

SmartPark Project: Milestone 1 Report

Project Title: SmartPark: An Automated Parking Guidance and Slot Display System

Team Members: Noe S Setenta Jr, Jah Isaac Cagula

Milestone: 1 - Core Module Development and Unit Testing

Date: 10/31/2025

1. Milestone 1 Summary

This report summarizes our progress for the first milestone of the SmartPark project. Our primary focus was on the development and individual testing of the two core hardware interfaces: the LCD display and the ultrasonic sensor. We have successfully written and verified the drivers for both components, confirming that they function as intended. This establishes a solid software foundation for the system.

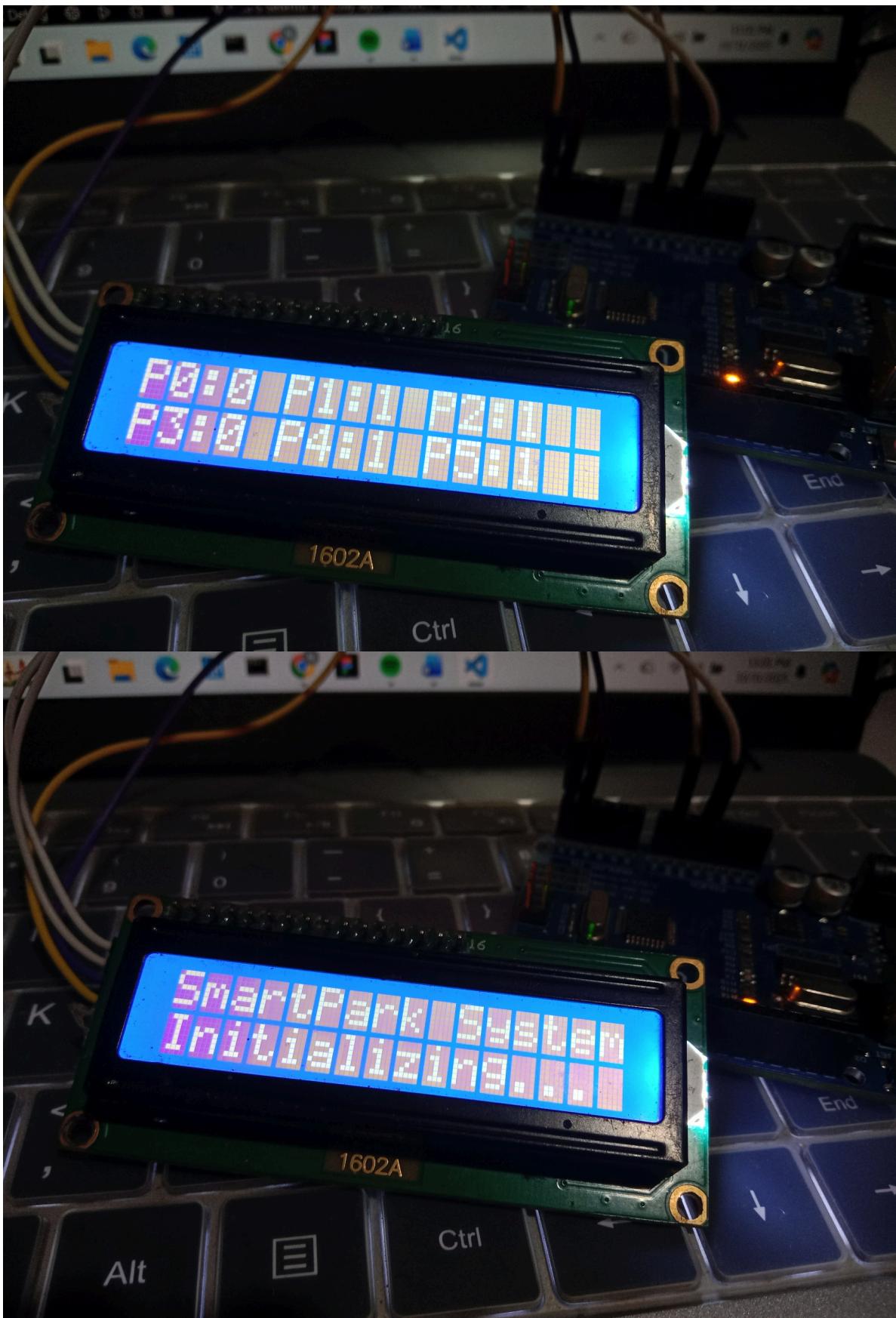
2. Work Completed & Testing

We have completed the firmware for the key components and conducted initial unit tests.

