

Car Park Sensor System Project Scope

Project Overview:

The Car Park Sensor System is designed to assist drivers by providing feedback on obstacles when

parking, using the PIC16F877A microcontroller.

This system utilizes ultrasonic sensors to measure the distance between the car and nearby

obstacles at both the front and back of the vehicle.

Feedback will be provided through auditory signals (buzzer), visual indicators (LEDs), and a display

(OLED/LCD).

The system helps drivers park safely by giving real-time information on proximity, with a focus on

providing a clear understanding of the distance from both the front and back of the car.

System Components:

- PIC16F877A Microcontroller: The core unit that processes the sensor data, controls the buzzer,

LEDs, and display.

- Ultrasonic Sensors (Front and Back): The system will use ultrasonic sensors placed both at the

front and the back of the vehicle to measure the distance to obstacles in each direction.

- Buzzer: Provides auditory feedback based on proximity to obstacles:

- Slow Beeps: Indicate a safe distance (50-100 cm).

- Fast Beeps: Indicate a critical distance (<20 cm).

- OLED or LCD Display: Displays real-time distance information for both the front and back of the

car, showing the distance to the nearest obstacle in each direction and status messages.

- LED Indicators (Red, Yellow, Green): LED lights used to visually indicate the proximity of obstacles

from both the front and back of the car:

- Green LED: Safe distance (greater than 50 cm).

- Yellow LED: Caution (20-50 cm).

- Red LED: Danger (less than 20 cm).

- MPLAB & Proteus: Used for programming the PIC16F877A and simulating the system before

implementation.

- GitHub: A platform to manage the code, track the progress, and share updates on the project.

Project Features:

- Front and Back Distance Detection: The ultrasonic sensors will measure the distance from both the

front and the back of the car to the nearest obstacle. This helps the driver get real-time feedback

about both ends of the vehicle.

- LED Feedback System: Visual indicators (Red, Yellow, Green) provide clear signals about the

proximity to obstacles in both directions:

- Green LED: Indicates safe distance (>50 cm).

- Yellow LED: Indicates a need to slow down (20-50 cm).

- Red LED: Warns of immediate danger (<20 cm), signaling the driver to stop or reverse.

- Auditory Feedback via Buzzer: The buzzer provides auditory feedback based on the proximity:

- Slow Beep: For a safe distance.
- Fast Beep: For a critical distance, warning the driver to stop or reverse.
- OLED Display Feedback:
 - The OLED will display the distance from both the front and back of the car.
 - It will also display status messages like:
 - "Clear Path" for distances greater than 50 cm from both the front and back.
 - "Caution: Slow Down" for distances between 20-50 cm.
 - "Stop: Obstacle Detected" for critical distances less than 20 cm from the front or back.
- Future Enhancements: The system will have the potential to integrate motors and wheels to make the system mobile, adding the possibility of remote control via Bluetooth or a mobile app.

System Workflow:

1. Distance Measurement: The ultrasonic sensors at both the front and back of the car measure the distance to the nearest obstacles.
2. Processing Distance Data: The PIC16F877A processes the data from both sensors and determines the distance to obstacles at the front and rear of the car.
3. LED Indicators:
 - Green LED lights up when the car is at a safe distance (more than 50 cm).
 - Yellow LED lights up for caution when the distance is between 20-50 cm.
 - Red LED lights up when the distance is less than 20 cm, warning the driver to stop or reverse.
4. Auditory Feedback: The buzzer emits a slow beep when the distance is safe and a fast beep when the car is dangerously close to an obstacle.

5. OLED Display: The display will show the distance from both the front and back of the car and

status messages:

- "Clear Path" for both front and back distances greater than 50 cm.
- "Caution: Slow Down" when distances are between 20-50 cm.
- "Stop: Obstacle Detected" when any distance is less than 20 cm, requiring the driver to stop or reverse.

6. Future Expansion: The system could be upgraded with motors and wheels, creating a mobile

parking sensor system that moves autonomously, avoiding obstacles. Bluetooth or mobile app

control can also be added for remote control functionality.

Conclusion:

The Car Park Sensor System will enhance parking safety by providing both auditory and visual

feedback about obstacles at the front and back of the vehicle. The system will allow drivers to safely

park by displaying real-time information about the proximity of obstacles, both visually and audibly.

The addition of front and back sensors ensures comprehensive coverage around the vehicle. Future

upgrades may include adding wheels and motors to create a mobile version of the sensor system,

potentially incorporating Bluetooth or mobile app control.