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CSE323.7

Car Parking and Management System

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Spring, 2024

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Introduction

Background and Motivation

The increasing number of automobiles in metropolitan areas makes managing car parking effectively a considerable concern. This problem can be solved by implementing an automobile parking system with Arduino and an I2C LCD display. This method intends to reduce the amount of time and effort needed to find parking by giving drivers real-time information on the availability of parking spots, directing them to open spots. The automobile parking system can precisely measure the distance between the sensor and a car parked in a defined area by integrating an Arduino board, an I2C LCD display module, and an ultrasonic distance sensor [1]. The calculated distance data is then shown on the LCD panel, enabling drivers to find parking places quickly. The I2C LCD display was selected for its ease of use and simplicity. Due to its small size, it is simple to post at the start of every parking space, giving a visible and readable indication of the parking status. The Arduino board's integration enables effective data processing and communication between the LCD display and the ultrasonic sensor. In order to identify the presence of a vehicle, an ultrasonic distance sensor, like the HC-SR04, is essential. The sensor can precisely determine the distance between the car and itself by sending out ultrasonic waves and timing how long it takes for the waves to return. The I2C LCD display and Arduino-based automobile parking system not only improve the parking experience for drivers but also maximize space usage by assuring effective parking place distribution. By eliminating the time spent looking for parking, it can also help lower traffic congestion and carbon emissions [2]. This system is an excellent way to improve parking management and improve the overall urban mobility experience because it is straightforward and inexpensive to install in both public and private parking lots.

Methodology

Objective and Rationale

Making a user-friendly and effective system for managing parking places is the goal of constructing a car parking system utilizing Arduino and an I2C LCD display. The system wants to accomplish the following goals: Parking spot Availability in Real Time: The system must accurately determine and provide the parking spot availability in real time. The LCD display should make it simple for drivers to discover open spaces, cutting down on the time and effort needed to find parking. Optimal Space Utilization: The system tries to maximize the use of parking areas by giving correct information regarding available parking spaces [3]. This aids in avoiding pointless traffic and guarantees that parking spaces are distributed effectively. User-Friendly Interface: Information about parking availability should be presented in a clear and understandable manner on the LCD display. Drivers should be able to easily understand the system's user interface, which will enable seamless engagement and a pleasant parking experience. Cost-Effective Approach: Using Arduino and I2C LCD display modules to construct the parking system is a cost-effective approach. The goal is to develop a system that is reasonably priced and simple to install in a variety of parking lots, including both public and private spaces. Enhanced Parking Management: By cutting down on time spent looking for parking, reducing traffic congestion, and helping to create a more sustainable and effective urban environment, the auto parking system seeks to improve overall parking management.

Components

- Arduino Nano,
- 20×4 LCD Display,
- I2C LCD Module,
- Male Header,
- Female Header,
- IR Sensor x 8,
- Mini Servo Motor SG-90
- Female DC Power Jack
- 5v 2Amp Power Adapter
- 420uf Electrolytic Capacitor
- Red black wire
- Jumper wires
- Non texture matte white PVC
- 9V battery clip
- 2pin Rocker switch
- Tape/soldering/ziptie/hot glue
- LM 7806 Voltage regulator

Results

System Design

The I2C LCD display and Arduino-powered automobile parking system is intended to manage parking places in an effective and user-friendly manner [4]. An Arduino board, an I2C LCD display module, and an ultrasonic distance sensor make up the system. The Arduino board is attached to an ultrasonic distance sensor, which measures the separation between the sensor and a car that is parked in a specific location. It sends out ultrasonic waves and measures how long it takes for the waves to return. The Arduino calculates the distance and determines whether or not the parking space is occupied based on this time measurement.

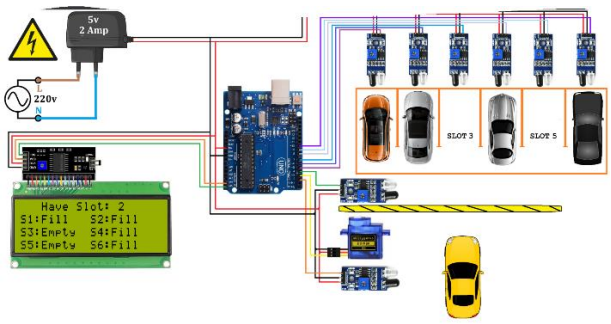

Figure 1: Car parking system

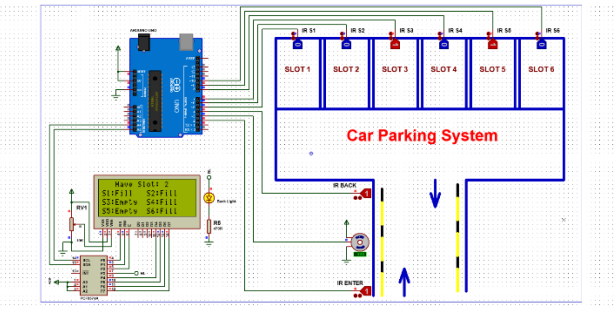

Figure 2: Proteus software

The I2C interface is used to link the I2C LCD display module to the Arduino board. It acts as the visual interface for showing the availability of parking spaces [5]. The LCD display module receives commands and data from the Arduino to display if a parking space is occupied or available. To assist drivers in finding open parking spaces quickly, the display offers information that is clear and simple to understand.

References

1. J. Zhang, H. Chen, and X. Wang, "An Intelligent Car Parking System Based on Internet of Things," in 2017 4th International Conference on Systems and Informatics (ICSAI), 2017, pp. 1029-1033.
2. A. Kumar, S. V. Pandey, and R. Garg, "Smart Parking System using IoT and Cloud Computing," in 2018 International Conference on Recent Innovations in Electrical, Electronics & Communication Engineering (ICRIEECE), 2018, pp. 1-5.
3. T. K. Talha, M. Al Amin, and T. I. Shibly, "An IoT-based Smart Parking System Using Arduino," in 2019 7th International Conference on Information and Communication Technology (ICoICT), 2019, pp. 1-5.
4. S. R. Zafar, I. Ahmed, and A. H. Kazmi, "Smart Parking System Using Arduino and IoT," in 2018 International Conference on Frontiers of Information Technology (FIT), 2018, pp. 114-119.
5. M. S. Chowdhury and M. Rahman, "Design and Implementation of a Smart Car Parking System Using Arduino and Internet of Things (IoT)," in 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2020, pp. 1-5.