

Automatic Controlled Car Parking System Documentation

1. Introduction :

This project was developed as a science assignment by **Aarav Sheel Parida** and **Advaita Sheel Parida** from **Delhi Public School Bangalore North**, aimed at creating an innovative and functional model with real-world applications. After exploring several concepts, we merged the ideas of a **Car Parking System** and a **Toll Plaza** to design an **Automatic Controlled Car Parking System** that manages entry and exit gates, tracks available parking spaces, and provides visual indicators for occupied spots.

2. Concept Development :

Initial Ideas

During the brainstorming phase, we considered several ideas:

- **Car Parking System**
- **Gun Made with a Lighter**
- **Toll Plaza**
- **Mini Fan**

We ultimately decided to integrate the **Car Parking System** with the **Toll Plaza** concept, requiring various components such as sensors, a microcontroller, motorized gates, and a display system. This combination promised both functionality and complexity, making it an exciting challenge.

3. Project Overview :

Objective

The goal was to create a **fully automated car parking system** capable of:

- Detecting incoming and outgoing vehicles.
- Automatically controlling entry and exit gates.
- Tracking available parking spaces.
- Indicating occupied spots using LED lights.

How It Works

1. **Vehicle Detection:** An ultrasonic sensor identifies an approaching car.
2. **Gate Control:** A stepper motor opens the gate automatically.
3. **Space Tracking:** The LCD display updates to show remaining spaces.
4. **LED Indicators:** Red LEDs light up to signal occupied spots.
5. **Exit Process:** The sensor detects a departing vehicle, opening the gate and updating available spaces.

4. Project Plan :

#	Topic	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15
1	Brainstorming															
2	Finalizing the Project															
3	Proof of Concept															
4	Analyzing requirements															
5	Materials Procurement															
6	Prototyping															
7	Software Development															
8	Hardware Design															
9	Integration															
10	Testing															
11	Debugging															
12	Improvements															
13	Writing Documentations															
14	Video Presentation															

Task Division

To ensure efficient project development, tasks were divided:

- **Hardware Assembly:** Connecting sensors, motors, and LEDs.
- **Software Development:** Writing code for gate control, display updates, and sensor integration.
- **Testing & Debugging:** Ensuring smooth operation of all components.
- **Finishing Touches:** Assembling the final working model.

5. Team and Collaboration :

Team Members

- Aarav Sheel Parida
- Advaita Sheel Parida

Consultants

- Shilabhadra Parida
- Neelambari Pardeshi

6. Proof of Concept (PoC) :

A. Entry Process:

- The ultrasonic sensor detects an approaching vehicle.
- The stepper motor opens the gate.
- The LCD display decrements available spaces.

B. Parking Process:

- The driver parks in a spot with no illuminated red LED.
- The red LED lights up, indicating the spot is occupied.

C. Exit Process:

- The sensor detects the car at the exit.

- b. The gate opens automatically.
- c. The LCD display increments the available spaces.

This system reduces time spent searching for parking by providing clear visual cues and automated space tracking, enhancing overall efficiency.

7. System Limitations and Challenges :

- 1. **Lack of Authentication:** No system to verify vehicle identity.
- 2. **No Payment Integration:** Lacks automated fee collection.
- 3. **Security Risks:** Walls can be breached, making it vulnerable.
- 4. **Sensor Blind Spots:** Ineffective in certain detection zones.
- 5. **LED Placement Issues:** LEDs could obstruct smaller vehicles.
- 6. **High Cost:** Dual Arduino boards increase the budget.
- 7. **Maintenance Complexity:** Entire system must be lifted for repairs.

8. Conclusion :

The **Automatic Controlled Car Parking System** is a step toward efficient, automated parking management. While the model demonstrates core functionality, future improvements could focus on integrating security, payment systems, and reducing costs for real-world deployment. Despite its flaws, it showcases the potential for smart parking solutions in modern infrastructure.

Appendices

Materials Used




- 2 Arduino Uno boards
- 5 Ultrasonic Distance Sensors (HC-SR04)
- 2 Stepper Motors (28BYJ-48)
- 2 Stepper Motor Drivers (ULN2003)
- 1 LCD Display (RG1602A)
- 1 I2C LCD Adapter
- 1 Arduino Prototype Shield
- 3 LEDs
- 3 220-ohm Resistors
- 1 Power Supply Module
- 3 9V Batteries
- Multiple Jumper Wires

Image Project

★ Automated controlled car parking system ★

About The Project

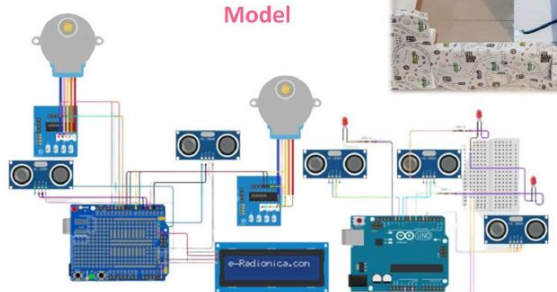
The Automatic Controlled Car Parking System, developed by Aarav Sheel Parida and Advaita Sheel Parida, combines car parking and toll plaza concepts. It uses an Arduino Uno, ultrasonic sensors, stepper motors, and an LCD display to automate parking and indicate available spaces. LED indicators and efficient entry/exit mechanisms enhance user experience.



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- 3 LEDs
- 3 220-ohm resistors
- 1 Power Supply module
- 3 9V batteries
- A lot of jumper wires

Model



Steps

1. Car arrives at the entrance gate.
2. Ultrasonic sensor detects the car and opens the gate via stepper motor.
3. LCD display updates to show one less available space.
4. Car parks in a spot without a red LED indicator, which then lights up.
5. Car exits through the gate detected by the sensor, stepper motor opens the gate.
6. LCD display updates to show one more available space.



Quick RAID Analysis

#	Risks	Assumptions	Issues	Dependencies
1	Power Shortage limiting software development	All Materials will be procured	All functionalities could not be done using 1 arduino	Shops
2	Hardware Breaking Down	Consultants are always free to help	Thermocol got in way of gate	Parents
3	Battery goes out			Computers