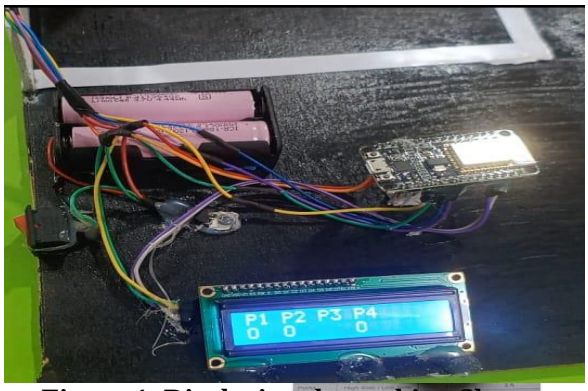


Figure-1. Displaying the parking Slots

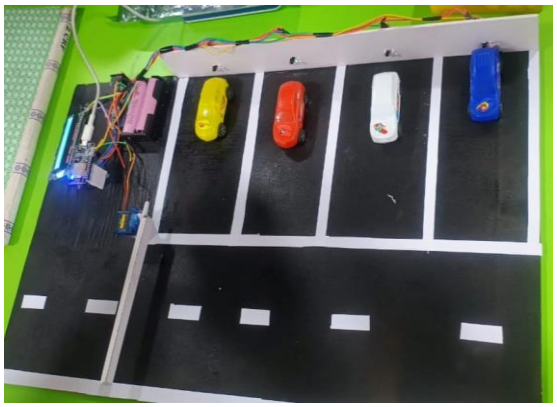


Figure-2. The parking was filled and the gates were closed.

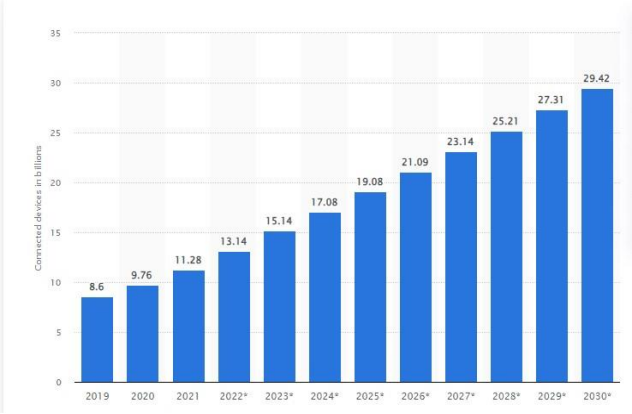


Figure-3: It shows the future usage of Our product.

6. CONCLUSION

The concept of Smart Cities has always been a dream for humanity. Since the past couple of years ago large advancements have been made in making smart cities a reality.

The growth of the Internet of Things and Cloud technologies have given rise to new possibilities in terms of smart cities. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this project, we address the issue of parking and present an IoT-based Cloud integrated smart parking system. The system that we propose provides real-time information regarding the availability of parking slots in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this project are intended to improve the parking facilities of a city and thereby aim to enhance the quality of life of its people.

7. FUTURE WORK

7.1 QR code generation

Generating the QR code at present we are using the BLYNK App later ever willing to use the prototype needs to buy the Network gateway and then a particular QR code will be generated.

7.2 Improving the battery power:

The Servo motor uses a high amount of power in place of 5V batteries we need to use the power batteries with the highest capacity and we replace the Ultrasonic Sensors in the place of IR Sensors because of distance Coverage.

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REFERENCES

1. Abdul Ahad, Zishan Raza Khan, Syed Aqeel Ahmad, “Intelligent Parking System” Scientific Research Publishing, Vol.4, No.2, pp. 160-167, May 2016.

2. Dr Y Raghavender Rao,” Automatic Smart Parking System using Internet of Things (IoT)” International Journal of Engineering Technology Science and Research, Vol. 4, No.5, pp.225-258, May 2017

3. Suprit Atul Gandhi, Hasan Mohammad Shahid,” Smart Parking System”

4. Asian Journal of Convergence in Technology, Vol.4, No.1, May 2017Benson, J.P.,
T. O'Donovan, P. O'Sullivan, U. Roedig and C. Sreenan et al.,” Car park management using wireless sensor networks”, Proceedings of the 31st Conference on Local Computer Networks, Tampa, FL., USA., pp: 588-595 November 2006.

5. Geng Y. and Cassandras C. G, “A new smart parking system based on optimal resource allocation and reservations,” in Proc. IEEE Conf. Intell. Transp. Syst. pp. 979–984, July 2011.

6. M. M. Rashid, A. Musa, M. Ataur Rahman, and N. Farahana, A. Farhana, “Automatic Parking Management System and Parking Fee Collection Based on Number Plate Recognition.”, International Journal of Machine Learning and Computing, Vol. 2, No. 2, April 2012, Published 2014.

7.Arduino.cc. (2018). Arduino - ArduinoMega2560. , retrieved date: 21Oct.2018, online available at:https://www.arduino.cc/en/Guide/ArduinoMega2560