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ARDUINO INDUSTRIAL ROBOT WITH POINT-TO-POINT CONTROL

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I. THE PROBLEM: MANUFACTURING HITCHES

The Manufacturing Industry

The manufacturing industry is the industry concerned with a remarkable change in the nature of materials for the benefit of man. They deform, form, join or transform every day materials including plastics, metal, wood, etc. for effective use by man.

I. THE PROBLEM: MANUFACTURING HITCHES *(CONT'D)*

Challenges Faced in the Manufacturing Industry

In the process of creating goods and services for the benefit of man, there are many challenges faced by manufacturers. Some of them include:

INSUFFICIENT SKILLED WORKERS

In most manufacturing companies, highly skilled workers are very few.

Most of the employed workers learn on the job, making them prone to costly mistakes. This is a challenge.

INCREASING DEMAND

The world's population is increasing. This means, there will be an increase in demands of goods.

This can be a problem for companies with little work force or small scale production.

INCREASED PRODUCTION COST

In recent years, we have experienced a global inflation. Production costs will increase.

This is a great challenge for production companies which have to keep paying staff and not reduce in productivity.

NEED TO SCALE

Due to demand or business goals, production companies constantly face the need to scale production.

Scaling is costly and can affect productivity in some cases if not properly managed.

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II. PROFFERED SOLUTIONS IN THE PAST

A look at some of the solutions to the problems in the manufacturing industry proffered by engineers in the past.

PROFFERED SOLUTIONS IN THE PAST

In an attempt to solve some of the problems in the manufacturing industry earlier mentioned, these solutions have been proffered in the past.

AUTOMATED SYSTEMS

"Using machines to reduce work performed by humans", companies have employed the use of technological systems to solve production challenges.

Some examples are automated assembly lines, Artificial Intelligence (AI) algorithm, etc.

"HUMAN" ROBOT WORK FORCE

Instead of using automated systems, some companies have gone as far as replacing trained human workers with programmed, robots containing human-like features to perform multiple production functions.

The picture on the left is a Professor in Japan with his 'robot twin' that helps him handle his teaching duties at Osaka University in Japan.

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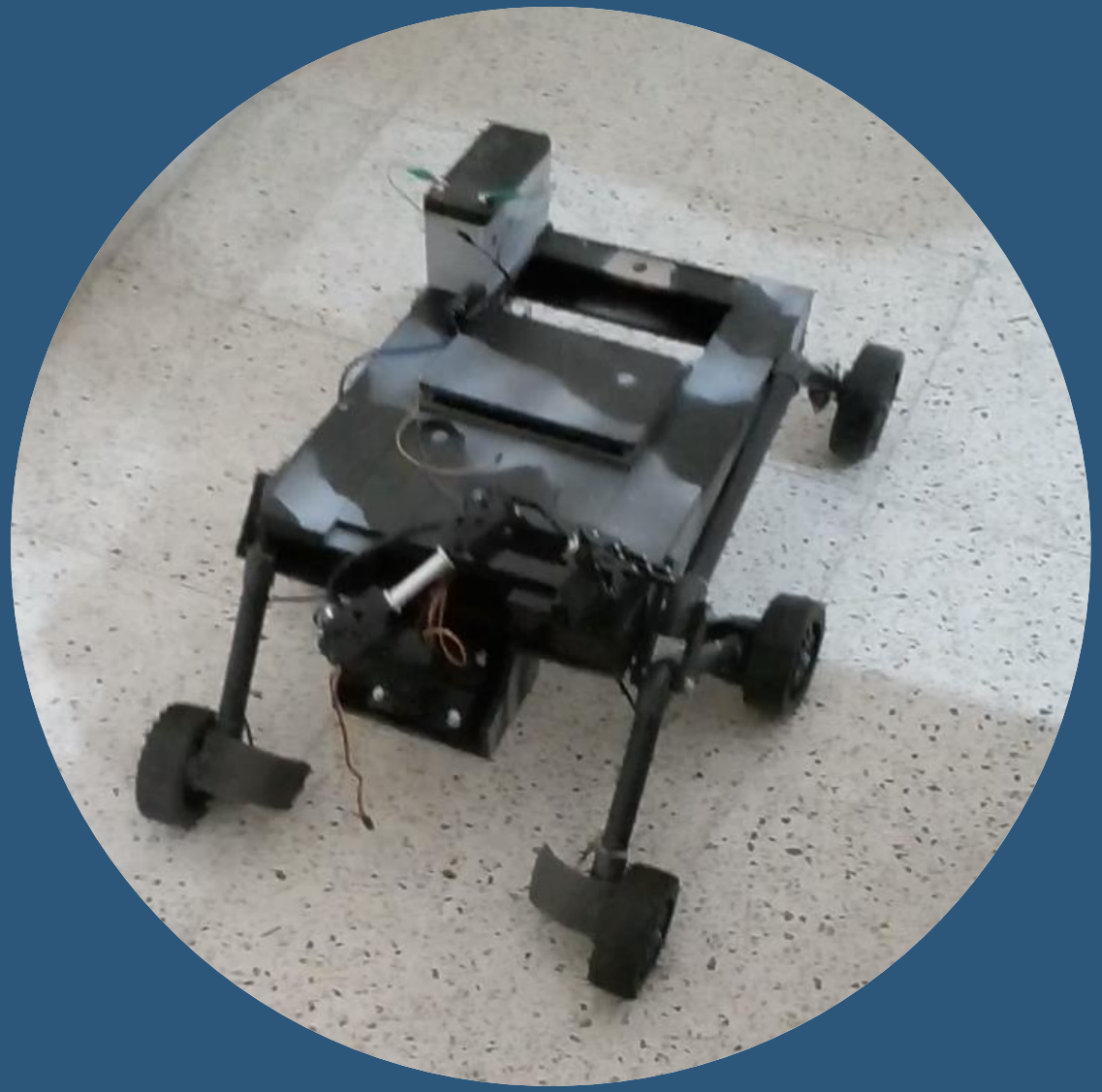


