Robotics Community

Beni Suef

ROBOTRONICS

TESLA CYBER TRUCK

Technical Report

ABSTRACT

Tesla Cyber Truck is a unique type of robotic system which can pass through a lot of different types of tracks. It can pass through sand and gravel and ramp, go on the line follower automatically till the maze end, pass the maze (automatic or manual), save a person live by removing one of building debris, take the person to the safe zone. A Line Following Robot is an autonomous robot which is able to follow either a black line that is drawn on the surface consisting of a contrasting color. It is designed to move automatically and follow the line. A Maze runner robot (of type wall detection) is a robot which is able to control its' movements in order to avoid hitting the walls during solving the maze. A Bluetooth controlled robot is a remote controlled robot which is controlled by humans. By using Bluetooth, Tesla can go throw sand and gravel and ramp, save the person with the arm attached to its body and take the person to the safe zone. The robot is designed to rescue persons who are trapped under the wreckage of the building after earthquakes or the building damage generally.

Tesla Cyber Truck Team

Team Members and their roles

Programing and electrical work:

Esraa Abdelnaby

Student at faculty of computers and AI

Eslam Sayed

Student at faculty of computers and AI

Mechanics and Design work:

Esraa Azmy

Student at faculty of computers and AI

Zeyad Ashraf

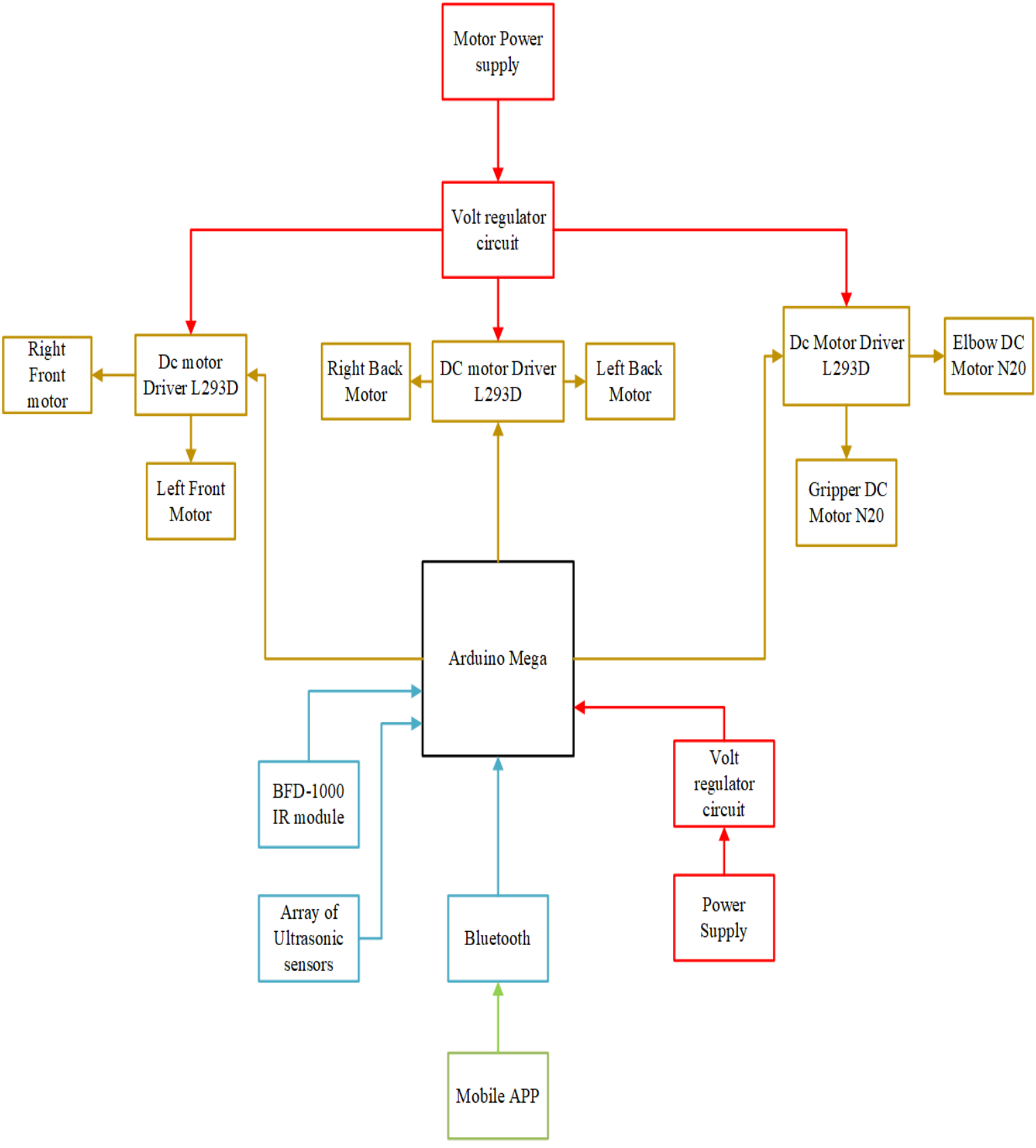
Student at faculty of Engineering

Nourhan Mahmoud

Student at faculty of computers and AI

Tesla Cyber Truck Design and Implementation

Block Diagram: (inputs and outputs)



Hardware needed:

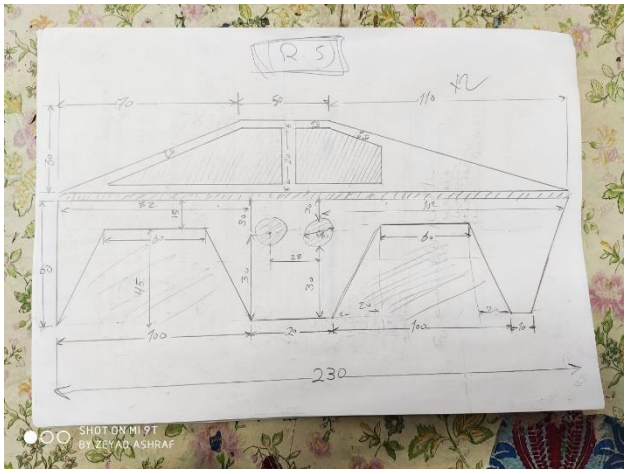
Module name	Quantity	Unit price	Total price
Arduino Mega 	1	150	150
BFD-1000 	1	150	150
Bluetooth 	1	135	135
DC geared motors 	4	25	100
DC N20 motor 	2	100	200
Ultrasonic 	3	45	135
Wheels 	4	20	80
L293D motor driver 	3	60	180

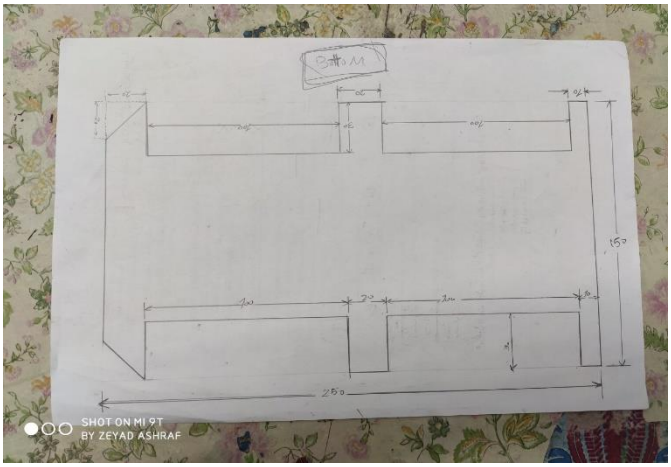
We used other materials and electronics during our different phases of making Tesla cyber Truck, so the Robot Total cost is: 1500 LE

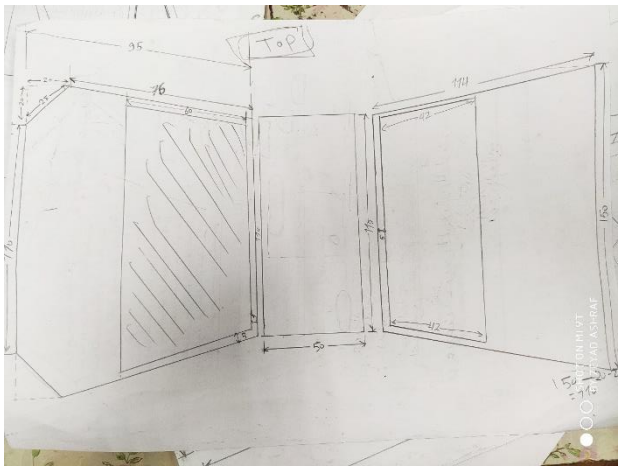
Tesla Mechanics:

