Department of Computer Science and Engineering
Premier University

EEE 372 : Microprocessors & Microcontrollers Laboratory

Project Proposal Report

Mobile Apps Controlled Smart Vehicle System

Submitted by

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Remarks

Abstract

This proposal details the design and development of a Mobile Apps Controlled Smart Vehicle System using Arduino. The system enables users to control the vehicle's movement (left, right, forward, backward) via a mobile application. Additionally, the vehicle stops when an obstacle is detected in its path using ultrasonic sensors.

Contents

1 Introduction

This project proposes the development of a smart vehicle system that can be controlled via a mobile application. The vehicle will be capable of moving left, right, forward, and backward. It will automatically stop upon detecting obstacles using ultrasonic sensors, enhancing safety and usability.

2 Objectives

The main objectives of this project are:

- To develop a mobile application to control the vehicle's movements.
- To integrate sensors for obstacle detection and automatic stopping.
- To design a user-friendly interface for the mobile application.
- To test and validate the system under various conditions.

3 Methodology

3.1 System Design

The smart vehicle system will include an Arduino microcontroller, a Bluetooth module for communication, motor drivers for movement, and ultrasonic sensors for obstacle detection.

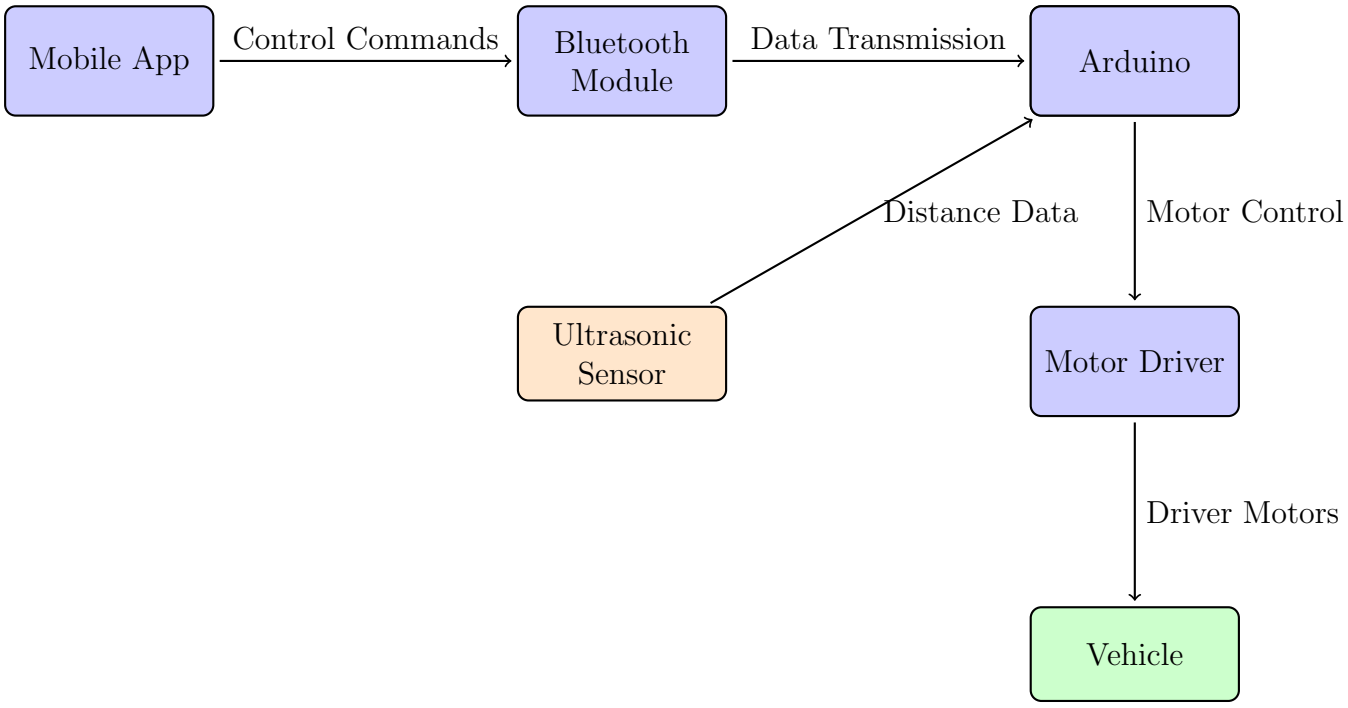

Figure 01 : Block Diagram of the Smart Vehicle System

3.2 Hardware Components

- **Arduino Uno**: Acts as the main control unit for the vehicle.
- **HC-05 Bluetooth Module**: Enables communication between the mobile app and Arduino.
- **L298N Motor Driver**: Controls the motors to facilitate movement.
- **Ultrasonic Sensors**: Detects obstacles and triggers the vehicle to stop.

3.3 Movement Control

The vehicle will be capable of the following movements:

- **Forward**: Move in the forward direction.
- **Backward**: Move in the backward direction.
- **Left**: Turn left.
- **Right**: Turn right.
- **Stop**: Halt when an obstacle is detected.

3.4 Software Development

The mobile application will be developed using Android Studio, chosen for its robust development environment and compatibility with Android devices. It will establish a Bluetooth connection with the vehicle to send control commands (e.g., left, right, up, down) to an Arduino microcontroller. The Arduino will be programmed using the Arduino IDE, integrating libraries for motor control and obstacle detection via an ultrasonic sensor. Additionally, a Java-based application sourced from a Youtube Video will be adapted to complement our project requirements, ensuring seamless integration with the smart vehicle system.

3.5 Implementation Plan

1. **Design Phase**: Design the system architecture and select components.
2. **Development Phase**: Develop the mobile app and Arduino code.
3. **Integration Phase**: Integrate hardware and software components.
4. **Testing Phase**: Test the system in different environments.

4 Expected Outcomes

The expected outcomes include:

- A functional smart vehicle prototype.
- A mobile application to control vehicle movements.
- Successful integration of obstacle detection with automatic stopping.
- A detailed report on the design, development, and testing processes.
- A presentation about the project.

5 Conclusion

The Mobile Apps Controlled Smart Vehicle System successfully enables remote control of vehicle movements via a mobile application, facilitated by Arduino and Bluetooth technology. It incorporates real-time obstacle detection using ultrasonic sensors to ensure safe operation. Through meticulous hardware integration and software development using Android Studio and Arduino IDE, the system demonstrates robust functionality and usability. This project not only achieves its goals of creating a functional prototype but also highlights the practical application of embedded systems in modern transportation solutions. Future advancements could further optimize control algorithms and expand its application in robotics and smart vehicle technologies.