



SMART PARKING SYSTEM

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Abstract : The Smart Parking System is presented in this article with the intention of improving the administration of parking in metropolitan areas. With the use of Internet of Things technology, the system makes use of sensors and communication networks in order to deliver data in real time on the availability of parking spaces. Drivers are able to discover and book parking places in an effective manner. By use of a liquid crystal display (LCD) and a mobile application that is simple to use, to reduce congestion and maximize the utilization of time. One example of a technological improvement is the utilization of sensors and information technology to provide users with assistance in locating parking spaces that are available.

IndexTerms -IoT(Internet of Things), Ultrasonic Sensors, Mobile App, SmartParking, Traffic Management.

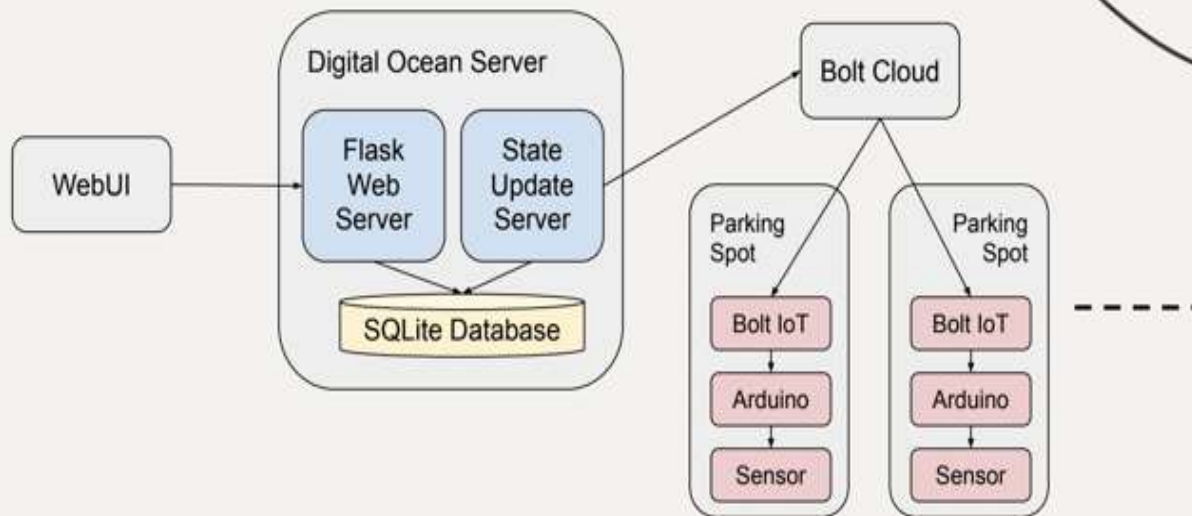
I. INTRODUCTION:

People are having a tough time finding parking places that are vacant as a result of fast urbanization and an increase in the number of vehicles. This is a negative effect of both of these factors. Those parking spots that are placed on the surface, such as those found in retail malls, train stations, and corporate campuses, are the ones that are most commonly impacted by these problems. This ultimately leads to the piling of traffic congestion, the loss of time, and the degradation of the environment for the environment? In this article, the concept of a Smart Parking System is discussed. This system makes use of technology that is connected to the Internet of Things in order to reduce the problems that were addressed before. The purpose of the Smart Parking System is to supply motorists with information that is both accurate and up to date on the availability of parking spots.

II. System Design:

This section examines the body of research on smart parking systems, IoT applications in transportation, and urban parking management. It examines the drawbacks of conventional parking systems and emphasizes the advantages of putting IoT-based solutions into practice.

Block Diagram



System Operation:

Sensor Detection: Sensors positioned at each parking spot identify whether or not there are any cars there. Depending on the architecture of the system, these sensors may be magnetic, infrared, ultrasonic, or of other sorts.

Data Transmission: Microcontrollers or control units gather the sensor data and send it to the central server. Usually, wireless communication modules and protocols like Wi-Fi, Bluetooth, LoRa, or GSM are used for this transfer.

Data processing: The central server processes the sensor data to ascertain the parking spots' current availability status. To update the parking availability information in real-time, it analyzes the incoming data.

User-InterfaceCommunication:

Mobile Application: Through a mobile app, users—typically drivers—interact with the Smart Parking System. They book parking spaces, get real-time parking availability information, and find their way to specific parking lots.

LCD Displays: Placed at key spots, these displays inform passing motorists by displaying the availability of parking in a certain region in real time.