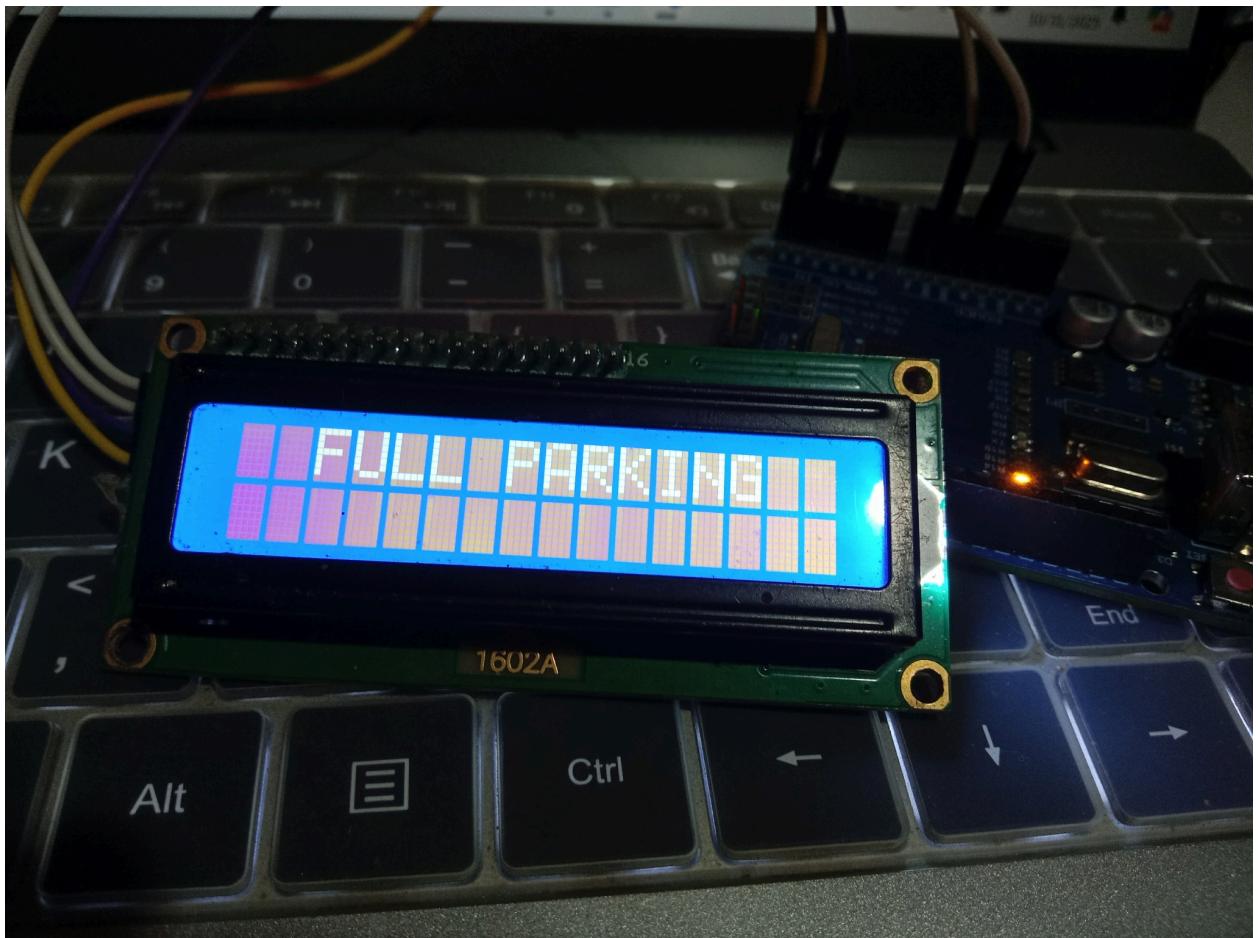
- I2C LCD Display Module:
 - Status: Completed and Tested. The driver successfully initializes the display and can show custom messages. The special `lcd_display_slots()` function correctly shows parking slot statuses and switches to a "FULL PARKING" message when all slots are occupied.
- Ultrasonic Sensor (HC-SR04) Module:
 - Status: Completed and Tested. The driver uses an interrupt-based method for accurate distance measurement. Testing confirms it provides stable and reliable readings in centimeters.

Verification Photos:

