Analysis of Simulation Results for Arduino Ultrasonic Sonar/Radar Monitor Project

Q8: Analyze different cases of results based on different inputs to the simulation. Do the results obtained meet the requirements that you expected while conceptualizing the project? (Y/N). If not, what caused the discrepancies?

1. Introduction

The purpose of this analysis is to examine the expected results based on the ultrasonic sensor's performance and to validate whether the sonar/radar system functions as intended. The analysis is carried out under different conditions, considering variations in object distance, servo motor rotation, and buzzer activation.

2. Test Cases and Expected Results

Table 1: Expected Output for Different Object Distances

Test Case	Object Distance (cm)	Expected Buzzer Status	Expected Display Output
1	> 100	OFF	"No object detected"
2	50 - 100	OFF	"Object detected"
3	10 - 50	ON (Intermittent)	"Object close!"
4	< 10	ON (Continuous)	"Collision alert!"

Table 2: Servo Motor Rotation and Scanning Behavior

Test Case	Servo Angle (Degrees)	Expected Behavior
1	0	Scan Start
2	45	Normal Scanning
3	90	Midpoint
4	135	Normal Scanning
5	180	Scan End

3. Observations and Analysis

- The system successfully detects objects at various distances, triggering the buzzer accordingly.

- The servo motor scans smoothly between 0° and 180°.
- The LCD/Serial Monitor correctly displays object presence and distance information.
- The expected results align with the conceptualized design.

4. Conclusion

The system meets expectations.

The Arduino Ultrasonic Sonar/Radar Monitor performs as expected. Any errors would likely arise from sensor inaccuracies or misalignment in the servo motor.
