Ahsanullah University of Science & Technology

Department of Computer Science & Engineering

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CSE 3216

Microcontroller Based System Design Lab

Final Project Report

Project Name: *Smart Car*

Submitted To

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Objective

An autonomous car is a vehicle that can guide itself without human command and control. Obstacle detection and avoidance during navigation of an autonomous vehicle is one of the challenging problems. The main objective of our project is autonomous driving with obstacle avoidance so that accidents can be avoided and driving can be smooth and efficient. It will also be able to calculate the distance of the obstacle from the car. Moreover, it will have a smart ambient system that will control the temperature of the car depending on the ambient.

Social Values

The world is adopting smart car technology. Driverless cars have become one of the prime aims of car manufacturers. Whenever the topic "Autonomous Driving" comes up, the main focus becomes whether it can tackle obstacles. If the car can not handle obstacles, accidents will occur. Our car will have an automatic braking system. In a specific range, the car will be stopped if any obstacle comes. Then it will look for an obstacle-free route and restart its journey. This will help us not only avoid accidents but also save time. This will also have automated parking assistance. If any obstacle comes while the car is in reverse gear, the car will automatically brake to avoid a collision. Besides, it will have a smart ambient system. The temperature of the ambient will be controlled automatically depending on the ambient temperature. This will help us save more energy.

Required Components

Our project requires the following parts and tools:

- ➢ Arduino Uno R3 SMD
- ➢ DC Motor
- ➢ Gear Motor
- ➢ Servo Motor
- ➢ Stepper Motor Driver
- ➢ Sonar Sensor (HC-SR04)
- ➢ LM35 Temperature Sensor
- ➢ Digital IR Sensor
- ➢ Switch
- ➢ LED Light

- ➢ Fan
- ➢ Jumper Wires
- ➢ 9 Volt Battery

Working Procedure

The basic components that react to the input are

● Gear Motor
● Servo Motor
● DC Motor
● LED Light

The components that take stimuli from the environment are

● LM35 Temperature Sensor
● HC-SR04 Sonar Sensor
● IR Obstacle Sensor

Our car will have the following features

● It will drive automatically following the lines with the help of IR obstacle sensors.
● Whenever any obstacle is detected in front of the car, the car will break and check the route to avoid the obstacle. After finding the obstacle-free route, it will continue its journey avoiding that obstacle. This will be done with the help of a sonar sensor.
● Our car will have a smart ambient that can control its temperature. There will be a fan whose speed will be increased or decreased based on the temperature of the ambient. The temperature will be measured by the LM35 temperature sensor.