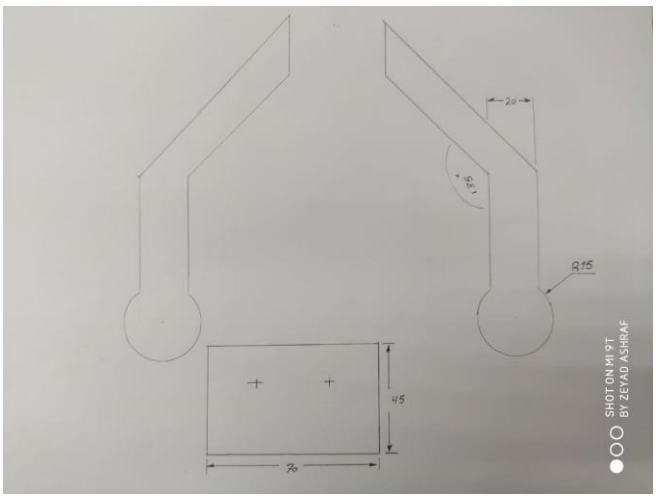
In mechanics at first the team started to draw the design on paper then we drew the tesla body on Solidworks. We had our design cut with laser cutting machine. For the arm we made it manually with simple but suitable enough materials.

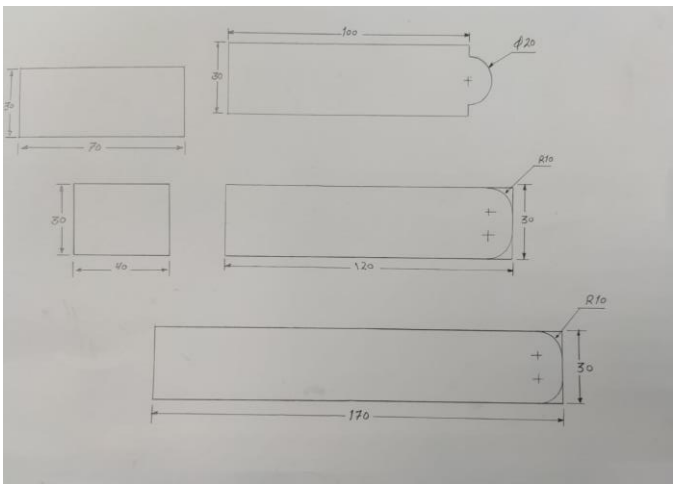
Instead of using too many servos we used 2 DC-N20 motors for the arm, one for Elbow and one for Gripper. DC-N20 Motor with Metal Gearbox Wheel is Brand new and high quality, Metal material, great touch feeling, high quality, durable, RPM15/30/50/60/100/200/300/500/1000 for your choice.