System Hardware Componentes:

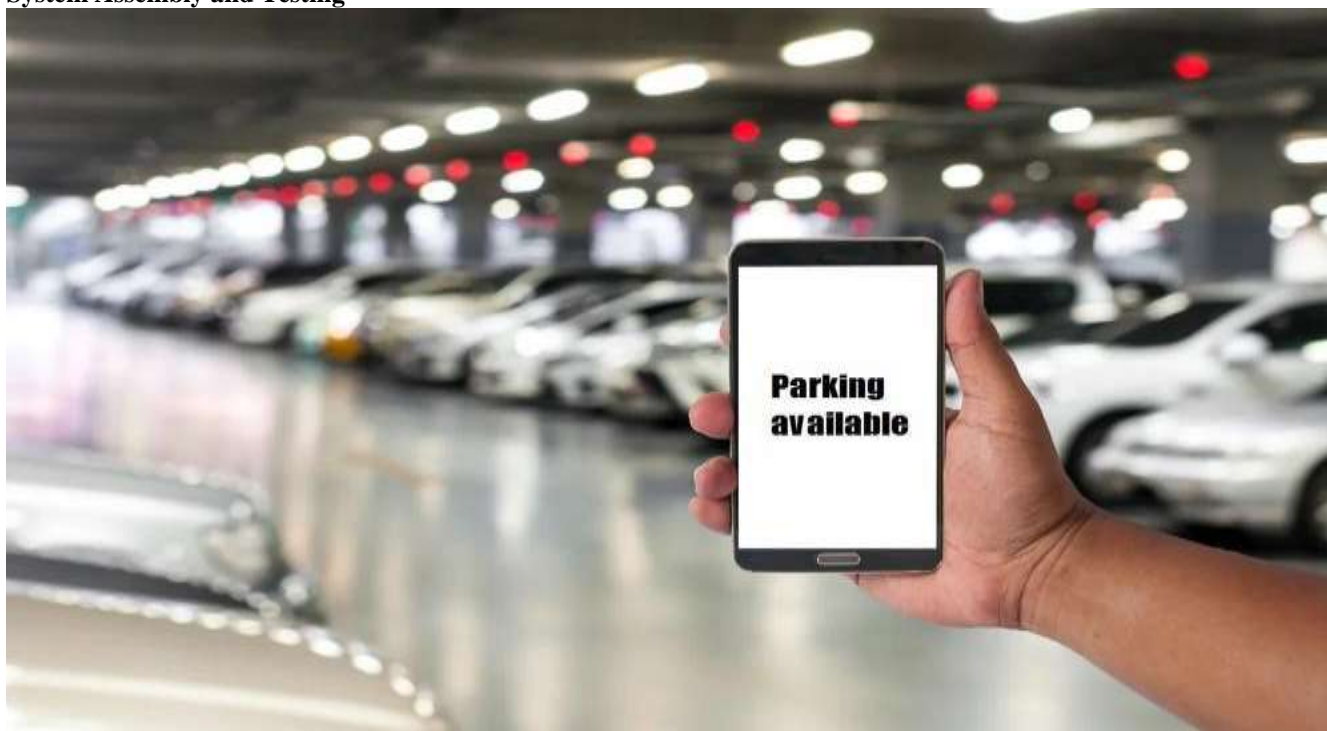
- 1.ArduinoUNO microcontroller.
- 2.Ultrasonic sensor
- 3.LCD Display

Software Development:

The Arduino IDE (Integrated Development Environment) is used to program the Arduino microcontroller. The program should include the following functionalities:

- Library inclusion for Ultrasonic sensor sensor and wireless communication module.
- Setting up the Ultrasonic sensor sensor pin as input and buzzer/LED pins as outputs.
- Defining a function to read the Ultrasonic sensor sensor data.
- Implementing a loop that continuously reads the sensor data.
- If the sensor detects vehicle(change in state), it display the parking vacancy status.
- Transmit a wireless signal using the communication module library.

System Assembly and Testing



Navigation Support: To help customers find the designated parking lot or space, the system may offer navigation support if they have reserved a place or are searching for open spots. Combining Smart City Initiatives: In line with larger smart city programs, smart parking systems use technology to improve urban mobility, lessen environmental impact, and raise inhabitants' quality of life. All things considered, there are many benefits to Smart Parking Systems, from increased motorist convenience and efficiency to better environmental sustainability and urban planning potential. Enhanced Parking Efficiency: The technology lets vehicles find available spaces fast and spends less time looking for parking by providing real-time information on spot availability.

Reduced Traffic Congestion: By effectively directing cars to parking spots that are available, the system lessens traffic congestion and eases the burden on urban road networks. Reduced time spent looking for parking has a positive influence on the environment since it reduces car emissions and fuel consumption, which in turn improves air quality.

Conclusion: smart parking systems are essential for encouraging environmentally friendly transportation methods, getting rid of traffic jams, cleaning up the air, and generally raising city dwellers' quality of life. The future of urban parking management and mobility will be greatly influenced by Smart Parking Systems' ability to solve problems, look for ways to improve, and welcome innovation.

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