WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

AUTOMATIC CAR PARKING SYSTEM

Prof. Janhavi Raut[1], Ms. Naina Prasad[2],Mr. Sahil Dubey[3], Ms. Kashish Gupta[4]

[1] Professor of Pravin Patil Polytechnic, Department of Electronics and Telecommunication Technology, Bhayandar, Thane, India – 401105.
[2] Department of Electronics and Telecommunication, Pravin Patil Polytechnic, College of Engineering, Bhayandar, Thane, India - 401105.
[3] Department of Electronics and Telecommunication, Pravin Patil Polytechnic, College of Engineering, Bhayandar, Thane, India - 401105.
[4]Department of Electronics and Telecommunication, Pravin Patil Polytechnic, College of Engineering, Bhayandar, Thane, India - 401105

ABSTRACT:

The "Smart Parking System" is an innovative solution designed to streamline vehicle parking management using an Arduino microcontroller, infrared (IR) sensors, an I2C-enabled LCD display, and a servo motor. This system aims to efficiently monitor parking space availability and control vehicle entry based on real-time occupancy data.

System Components and Functionality:

IR Sensors: Strategically positioned at the entrance and within individual parking slots, these sensors detect vehicle presence. The entrance IR sensor identifies incoming vehicles, while the slot- specific sensors monitor occupancy status.

I2C LCD Display: Located at the parking area entrance, this display provides drivers with real-time information on available parking spaces, ensuring transparency and aiding in decision-making.

Servo Motor: Acting as a gate barrier, the servo motor regulates vehicle entry. It operates based on data from the IR sensors, allowing access only when parking spaces are available.

INTRODUCTION:

With the growing number of vehicles in urban areas, managing parking efficiently has become a major challenge. Traditional parking systems often lead to congestion, inefficient use of space, and delays for drivers. To tackle these issues, a Smart Parking System is proposed, integrating Arduino, IR sensors, an I2C LCD display, and a servo motor to automate space detection and access control.

This system detects vehicle presence using infrared (IR) sensors positioned at both the entrance and individual parking slots. The I2C LCD display provides real-time updates on available parking spaces, allowing drivers to make informed decisions before entering. A servo motor-controlled gate regulates entry, permitting access only when vacant spots are available. If the parking lot is full, the gate remains closed to prevent additional vehicles from entering.

By utilizing simple yet effective electronic components, this cost-efficient and scalable solution optimizes parking efficiency, reduces the need for manual intervention, and helps alleviate traffic congestion within parking areas.

BACKGROUND STUDY:

The increasing number of vehicles in urban areas has led to significant challenges in parking space management, traffic congestion, and inefficient utilization of available parking slots. Traditional parking systems rely on manual supervision, paper tickets, and inefficient entry/exit management, which results in delays, fuel wastage, and frustration for drivers. To overcome these issues, automated smart parking systems have been developed using embedded systems, sensors, and microcontrollers.

1. Evolution of Parking Systems

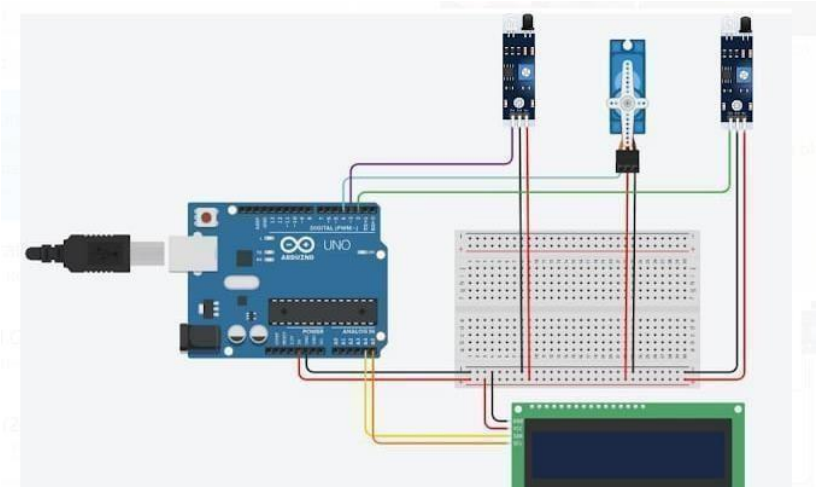
Manual Parking Management:

Requires human attendants to guide vehicles and collect parking fees. Prone to errors, delays, and mismanagement.

