Automatic Car Parking and Accident Detection

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Abstract—The purpose of this project is to provide a system that enables a car to parallel-park itself. The car will use 3 infrared sensors to provide "eyes", which will feed data to Arduino that will control its motors, to safely guide the car from the moment a driver decides to park to the point when the car is in the correct position. It also notifies the driver the information of if the vehicle is parked or not along with its exact location. The prototype will also have an accident detection system in which, as soon as an accident is detected, a message will pop up to all the family members or to the ambulance about the accident along with its location. For sending location, GSM module is used.

Index Terms—Arduino, DC Motor, GSM Module, IR sensor, Ultrasonic sensor

I. INTRODUCTION

As the number of cars increase on the road, it becomes increasingly difficult to find a parking space. However, the final option of parallel parking is usually a driver's worst nightmare because not only of the driver's own skills but also the possibility of other drivers bumping into their parked vehicle. As such, people will drive around for half an hour to avoid facing this challenge. In an attempt to provide more simplicity into people's lives, our project will develop a system that enables a car to parallel-park itself and sends its location to owner if its parked and to emergency numbers in case of accidents.

II. EASE OF USE

A. Automating the car parking mechanism

This project aims to reduce the difficulty faced by car driver at the time when there is constrained parking space as well as when there long queue for parking.

B. Sending location of car

When the car is parked, the owner will get its location using GSM module and in case of accidents its location is sent to the ambulance.

III. BLOCK DIAGRAM
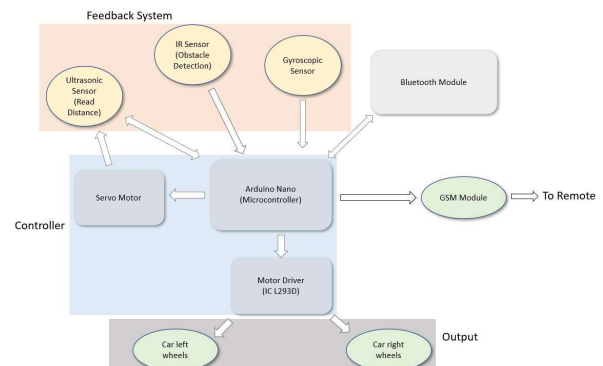
IV. MODULES

A. ARDUINO CONTROLLER

Arduino is an open-source platform that is used for electronics projects. Arduino has some advantages over other controller boards.

- Consists of two physical boards.
- One is a circuit board that is programmable(often referred to as a microcontroller) and the second is a piece of software or also called an IDE (Integrated Development Environment), which runs on our computer, that is used to write and upload computer code to the physical board.
- Programming language is C .
- No additional hardware is needed.
- Thus, Arduino is a basic member of electronics.

- It consists of RAM, ROM, supply, and analog and digital pins required to run an electronic system.

B. GSM Module

The GSM module establishes communication between the computer and the GSM system. Global System for Mobile communication (GSM) is a type of architecture that is used for mobile communication in most countries. GSM MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM network. It requires a SIM (Subscriber Identity Module) card, like mobile phones, to activate communication with the network. Also, they have IMEI (International Mobile Equipment Identity) numbers that are very similar to mobile phones. for their identification. A GSM MODEM can perform the following operations:

- Receive, send or delete SMS messages in a SIM.
- Read, add, and search phonebook entries of the SIM.
- Make, Receive, or reject a voice call.

The GSM module interacts with the Arduino board and sends and receives data to communicate with the system through the receiving and transfer pin of GSM to Arduino Uno.

V.   METHODOLOGY

The following steps were involved in the project:

- Write the INO code to control motor and sensors of the car and store it in Arduino.
- Perform software simulation to verify the correctness of the program.
- Make all connections and complete the hardware implementation.
- Used ultra sonic and infra red sensor for object detection and gyro sensor for accident detection.
- Used GSM SIM800L for mobile communication.
- If the ultra sonic sensor detects some obstacle ahead, it will check for which direction to turn and proceeds forward.
- Infra red sensor at side detects the free slot to be park in.
- Gyro sensor will be used to detect accidents, soon after that GSM module will send message with location to any of the family member.
- Create an android application to provide a user interface for communication with the user.
- Mobile app will show the current status of the parking slots to the user, if slot is free, the data of the IR sensor will be displayed on the app through ESP8266 wifi module which uses MQTT.

VI.   ALGORITHM

A. Parking

- First, the car moves forward searching for parking space to the right of it using IR sensors.
- If there is enough space to park the car, then it goes in parking mode. Otherwise, it goes on searching for it.
- Next, it will move in the parking space by moving right and slightly forward.
- Then it moves backward till there is no enough space.
- It repeats previous two steps until there is not space to the right and back of the car. This ensures efficient parking.
- At last it stops and a beep sound is produced indicating that the car is parked.

B. Accident Detection

- First, the car is moving safely.
- In case of accident, the distance from front will be less which is sensed by the ultrasonic sensor or the gyro sensor detects the flipping of the vehicle.
- This moment a function to send SMS along with its location is called which sends message to the receiver.

VII. CONCLUSION

A car with automatic parking and accident detection using Arduino is an excellent example of automation. It is seen that parking is difficult for a new driver, parking algorithm will help those persons, and accident detection algorithm helps to save someone's precious life. During this project, we came across many sensors and their practical use.

VIII. ACKNOWLEDGMENT

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