Intelligent Parking System

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Peer Review Information	Abstract
	This paper presents the progressive development of an advanced IOT-based car parking on public & commercial Places. The system seamlessly integrates Arduino uno, IR sensor, servo motor and RD 16X2, Arduino uses a variant of the C++ programming language. The code is written in C++ with an addition of special methods and functions. technologies to automate car Parking system. The paper comprehensively discusses the system architecture, hardware and software components, data flow mechanisms, and This system provides real-time monitoring and efficient space management by automatically Controlling. Parking access and tracking space availability. The integration of these component results in a reliable, and easy-to-implement solution to enhance the overall management and security of private parking spaces. Additionally, electric vehicle (EV) charging station, provide convenient and sustainable parking experience for EV owners. This study serves as a valuable reference for researches and developers Seeking to advance Intelligent parking system through IOT innovation.

Introduction

In smart cities, there is a greater need for new and effective technology to tackle many of the problems that are visible on the surface, as well as to make cities less crowded. Finding a parking spot is one of the most aggravating issues for drivers. Particularly in public venues such as shopping malls, 5-star hotels, and multiplex cinema halls. Even within the park, drivers waste time and fuel hunting for a spot to park their cars. This will damage the driver's emotions as well as pollute the environment while searching for a parking spot. In this study, we create and design a smart parking system

that effectively addresses these issues. Many research have been conducted in recent years with the goal of reducing car parking issues and making it more convenient and humane. It has recommended a smart parking system survey. They concentrate on practical smart parking technologies developed to address existing issues through the use of a wireless sensor network and real-time data processing from the sensors. The system appears to be unfixable and employs a complicated access technology; additionally, there is no. guidance mechanism for parking places. The Arduino Uno is used to create a smart car parking system. The device

uses IR sensors mounted in the parking slots to detect empty slots and assists the driver in finding parking in a new city. The system lacks a payment mechanism as well as guide technology that can automatically find available parking spaces. The goal of the smart auto parking initiative is to make parking simple and straightforward. This project assists car drivers in parking their vehicles with the least amount of wasted time by providing reliable information on the availability of parking spaces. The servo motors, LCD display, and IR sensor are all connected to an Arduino Uno microcontroller unit. The LCD shows how much space is available, and the IR sensors keep track of how many automobiles enter and exit the parking place. The IR sensors identify whether or not a parking place is available.

LITERATURE SURVERY

In [1] this paper they explains the architecture and design of Arduino based car parking system. They will give authorization card to each user, which carries the vehicle number or other details. If the user is authorized and space is available in the parking, then the parking gate will open and the user is allowed to park the vehicle in parking place else the user is not allowed even the user is authorized person. It solves the parking issue in urban areas, also provides security to a vehicle and an unauthorized user is not allowed to enter into a parking place. It helps to park vehicle in multifloored parking also as it will display which floor has free space.

In [2] introduce one solution to reduce car parking problem is to use rotary parking system. The rotary parking design uses 6 parking shelves that arranged vertically and rotate. It is an automated parking system that utilizes relatively narrow space using a rotation system. The Arduino Uno module is used as the controller that governs all the devices. The results are done by running the rotary parking system and the system can function properly.

In [3] they introduce. a smart parking system based on Arduino components, website and mobile application. The system helps drivers to find an empty park space depending on the number of unoccupied lots in the park. This can increase the economy by reducing fuel consumption and pollution in urban cities. Moreover, it helps to reduce the time of finding car lot. Also, it helps the driver to find his car when he forgets the car location easily. Finally, the system shows the reserved, booked and empty lots in park for staff and drivers.

In [4] r they explain the developed system that has capability to control the entry of authorized vehicles in parking area and block unauthorized vehicles.

In [5] they proposes a new architecture with an algorithm for better to park the vehicle further in this document, examine the parking availability status of the registered and / or reserved vehicle to park the vehicle and examine the sensor-based intelligent parking system. The main intention of the car parking system is to distribute the slot in the parking area without becoming rigid for vehicle parking.

