

Distance-Based Object Detection System for Parking Assistance

Yasmin Pokia
s222245206



Problem Statement

- Misjudging distance when parking causes small collisions.
- Existing camera and radar-based systems are expensive and difficult to set up, particularly on older vehicles.
- There is a demand for a low-cost, easy solution for real time parking assistance.

Existing Solutions

- Camera-Based Systems: Provide real-time visual feedback but are costly and sensitive to environmental conditions.
- Radar-based systems provide excellent accuracy but are expensive and need extensive installation.
- Ultrasonic systems are low-cost but lack advanced capabilities such as real-time alerts and data logging.



Gaps in Existing Solutions

- Camera and radar systems are inaccessible due to their high cost and complicated installation.
- Ultrasonic systems do not support cloud integration, data logging, or real-time alerting.
- The requirement for a system that is inexpensive, simple to setup, and provides real-time data tracking and alarms.

Proposed Methodology

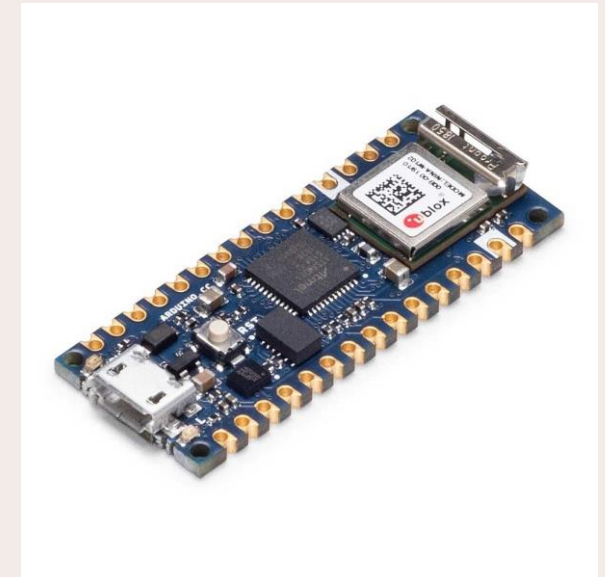
- Using an HC-SR04 Ultrasonic Sensor and Arduino Nano 33 IoT for distance measurement.
- Data is transmitted to the Arduino Cloud for real-time monitoring and logging.
- Python script for real-time data display and alerts on a local dashboard.

HC-SR04 Ultrasonic Sensor



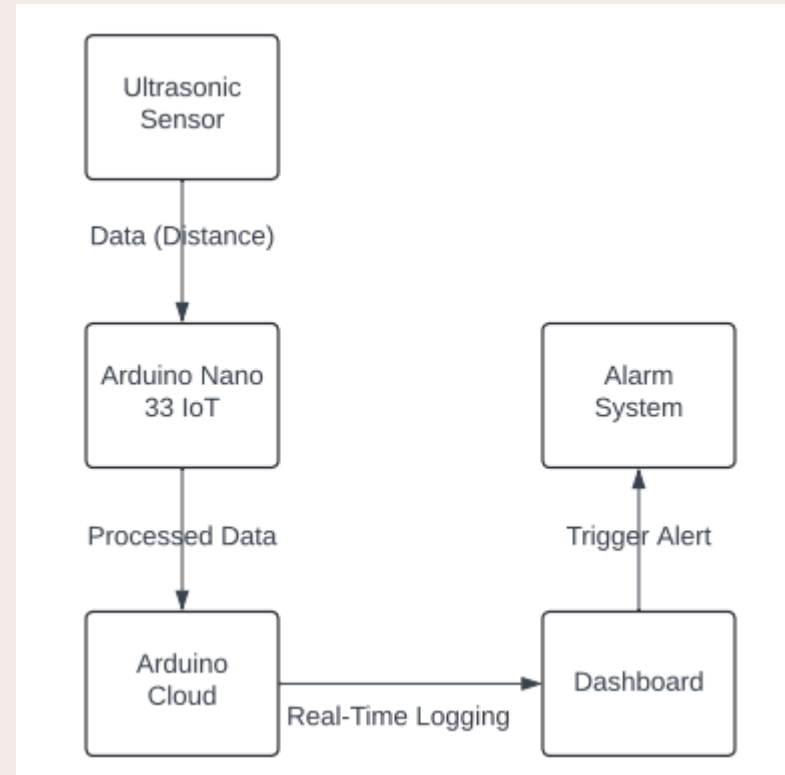
<https://core-electronics.com.au/hc-sr04-ultrasonic-module-distance-measuring-sensor.html>

Arduino Nano 33 IoT



<https://core-electronics.com.au/arduino-nano-33-iot.html>

System Architecture



Proposed Implementation Plan

- Research (Completed): Research existing solutions, and into sensors and Arduino.
- Hardware Setup (Completed): Wiring and testing of the sensor and Arduino.
- Programming (In Progress): Writing code for the Arduino Nano and Python integration.
- Cloud Integration (Upcoming): Set up real-time cloud dashboard.
- Testing (Upcoming): Verify functionality with different parking scenarios.
- Documentation (Upcoming): Final report preparation.

Budget

- Hardware Costs: Arduino Nano 33 IoT, HC-SR04 sensor, jumper wires, breadboard.
- Software: Arduino IDE and Arduino Cloud (Free).
- Programming: Estimated at 3 hours, including microcontroller and Python script.



<https://www.datarails.com/best-business-budgeting-software/>

Future Work

GSM Module



<https://core-electronics.com.au/gsm-gprs-module-sm5100b.html>

- Adding a GSM module for SMS or email alerts.
- Extending coverage using multiple sensors for 360-degree detection.
- Environmental calibration will increase accuracy.

Conclusion

- The Distance-Based Object Detection System provides a low-cost, simple parking assistance solution.
- It combines real-time monitoring with cloud-based logging and alerting.
- Future enhancements will make the system even more durable and adaptable.