Computer Interface Course Project Proposal
4th Year Computer Engineering

Project Title: [Autonomous Car]

Team ID: [2A]

Team Members:

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1. Project Objective:

A simple car connected to a PC (wireless [WI FI]), having 2 modes of operation, that the user can select through the GUI. The first mode is manual mode, where the user can control car movements through the GUI using buttons. The second mode is autonomous mode, when selected through GUI by user, in which the car keeps moving while avoiding collisions using its on-board sensors (ultrasonic). In all modes, the car will send sensor readings to the PC to display it on the GUI, while showing a status of (Obstacle in range or No Obstacles) and the distance between the car and the available obstacle if it exists.

Mode 1: Web Interface Control (MERN Stack)

Frontend (React):

- The interface allows users to set destinations, control movement, and monitor the vehicle's surroundings.

Backend (Node.js, nest.js):

- A Node.js and nest.js backend server manages communication between the web interface and the autonomous car using MQTT micro services.
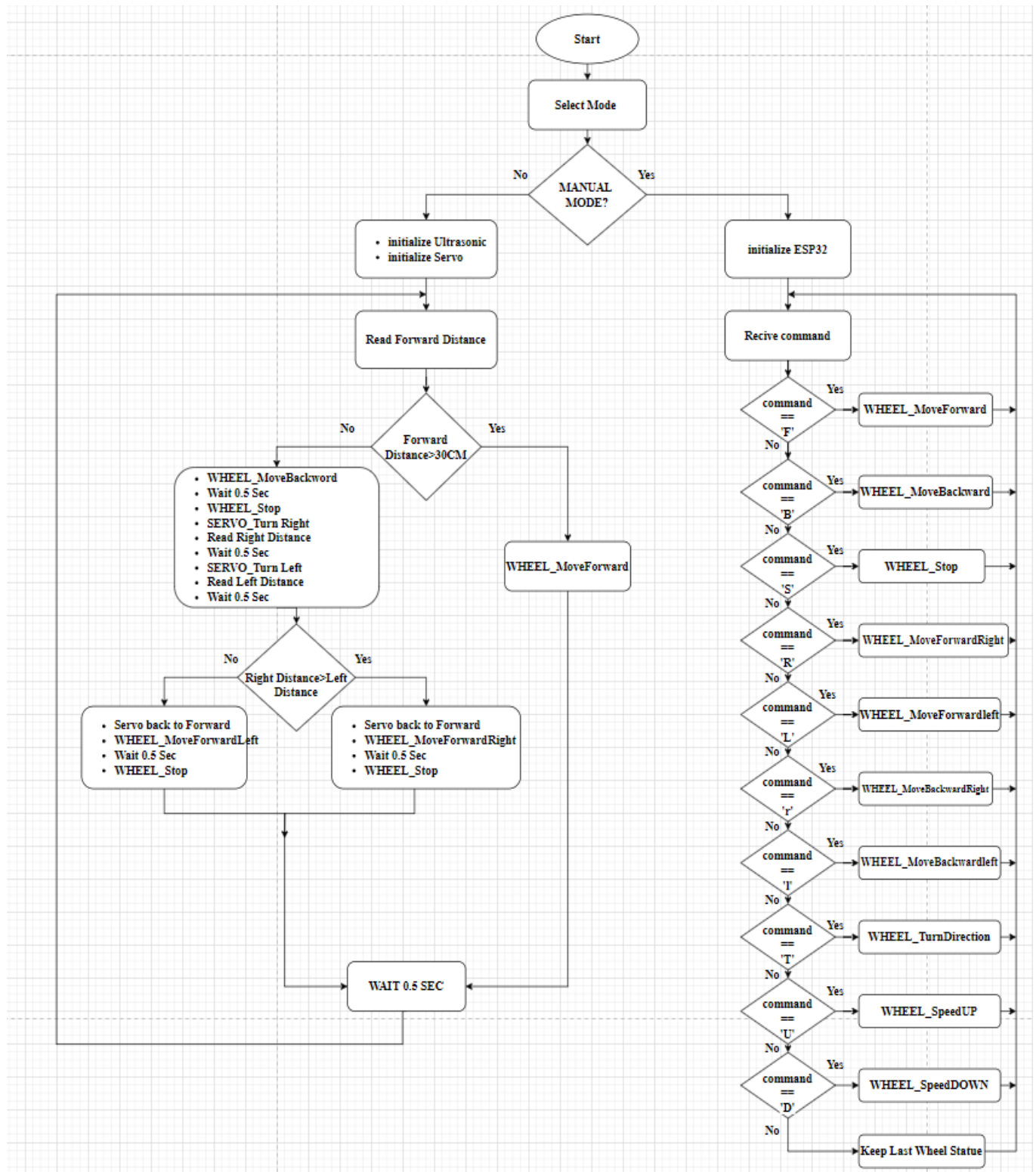
Mode 2: Ultrasonic Autonomous Navigation

Hardware:

- Ultrasonic sensors, strategically placed on the autonomous car, provide distance measurements to detect obstacles in the environment.

Control System:

- The car's microcontroller (AVR ATmega32) processes data from the ultrasonic sensors to make real-time decisions.

2. System Flow Diagram:

https://drive.google.com/drive/u/0/folders/1E_-L5B07vaeMt0pW0tjJa5r43wtBuRxx

3. Component List

- Microcontroller [AVR ATmega32]
- WIFI Module [ESP 32]
- Ultrasonic Sensor [HC-SR04]
- Servo Motor
- Chassis
- 4 DC Motor
- H_Bridge [L293]
- Power Source [5V &12V]
- LEDS
- BUZZER

4. Conclusion

This autonomous car project demonstrates a versatile and user-friendly approach to control using a MERN stack-powered web interface and ultrasonic sensors for autonomous navigation. The combination of a robust web interface and sophisticated autonomous capabilities enhances the adaptability and usability of the car in various scenarios. The project represents a harmonious integration of modern web technologies and sensor-driven autonomy for a comprehensive autonomous vehicle experience.