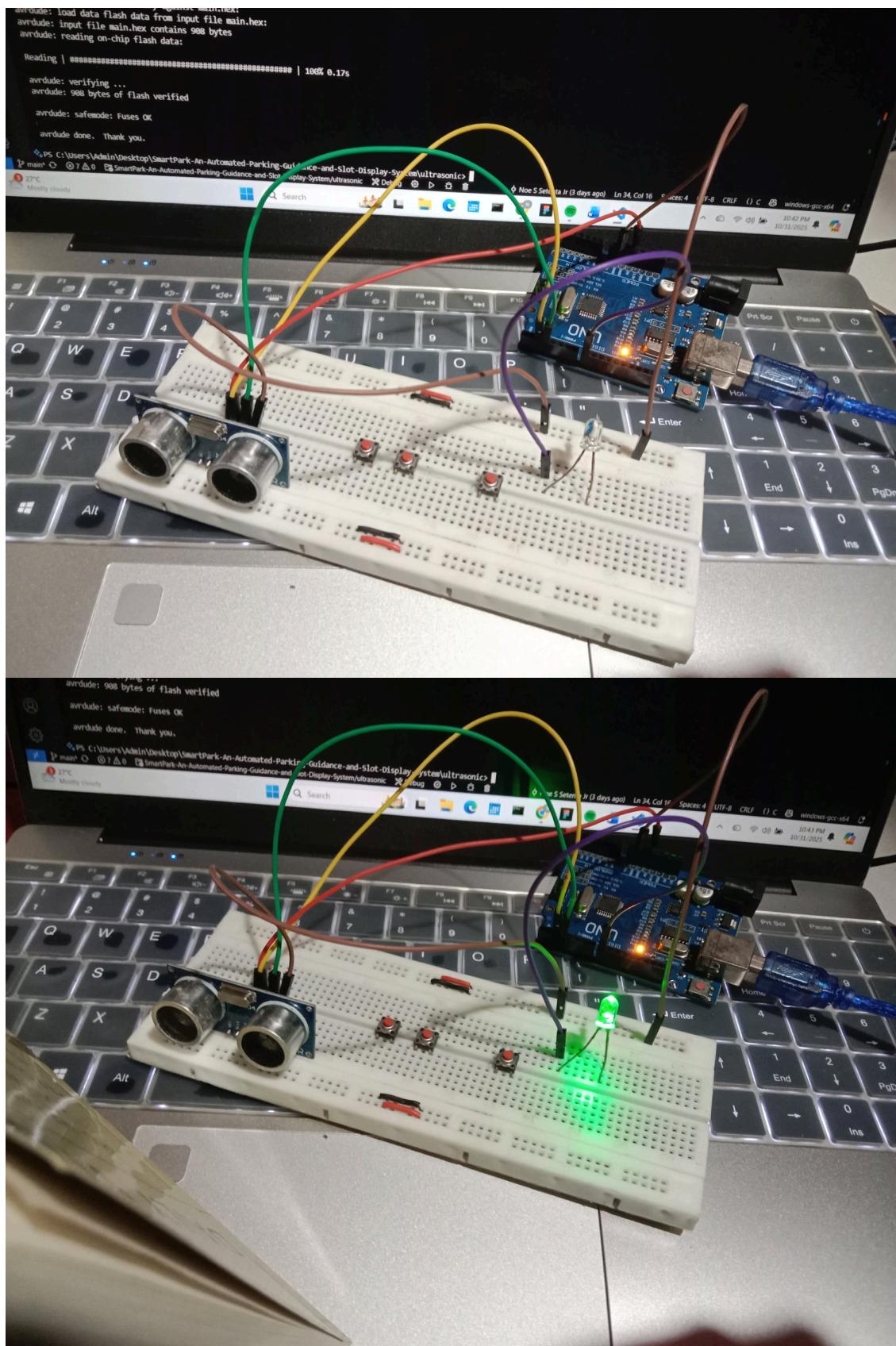
- Picture 1: LCD display showing the slot statuses and initialization of the system.