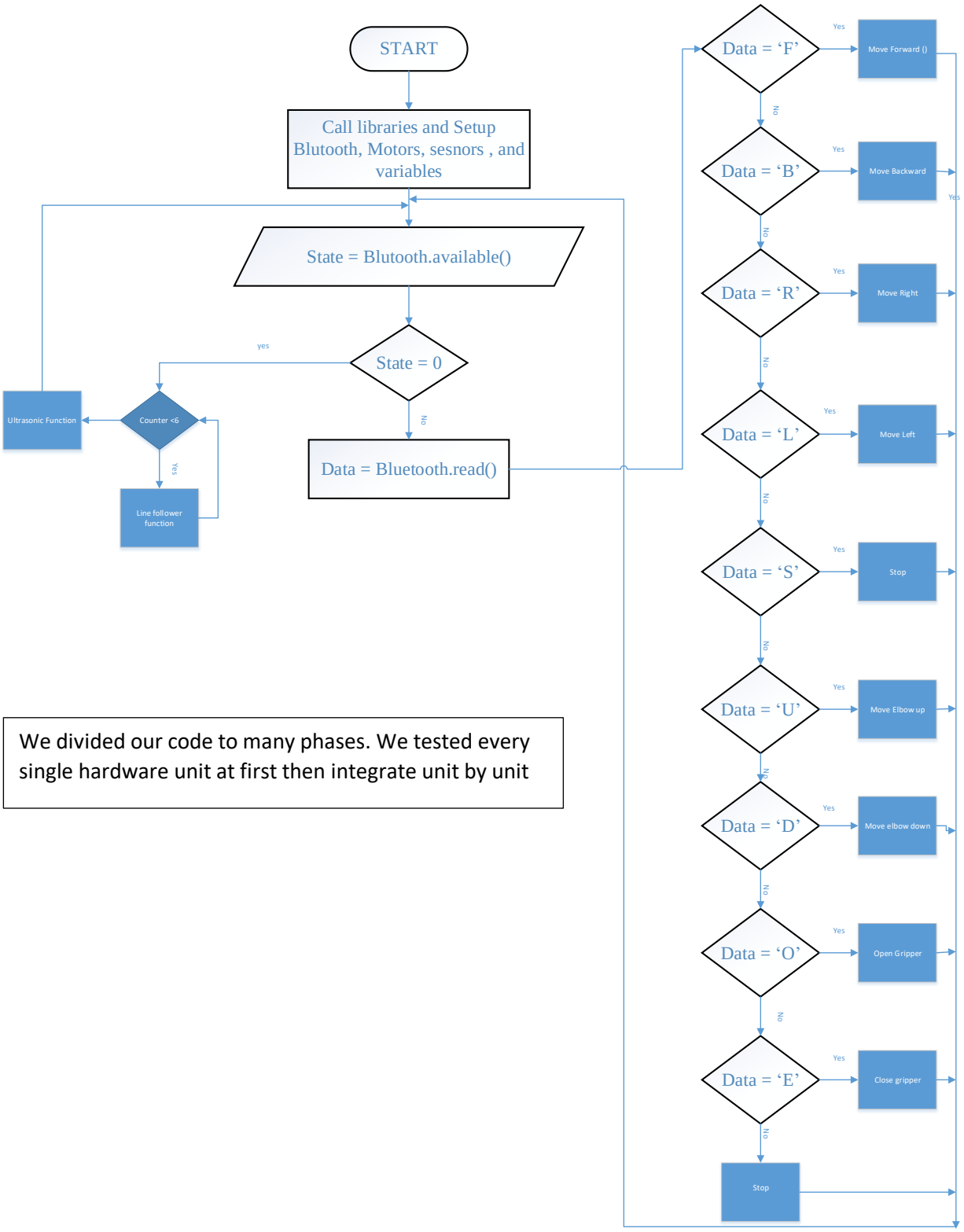








Tesla Programing:



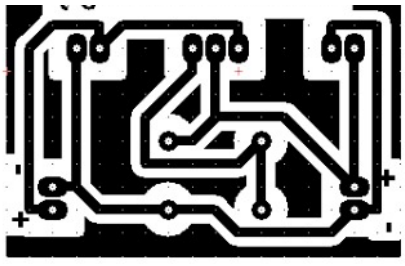
We divided our code to many phases. We tested every single hardware unit at first then integrate unit by unit

The basic operation of Tesla is as follow:

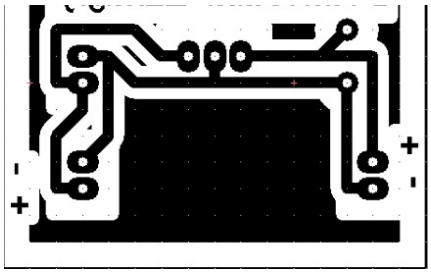
- First the robot checks for Bluetooth connection availability. If the Bluetooth is connected then the robot will wait to receive commands through the Bluetooth if not connected then the robot will operate automatically.
- To pass the first and second task (sand, gravers and ramp) the robot will work manually which means that the robot will wait for the signal of the Bluetooth to know what to do and how.
- Go on the line follower automatically by capturing line position with optical sensors mounted at the front end of the robot. For this BFD-1000 is used (5 channel line detector) this makes the sensing process of high resolution and high robustness.
- Pass the maze (automatic or manual). If the robot will operate automatically , then it will detect distances between the robot and the walls to avoid hitting them or get blocked, for this a combination of Ultrasonic is used to cover the front , right and left sides of the robot ,this makes calculating the distance more accurate. If the robot will go through the maze manual, a Bluetooth module is used for this purpose and the robot will then take the commands through tesla mobile app.
- Save person life by removing one of building debris using the arm attached in the tesla body and then take the person to the safe zone. Tesla will operate this task manually which means it will wait for commands.

Power management:

we made a circuit to make the batteries generate constant voltage 9v for each h-bridge and 7v for Arduino.



7v regulator circuit



9v regulator circuit

TimeLine:

15/12/2019: 15/01/2020 learning phase

16/01/2020: 25/01/2020 making Design on SOLIDWORK and test components

26/01/2020: 30/01/2020 have the body cut, make the arm and finish the video

31/01/2020: 5/02/2020 test code for each individual task and finish proposal

6/02/2020: 12/02/2020 try, test, make IC regulator PCBs and integrate final result to get final code

13/02/2020: 15/02/2020 test and modify if needed.

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