Smart Parking System

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The idea of smart cities has gained momentum in recent times which is becoming more popular with the upcoming concept of the internet of things. Smart cities particularly aim to use the resources efficiently and integrating with it has increased the productivity and reliability over the technology for the urban infrastructure. IoT can cater to many complex situations and one such problem faced by the commuters in smart cities is of parking as with increasing number of vehicles and scarcity of parking facility and traffic congestion there is a demand of smart parking system which solves this problem. This IoT smart and efficient parking system will not only solve the problems from the consumers perspective but also would solve difficulties faced by the management of these parking lots, with the IoT tapping in this system

***Index Terms*—IOT,Arduino,Ultrasonic sensors.**

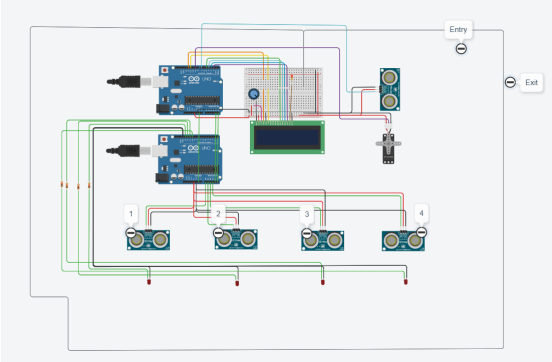
I. Introduction

IN the recent, the concept of smart city has gained appreciation. One of the important considerations of being a smart city is the Smart Parking facility. Finding a particular space to park our vehicle becomes an annoying issue. Besides, number of vehicles in like manner rapidly grows once every day. It has been seen that the drivers struggle to find a halting extent without thinking about where parking space is open. The request for the parking space prompts to develop the traffic congestion and excess consumption of fuel. To create a optimize solution for the crisis, many technologies evolved but it didn't benefit all varying with expense, efficiency, power, accuracy and other factors. In this review, we created a prototype of a novel smart parking framework for an urban domain in light of reservation utilizing Internet of Things (IoT) by using Raspberry-pi. Initially, our research gives a brief overview of the concept of smart parking system and the need for IoT devices to be integrated with cloud. Promote, we prove with artifacts that the prototype based on smart parking system using IoT finds a solution to the traffic congestion and ease the way to get a parking slot.

II. Literature Survey

In this section, some of the most representatives proposal in this area are described. In [8], an architecture for smart parking is proposed employing a mobile application connected to the cloud. The system provides parking facilities in real-time and users are able to reserve places and make payments before arriving at the parking space. There exist other systems that use wireless communication to reserve places and recommendations of nearest parking spaces through the global positioning system (GPS) [5]. The system transmits the availability of spaces every 2 min. If all parking spaces are occupied, no actions are considered; in the other case, any user is able to reserve a place within 2 km of their location. The GPS coordinates are available for any smartphone; then, the user receives a message with directions. The application requires a WiFi connection and no action is performed if there is a car parked in every parking spot. An intelligent parking algorithm is presented in [6], which calculates the optimal parking space for the user based on the distance of trajectory and time. It should be noted that the system does not have the reservation service and is subject to the availability of the space at that time. On the other hand, in the smart parking system proposed in [7], the authors presented the management of parking spaces in real-time using the cloud as a means of communication and a database. The system has a mobile application to make space reservations and an ultrasonic sensor placed on the ground connected via Ethernet. A novel parking system designed for smart cities is proposed in [9]. The system is connected to the cloud, and the guidance function is based on the Ant Colony Optimization algorithm (ACO) to calculate the shortest path between two points, the user and the available space. The authors did not present any application. There exist some proposals which focus their efforts on the available technologies for smart parking spaces. In [10], sensors, technologies, and interfaces are used to collect and display real-time parking occupancy information. Some applications are compared with this proposal and the results show that the parking occupancy sometimes cannot be displayed due too few connected users to the application. The authors explained that all the existing smart parking technologies and applications are not suitable for open parking lots due to varying environmental conditions and high expenditure. These current smart parking systems allow parking a vehicle quickly and efficiently. However, they require special infrastructure that is expensive in terms of installation, time, and money. The preceding raises an area of innovation opportunity in the automation of private parking lots looking for practicality in its installation, modularity, and design, which may trigger the introduction of new business models

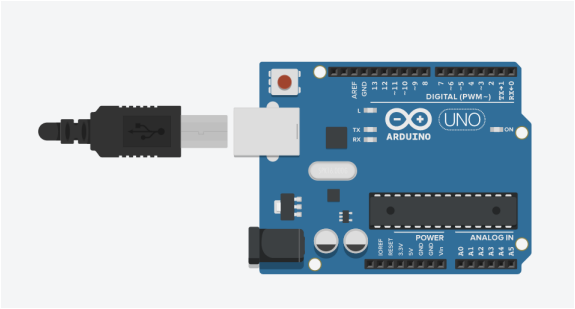
III. Methods And Experimenatal Setup



A. Hardware and Software Used

1) Arduino Uno R3

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program.