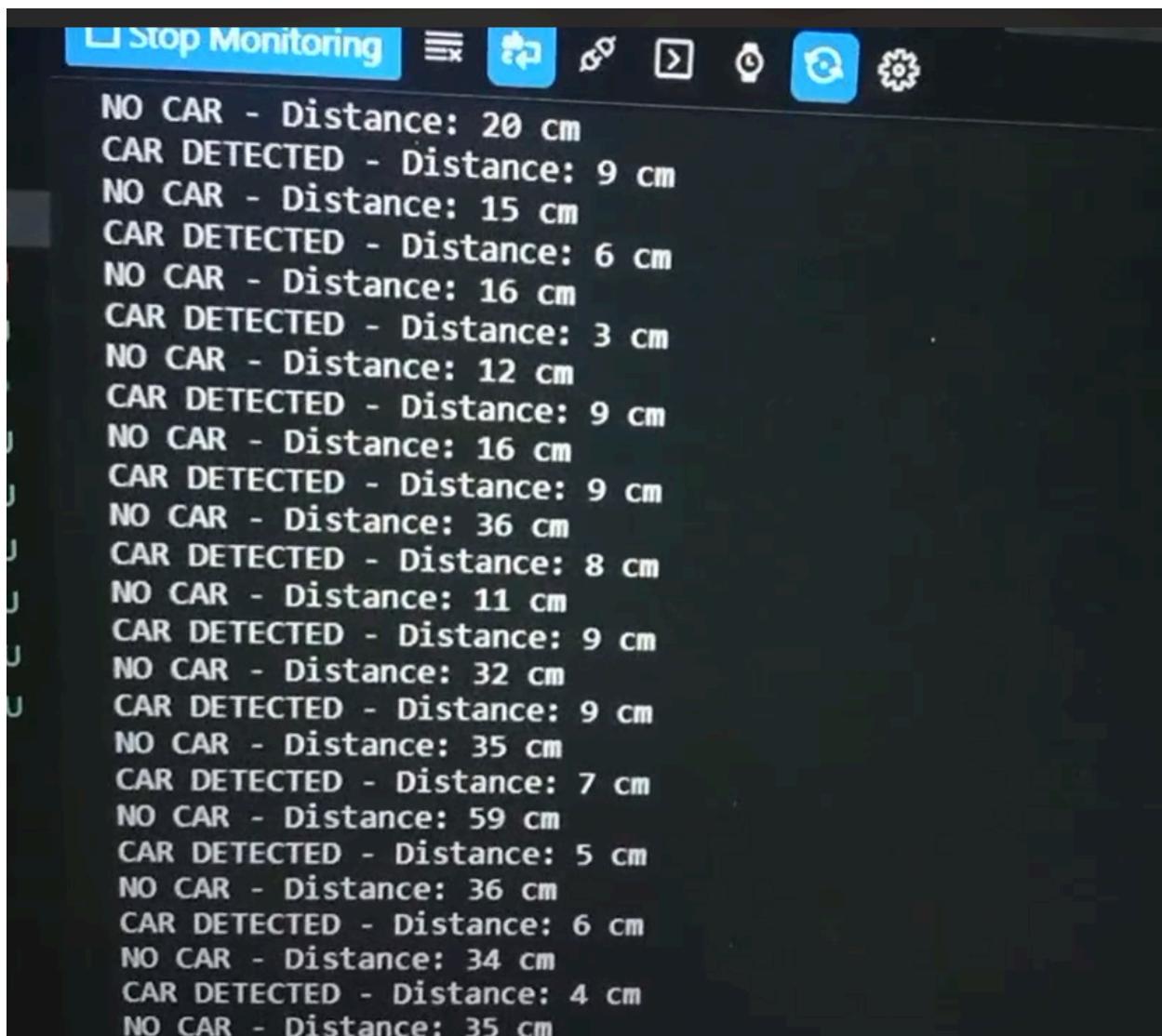


- Picture 2: LCD display showing the "FULL PARKING" message.



- Picture 3: Ultrasonic sensor connected to the microcontroller, with distance readings being verified.





The screenshot shows a mobile application window titled "Stop Monitoring". The main area displays a list of sensor readings. The readings alternate between "NO CAR - Distance: [value] cm" and "CAR DETECTED - Distance: [value] cm". The values for distance range from 3 cm to 59 cm. The background of the app is dark, and there are several icons at the top right, including a gear for settings.

| Reading Type | Distance (cm) |
|--------------------------|---------------|
| NO CAR - Distance: | 20 cm |
| CAR DETECTED - Distance: | 9 cm |
| NO CAR - Distance: | 15 cm |
| CAR DETECTED - Distance: | 6 cm |
| NO CAR - Distance: | 16 cm |
| CAR DETECTED - Distance: | 3 cm |
| NO CAR - Distance: | 12 cm |
| CAR DETECTED - Distance: | 9 cm |
| NO CAR - Distance: | 16 cm |
| CAR DETECTED - Distance: | 9 cm |
| NO CAR - Distance: | 36 cm |
| CAR DETECTED - Distance: | 8 cm |
| NO CAR - Distance: | 11 cm |
| CAR DETECTED - Distance: | 9 cm |
| NO CAR - Distance: | 32 cm |
| CAR DETECTED - Distance: | 9 cm |
| NO CAR - Distance: | 35 cm |
| CAR DETECTED - Distance: | 7 cm |
| NO CAR - Distance: | 59 cm |
| CAR DETECTED - Distance: | 5 cm |
| NO CAR - Distance: | 36 cm |
| CAR DETECTED - Distance: | 6 cm |
| NO CAR - Distance: | 34 cm |
| CAR DETECTED - Distance: | 4 cm |
| NO CAR - Distance: | 35 cm |

3. Pending Items & Next Steps

The remaining physical components (sensors, wires) necessary to build the complete multi-slot prototype are on order and are scheduled to arrive by November 3.

Upon receipt of the materials, our immediate next steps for Milestone 2 will be:

1. Full System Integration: Connecting all six ultrasonic sensors to the Arduino.

2. Final Assembly: Combining all hardware into a complete working prototype.
3. End-to-End Testing: Thoroughly testing the entire system to ensure all parking slots are detected and the display updates in real-time as required.

We are on track to complete the functional prototype shortly after the components arrive.