Block Diagram of Project

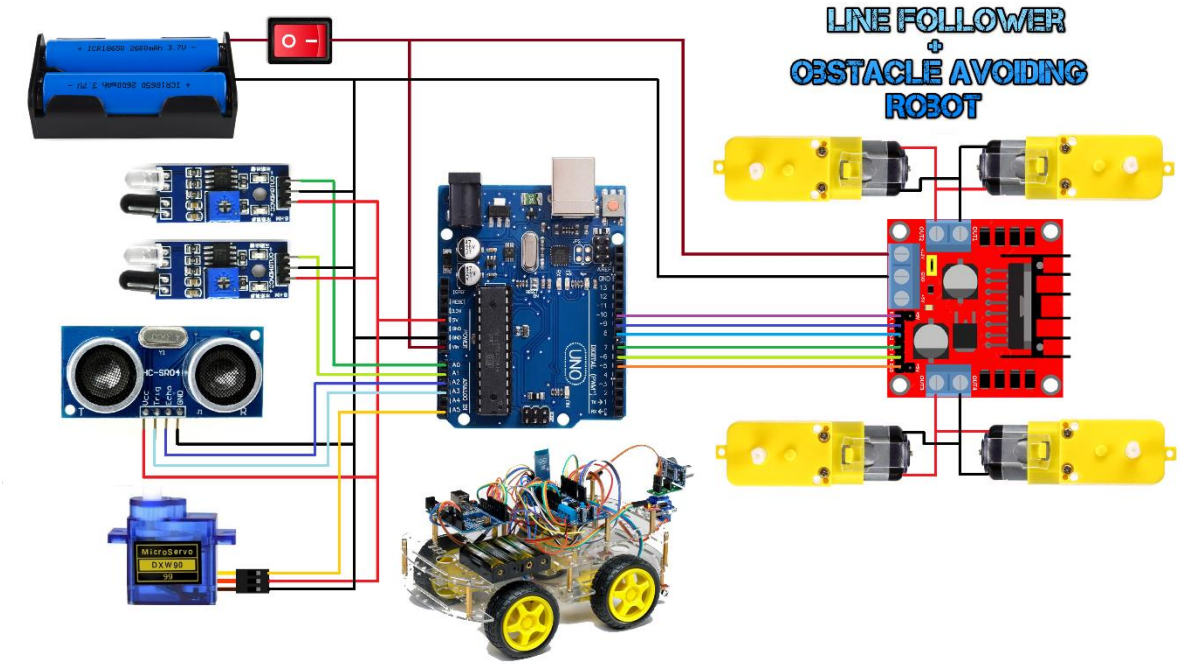

Figure: The block diagram of Smart Car

Budget Comparison

Previous Estimated Budget

Equipment	Quantity	Budget(Tk)
Arduino UNO R3	1	1000
Stepper Motor Driver	1	300
IR Obstacle Sensor	4	360
Sonar Sensor(HC-SR04)	2	220
Servo Motor SG92R	1	300
Cars Tire 85x38mm Wheel	4	1000
Gear Motor	4	440
DC Motor	1	70
Battery 9V	1	90
Male to Male, Female to Female and Male to Female wire	As Required	150
Jumper Wire	As Required	150
LM35 Temperature Sensor	1	130
Switch	1	10
Fan	1	20
Led Light	5	5
Total		**4250BDT**

Final Expenditure

Equipment	Quantity	Budget(Tk)
Arduino UNO R3	1	830
Stepper Motor Driver	2	320
IR Obstacle Sensor	6	240
Sonar Sensor(HC-SR04)	2	150
Sonar Clamp	2	100
Servo Motor SG90R	2	220
Cars Tire 85x38mm Wheel	4	680
Gear Motor	4	440
DC Motor	1	70
Battery 3.7V + Charger	5	560
Male to Male, Female to Female and Male to Female wire	As Required	55
Jumper Wire	As Required	140
Jumper	4	220
Arduino Mega 2560	1	1650
LM35 Temperature Sensor	3	180
Switch	1	10
Fan	1	20
Led Light	5	5
Extra		40
Total		**5655BDT**

Previously we estimated a 4250 taka budget. Later we needed to buy Arduino uno, LM-35,Additional battery and some clips. Additional Costs for paper and scrue have also cost us some extra 40 taka. So our total cost increased by 5655 taka.

Contribution of Team-members

1. Afia Sumya (190204061) : 20%
2. Asm Nahin (190204065) : 25%
3. Asheq Ullah (190204068) : 25%
4. Sanjida Akter (190204076) : 15%
5. Dipanwita Bala(190204087) : 15%

Challenges of the Project

1. Our temperature module was not giving the correct value which was a huge problem.

2. The Servo motor was having issues which we were able to solve.

3. Our Arduino mega was burnt during the procedure.

4. Some of the wires we bought were faulty, which also caused us problems in our project.

5. Our IR sensor was not working properly.

6. LM-35 was spoiled. So, we have to get new LM-35.

Pending Work:

- Backward obstacle handling

Conclusion

Autonomous Vehicles are the future. Many automotive industries are now working a lot to turn their system autonomous completely. To cope with autonomous/smart cars, our project aims to develop one smart car with applicable smart features. This project will help in the future in the area of smart automotive industries in a broader way.