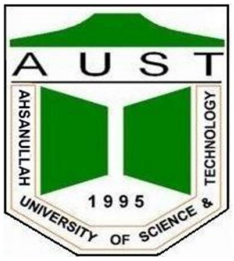

AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Computer Science and Engineering

Fall 2021

Project Final Report

Automated Safety System Robot Car

Lab Group: A2

Project Group: G5A2

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Date: 06 September 2022

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Objective:

Danger never comes by informing us. We always have to be careful. Though the usage of gas cylinders is much, people are not as careful as they should be. So, accidents often occur due to the absence of proper safety knowledge. Keeping in mind how to avoid such accidents, we have come up with this project.

Our project is basically a robotic car that can detect gas leakage. It will also detect fire and throw water to extinguish the fire. It will send a message or call to the owner of the house to alert him about the fire or gas leakage. It will turn its alarm on whenever a fire or gas leakage will be detected to alert the people nearby. It will be a self-driven robot car that will detect obstacles and will roam around the home avoiding the obstacles to find out fire and gas leakage.

Social Values:

Fire accidents are increasing day by day in Bangladesh. Again, In some working places in our country, the workers are exposed to extremely damaging gases and fumes which can have highly adverse effects on their bodies and minds and can even result in death. Our project will be helpful to detect fires and send SMS to the owner and the nearest fire service center. Again, our robot car will help in detecting explosive gases which may not be smelled by humans. It will also detect the presence of toxic gases in the air and alert us. So our project can be very much helpful for the safety of people in homes and working places.

Required Components:

The following parts and tools are required for building this project.

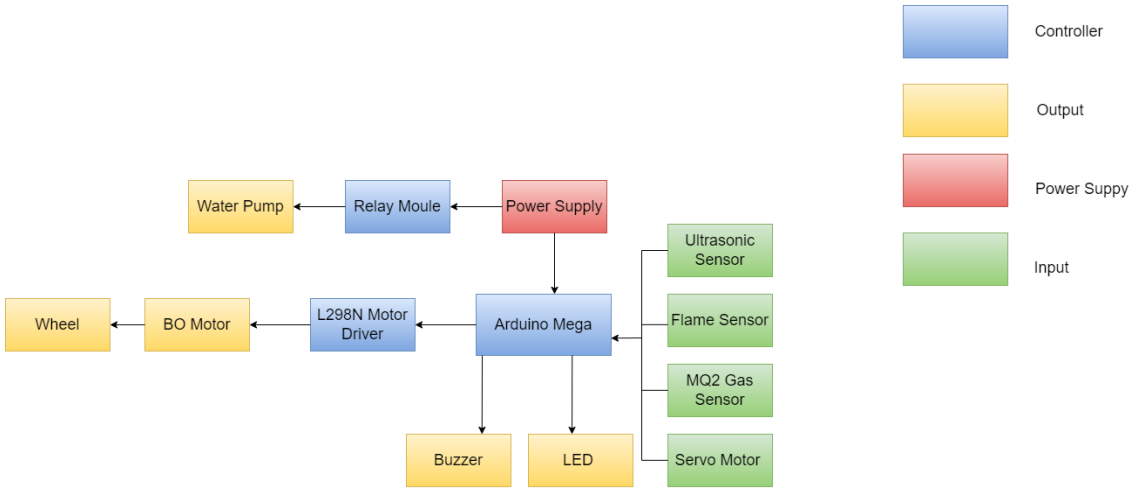
- Arduino Mega 2560 R3 Board
- Flame Sensor Module
- MQ2 Gas Sensor
- L298N Motor Driver
- Relay Module
- Servo Motor SG90
- Mini Water Pump (5V)
- Mini Water Tank
- 18650 Lithium Ion Battery (×3)
- 9V Battery
- BO Motor Wheel (×4)
- Battery Holder(1S×3)
- Jumper Wire
- Ultrasonic Sensor HC-SR04
- Ultrasonic Sensor Holder
- BO Motor
- Breadboard(×2)

- Buzzer
- LED
- PVC Board
- DC Power Switch

Working Procedure:

Our robot car will be automatically roaming around the house. If it detects any obstacle within 8 cm of the ultrasonic sensor, it will move backward. While a flame is detected by the flame sensor, the buzzer will turn on and a LED associated with it will be also turned on. At the same time, the water pump will be turned on and extinguished until the flame sensor is detecting the fire. Then if the gas sensor detects any gas, another LED associated with the Gas sensor will be turned on.

