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Department of Electronics and Communication Engineering

Mini-Project Presentation

on

"Smart Car Parking System"

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INTRODUCTION

- A Smart Car Parking System using Arduino Uno and IR sensors is a simple yet effective solution for automating parking management. The Arduino Uno microcontroller acts as the brain of the system, while IR sensors detect the presence of vehicles in parking slots. This system provides real-time updates on parking availability and controls entry and exit barriers
- IR sensors for vehicle detection, LEDs to indicate status (green for available, red for occupied), and LCD display for displaying available slots. This system is economical, energy-friendly, and less congested, as it makes it easier for users to locate parking slots in the least possible time. This project has scalability and easy implementation, hence a practical step toward smarter urban parking solutions.

LITERATURE SURVEY

PROBLEM STATEMENT

• Managing parking spaces in urban areas is inefficient and time-consuming, leading to traffic congestion, fuel wastage, and driver frustration. There is a need for a cost-effective, automated system to detect parking slot availability, display real-time updates, and streamline parking management. Additionally, traditional methods lack scalability and require significant human intervention, further reducing efficiency. An intelligent parking solution can address these challenges and improve the overall user experience.

OBJECTIVES

1. **Efficient Space Utilization**
2. **Real-Time Monitoring**
3. **Ease of Use**
4. **Traffic Congestion Reduction**
5. **Energy Efficiency**
6. **Scalability**
7. **Cost-Effectiveness**
8. **Error Reduction**
9. **Data Collection and Analytics**
10. **Environmental Impact**

METHOD OF IMPLEMENTATION

The implementation of a smart car parking system using Arduino, an LCD, IR sensors, and a servo motor involves designing a simple yet effective framework. The system starts with planning, where the requirements are identified. IR sensors are used to detect the presence or absence of a vehicle in a parking spot. An Arduino microcontroller is chosen to process the sensor data, control the servo motor for managing a barrier gate, and update the LCD with real-time parking information.

In the hardware assembly, IR sensors are installed at the entry and parking spots to detect vehicles. The Arduino is programmed to read signals from the sensors and trigger actions accordingly. The servo motor is connected to the Arduino to act as a barrier gate, opening when a vehicle is detected and parking is available. The LCD is mounted and wired to the Arduino to display parking status, such as available spots or an indication if the lot is full.

- The Arduino is programmed using the Arduino IDE. The code processes input from the IR sensors to determine vehicle entry or exit. It controls the servo motor to lift or lower the barrier and updates the LCD to display parking availability. Logical conditions in the code ensure the system operates smoothly and accurately reflects real-time changes in parking status.
- Once the system is assembled and programmed, it is tested for functionality. The IR sensors are calibrated for reliable detection, and the servo motor's movements are verified to match the programmed logic. The LCD is checked to ensure it displays the correct parking status. After successful testing, the system is installed in the parking area and maintained regularly to ensure reliable operation. This straightforward implementation provides an efficient, automated parking management solution.

Flowchart

EXPECTED OUTCOMES

1. Efficient Parking Management

The system will automate the process of detecting available parking spots, managing entry and exit, and updating drivers in real-time. This reduces manual intervention and makes parking more organized.

2. Accurate Parking Status Display

The LCD will accurately display the number of available parking spots or indicate if the parking lot is full. This provides clear and instant feedback to users.

3. Automated Barrier Control

The servo motor will act as an automated barrier gate, opening and closing based on the availability of parking spots and vehicle detection. This ensures smooth entry and exit without the need for manual operation.

4. Time and Energy Savings

Drivers will save time by quickly identifying whether parking is available, reducing unnecessary vehicle movement. This, in turn, minimizes fuel consumption and contributes to environmental sustainability.

5. Cost-Effective Solution

Using low-cost components like Arduino, IR sensors, and servos, the system will provide a reliable yet affordable parking management solution suitable for small and medium-sized parking areas.

6. Improved User Experience

The automation of parking management will lead to a hassle-free experience for drivers, reducing frustration and enhancing convenience.

These outcomes demonstrate the system’s potential to improve parking efficiency while being scalable for future enhancements.

APPLICATIONS

- **1. Residential Complexes**
- This system can be implemented in apartment buildings or gated communities to manage limited parking spaces efficiently, providing residents with real-time parking availability and automated entry and exit.
- **2. Small Commercial Establishments**
- Shops, small malls, and offices with limited parking spaces can use this system to automate parking operations, ensuring better space utilization and reducing manual intervention.
- **3. Educational Institutions**
- Schools, colleges, and universities can deploy the system to manage parking areas for staff, students, and visitors, reducing congestion and ensuring orderly parking.
- **4. Hospitals and Clinics**
- The system can be used in healthcare facilities to ensure quick and seamless parking for patients and visitors, saving time and minimizing stress during emergencies.

- **5. Small Parking Lots**
- Parking lots in urban areas or near public facilities, like parks or community centers, can benefit from this solution to manage entry and monitor available spots.
- **6. Event Venues**
- Temporary parking for events such as conferences, fairs, or sports gatherings can utilize the system to provide real-time updates and manage entry efficiently.
- **7. Workshops and Service Centers**
- Automobile workshops or service centers can use the system to streamline vehicle entry, parking, and exit, ensuring a better workflow for handling multiple vehicles.
- **8. Public Transport Hubs**
- Small bus stations, railway stations, or airports can implement this solution for short-term parking areas to help manage vehicle flow effectively.
- The system's affordability, scalability, and ease of deployment make it suitable for diverse environments, offering significant improvements in parking efficiency and user convenience.

CONCLUSION

- The smart car parking system using Arduino, IR sensors, an LCD, and a servo motor provides an efficient and automated solution for managing parking spaces. By detecting vehicle presence with IR sensors, controlling entry with a servo motor, and displaying real-time availability on an LCD, the system eliminates the need for manual intervention. This improves space utilization, reduces wait times, and enhances user convenience, making it ideal for small-scale parking areas like residential complexes, offices, and commercial establishments.
- This project highlights the effective use of affordable components to create a reliable and scalable parking management system. It is a cost-efficient solution that optimizes parking operations, reduces congestion, and provides a better experience for users. The system also serves as a foundation for future enhancements, such as IoT integration for remote monitoring or data analytics for improved functionality.

THANK YOU