III. OUR SOLUTION

- *Concept of Our Solution*
- *Components of Our Solution*

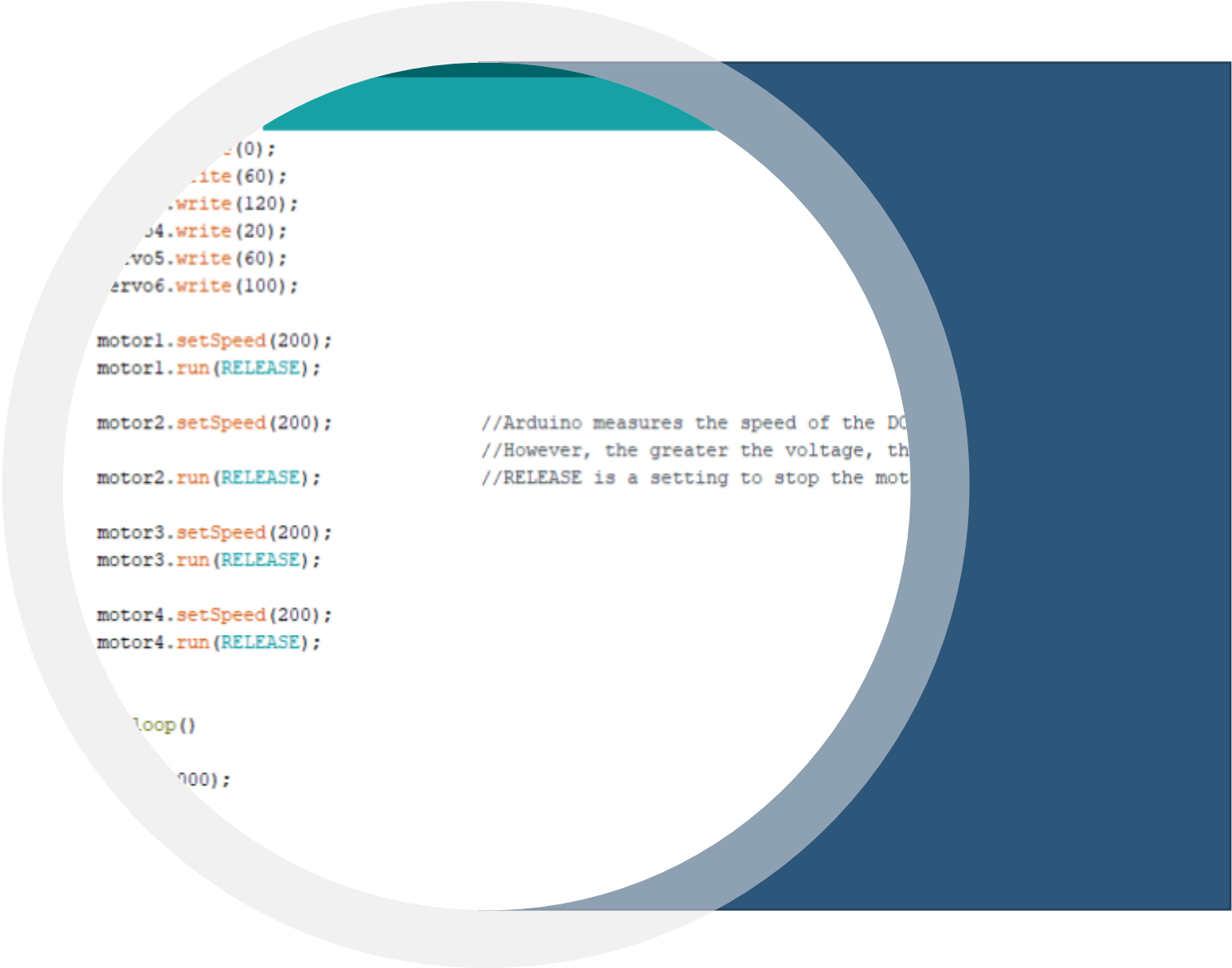
OUR SOLUTION

Concept of Our Solution

Instead of “employing” robots and giving them whole tasks, why not give them specific, repetitive tasks and let humans keep the tasks involved with reasoning, logic and decision making?

This is because times are changing and if we decide to go with decision making robots, with changing times, we have to constantly change their decision making algorithm which can be costly and/or time consuming.

Our solution is simple but we believe it will be help increase productivity in manufacturing/production.



```
(0);
ite(60);
.write(120);
4.write(20);
vo5.write(60);
ervo6.write(100);

motor1.setSpeed(200);
motor1.run(RELEASE);

motor2.setSpeed(200);          //Arduino measures the speed of the DC
                               //However, the greater the voltage, th
motor2.run(RELEASE);           //RELEASE is a setting to stop the mot

motor3.setSpeed(200);
motor3.run(RELEASE);

motor4.setSpeed(200);
motor4.run(RELEASE);


loop()

  900);
```

OUR SOLUTION *(CONT'D)*

Components of Our Solution

We were given access to a robot design earlier made by previous EMU students so we decided to tailor it to our needs.

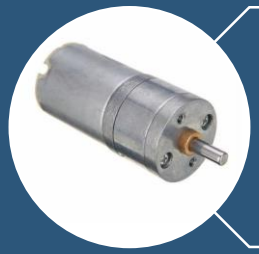