PROPOSED METHDOLOGY

As shown in the above Fig1 will contain the implementation of the proposed system. Every user who enter the parking area will be come in front of IR sensor .When the IR sensor detect the car it will send the message to arduino and arduino will the check whether the parking space are free or not, if the slot has some empty parking space the message will display welcome and show remaining slots left and the barrier gate will open the user can park the car in parking field, and if the slot is not empty the barrier gate will not open and in display the message will occur that "sorry no parking space".
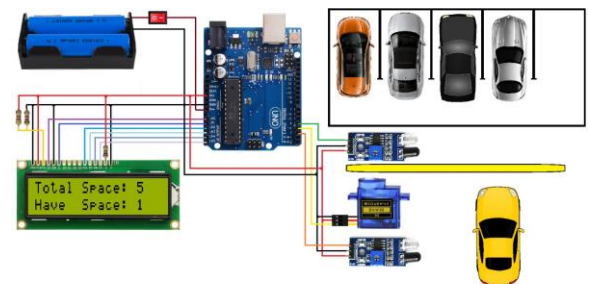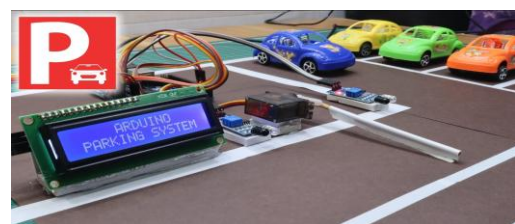

Fig 1: Proposed Architecture

Fig 2: Overall Digram of Proposed Methodlolgy

HARDWARE COMPONENTS

- **Aurdino Uno:**Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used a s PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. Simply connect it to a

computer with a USB cable or power it with a AC to-DC adapter or battery to get started.

- **IR Sensor:** An infrared sensor is basically an electronic device which is used to detect the presence of objects. Infrared light emitted by this device. If this device does not detect any IR light reflected back that means there is no object present. If the light is detected by the sensor there is an object present.

- **Servo Motor:** A servomotor is a linear actuator or rotary actuator that allows for precise control of linear or angular position, acceleration, and velocity. It consists of a motor coupled to sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

- **Jumper Wires:** Jumper wires are used for making connections between components on your breadboard and your Arduino's header pins. Use them to wir e up all your circuits.

- **LCD Display (16x2):** The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols.16×2 LCD is named so because; 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.

- **Breadboard:** Breadboard is a way of constructing electronics without having to use a soldering iron. Components are pushed into the sockets on the breadboard and then extra 'jumper' wires are used to make connections.

RESULTS AND DISCUSSION

The IoT-based Car Parking Management System with IR sensor was able to identify the presence or absence of a car, show the availability status of parking slots, and save the IR sensor data into a database. Furthermore, the suggested parking system has the advantage of being able to show the user the actual position of a parking place. According to the findings, the proposed car parking system with IR sensor was a good idea and a great system to develop, and it indicates that the respondents positively accepted the proposed parking system in order to minimise and reduce the problem of vehicle parking, particularly the time spent looking for available parking spaces.

CONCLUSION

The Internet of Things (IoT) was the key concept used to construct the proposed parking system employing an infrared sensor, and this study proposes an effective way for identifying a parking space. The IoT-based Car Parking Management System with IR Sensor was created as a prototype to help drivers locate a vacant or available parking spot. This parking system presented employed an infrared sensor to detect the presence and absence of a car in order to determine the state of a parking slot's availability. The parking places are continuously monitored, and the data on the LCD screen is updated on a regular basis. The LCD screen shows the exact location of the parking slot availability status. In the meantime, the data from the infrared sensor is also saved in the database. The suggested parking system's prototype was designed for a single storage parking space, but the concept can be expanded to accommodate several storage spaces.

In addition, for administrative purposes, a car parking management system interface was created to record the state of a parking slot as well as the precise time a car enters or quits a parking slot. The proposed parking system's conclusion is beneficial for implementing in any parking zone region to assist drivers in finding a vacant parking spot quickly. Furthermore, the proposed parking system was evaluated utilising a user acceptance test to determine public acceptance of the proposed parking system. The majority of respondents thought the proposed parking system with IR sensor was a wonderful concept and that developing a parking system that can help cars find a vacant parking spot quickly was a terrific idea. As a result, it provides convenience to users by allowing them to save time, energy, and fuel. This work might be expanded by creating a mobile app that allows users to navigate, identify, and reserve a parking spot online.

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