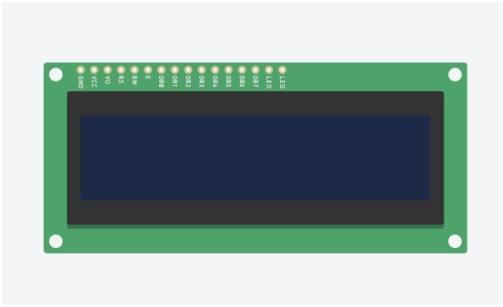


2) Ultrasonic Distance Sensor

Ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

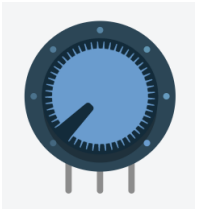
3) LCD 16x2

It has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots.



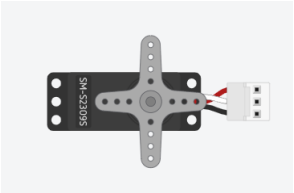
4) Potentiometer

A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat.



5) Mico Servo

Tiny little servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds you're used to but smaller. You can use any servo code, hardware or library to control these servos. ... Of course, its not nearly as strong as a standard servo.



6) Resistor 1k

7) Red LED

8) Resistor 220

With this system we succesfully implemented a sensor based smart parking system which makes it conviniet for the drivers to park their vehicles.We were not able to distinguish the object which is in the range of the sensor with this system,so this will be our future work path.

IV. Results and Discussions

The under taking of "IoT based Smart Parking framework" was outlined with the end goal that the status of availability of the parking space that can be shoed to the driver before entering the parking space.In this system the availability of the parking space and which parking space is available will be displayed on an LED display board.This system shows a constant real time approach to collect constant activity data time information in regards to availability of parking space.

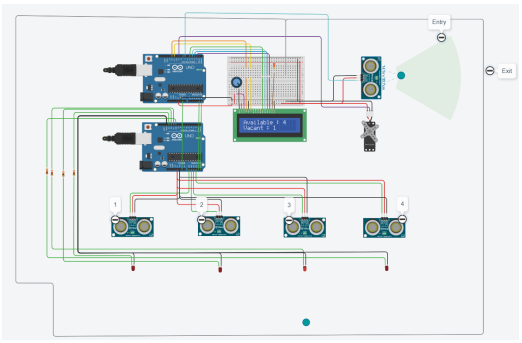


Fig. 1. When there is Vacant Space

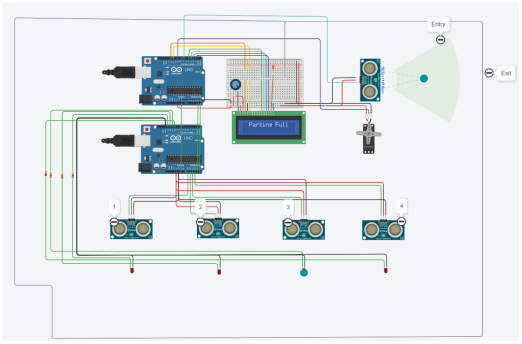


Fig. 2. When there is no Vacant Parking area

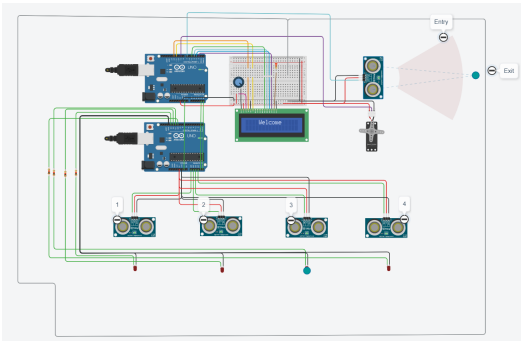


Fig. 3. In ideal state

V. Conclusion

The idea of Smart Parking system, as well as Smart cities, have been a fantasy for humankind. But in recent years, extensive headways have made the dream of a smart city to come true. The evolution of the Internet of Things has offered ascent to new potential outcomes regarding smart cities. Smart parking facilities and traffic management systems are two important aspects of building a smart city. Internet of Things has been playing a very essential role in the new digitized world, full of various technologies, offering us approaches to make our daily routine much easier and faster. In this paper, a novel approach has been described and we have addressed the problem of parking and presented an IoT based parking system. We used Arduino Programming along with Ultrasonic Sensors to speculate the availability of parking lots.Further scope of this project is to add a WIFI module.So that the users can use this system remotely.This system's drawback is that it cannot detect if the object within the range of the ultrasonic sensor is a person or a car,the future works can be the direction of rectifying this problem.

VI. References

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