Basic Automated Parking: Uses barriers and token-based entry systems. Lacks real-time updates on parking availability. Modern Smart Parking Systems: Integrates sensors, microcontrollers, and real-time displays for efficient management.

Can include IoT-based solutions, mobile apps, and AI for automated parking guidance.

CIRCUIT DIAGRAM:



1. Arduino Board (Uno)

- The central component is an Arduino Uno, a microcontroller board used for embedded system projects.
- It is powered through a USB cable or an external adapter.

2. Sensors (Possibly IR or Ultrasonic)

- The circuit includes two sensor modules (possibly infrared (IR) sensors or ultrasonic sensors) placed on the upper side of the image.
- These sensors are used to detect obstacles, distance, or objects.
- Each sensor is connected to the Arduino via power (VCC, GND) and data pins.

3. LCD Display

- A 16x2 LCD display is connected at the bottom.
- It is interfaced with the Arduino to display data from the sensors.
- It uses multiple connections for power, ground, and data signals.

4. Breadboard Connections

- A breadboard is used as an intermediary to connect components.
- It simplifies wiring by allowing multiple components to share power and ground lines.
- The resistors and jump wires are used for proper circuit operation.

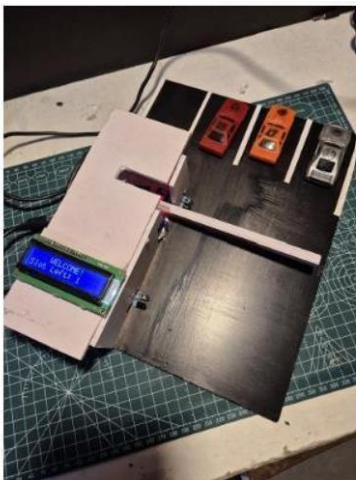
5. Wiring

- Red and black wires likely represent power (VCC) and ground (GND).
- Yellow, green, and other coloured wires carry data signals between components and the Arduino.

Possible Functionality

- The Arduino reads sensor data and processes it.
- The LCD screen displays the information received from the sensors.

RESULTS:



ADVANTAGES:

1. Space Efficiency
2. Time Saving
3. Environmentally Friendly
4. Better Security

DISADVANTAGES:

1. High Initial Cost
2. Maintenance Costs
3. Technology Dependence
4. Limited Availability

CONCLUSION:

The Smart Parking System using Arduino, IR sensors, an I2C LCD display, and a servo motor is a cost-effective automated, and efficient solution for modern parking management. By detecting vehicle presence, displaying real-time parking availability, and controlling entry using a servo motor, the system enhances convenience, security, and space utilization. This system significantly reduces manual intervention, traffic congestion, and fuel wastage caused by inefficient parking. Its scalability and adaptability make it ideal for use in commercial parking lots, residential complexes, offices, hospitals, airports, and smart cities.

REFERENCE:

1. **Smart Parking System Using IoT"** – IEEE Xplore
   IEEE Link *(Search for Smart Parking System)*
2. **"Automated Car Parking System using Arduino"**
   –ResearchGate
   ResearchGate Link *(Search for Automatic Parking System using Arduino)*
3. **Open-Source Code & GitHub Projects**
4. **GitHub Repository for Smart Parking System**
   GitHub Arduino Parking
5. **Arduino Code Example for Parking System**
   Open-Source Code *(Search for Automatic Parking System)*