Block Diagram:



Circuit Diagram:

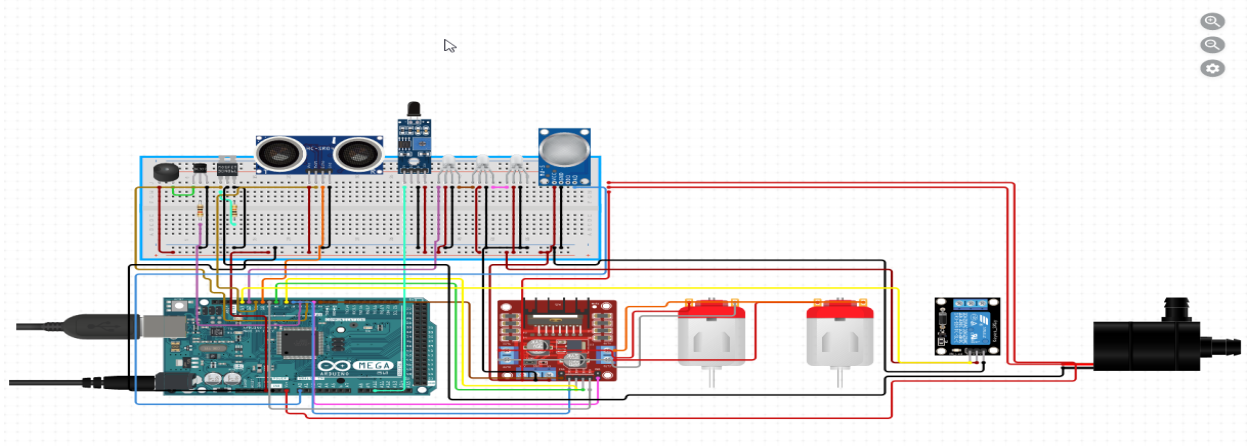
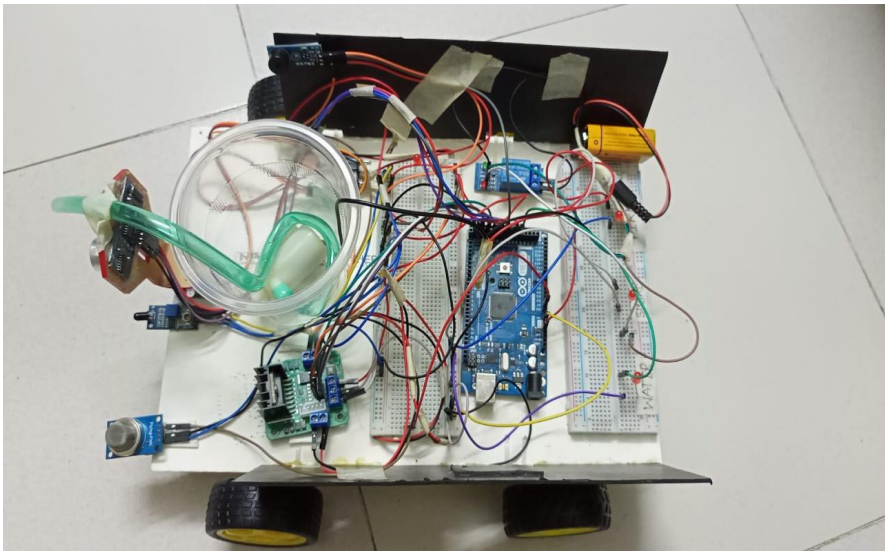


Image of our Project:



Budget Comparison:

Previously Estimated Budget:

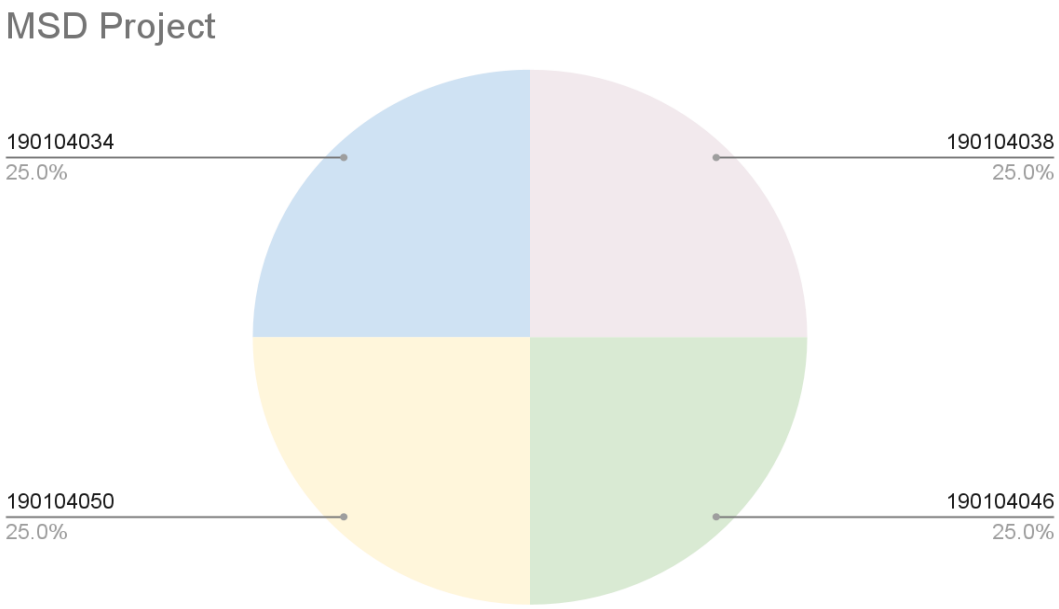
Equipment	Quantity	Budget(TK)
Arduino Mega 2560 R3 Board	1	2038
SIM800L Module	1	350
Flame Sensor	3	150
MQ2 Gas Sensor	1	140
L293D Motor Driver	1	240
Relay Module	1	142
LM2596 Buck Converter	1	99
Servo Motor SG90	1	907
Mini Water Pump(5V)	1	69
18650 Lithium Ion Battery	3	285
Motor Wheel	4	220
Battery Holder(1S)	3	66
Jumper Wire	As per need	300
Ultrasonic Sensor HC-SR04	1	90
Ultrasonic Sensor Holder	1	60
Gear Motor	4	380
Mini Breadboard	1	35
Buzzer	1	80
PVC Board	1	160
DC Power Switch	1	10
Total	5821	

Final Expenditure:

Equipment	Quantity	Budget(TK)
Arduino Mega 2560 R3 Board	1	2038
Flame Sensor	1	50
MQ2 Gas Sensor	1	140
Relay Module	1	142
Servo Motor SG90	1	907
Water Tank	1	50
Mini Water Pump (5V)	1	69
18650 Lithium Ion Battery	3	285
9V Battery	1	47
LED Light	3	3
Motor Wheel	4	220
Battery Holder (1S)	3	66
Water Pipe	1	10
LN298 Motor Driver	1	165
Jumper Wire	100	180
Ultrasonic Sensor HC-SR04	1	90
Ultrasonic Sensor Holder	1	60
BO Motor	4	380
Breadboard	1	97
Buzzer	1	80
PVC Board	1	160
Total		5239

Contribution of Team Members:

In this project, each member of our group contributed much. The percentage of contribution of each member is 25%.



Challenges of the Project:

- Our first challenge was to maintain the voltage of the motors.It was hard for us to give equal and sufficient voltage to the motors
- First We used L293D ic but it was not able to give the power to the motors. As a result, we needed to use an L298N motor driver. and we had to recreate the circuit.
- The gas sensor did not work in the digital pin. so we had to shift into the analog pin.
- We used a 12v battery supply after completing the circuit . The battery could not give the sufficient amount of voltage to the circuit . As a result some components did not work properly.
- We had to provide another 9v battery supply to maintain the water pump motor.

Conclusion:

In our initial plan we planned to use a sim module but this module did not work properly . So we did not use this module . In our future plan we will fix this problem so that this car can notify its owner about the fire and gas leakage .

The robot will help in the matter of ensuring home safety by minimizing the effect of fire accidents and gas leakage. The robot will be self-driven and avoid obstacles along the way so, the detection and the action-taking process will be much faster. Extinguishing fire and detecting fire and gas leakage at any time is a very sensitive safety requirement in every house. This initiative will fulfill this requirement. It will save people's lives and money. We will try to make this project budget-friendly to make it accessible for all walks of people. We tried our best to make all the features user-friendly to make the home safety process easier.

Reference:

- https://www.tinkercad.com/
- https://draw.io/
- http://www.robiulelectronics.com/