They designed a very good robot system which is a robot car working with mechanical control system, wireless communication system and a robotic arm feature.

Components of our design:

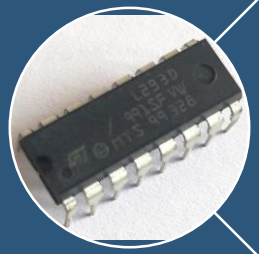
DC Motor
DC Motor Driver
Wheels
Robotic Car
Servo Motor
Robotic Arm
Arduino Mega2560

OUR SOLUTION *(CONT'D)*

Components of Our Solution (cont'd)



DC Motor is an electric motor. It has a positive and negative terminal. Flow of current through the terminals causes it to rotate.



L293D Motor Driver drives the 6 DC Motors used for the 6 wheels. The motor driver helps control the voltage/current received by the DC Motors from the power source.

Driven by the DC Motors, our project consists of 6 rubber wheels.

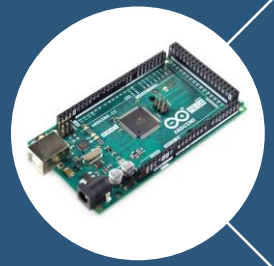
These parts make up the Robotic Car

OUR SOLUTION *(CONT'D)*

Components of Our Solution (cont'd)

Servo Motor is an actuator that allows for precise control of angular (or linear) position. We used 6 of these for our project.

Our project consists of a ***Robotic Arm*** which has 6 rotational joints, each driven by a Servo Motor.



Our project is based on Arduino Mega2560. This is a microcontroller board designed based on the microcontroller ATmega2560.

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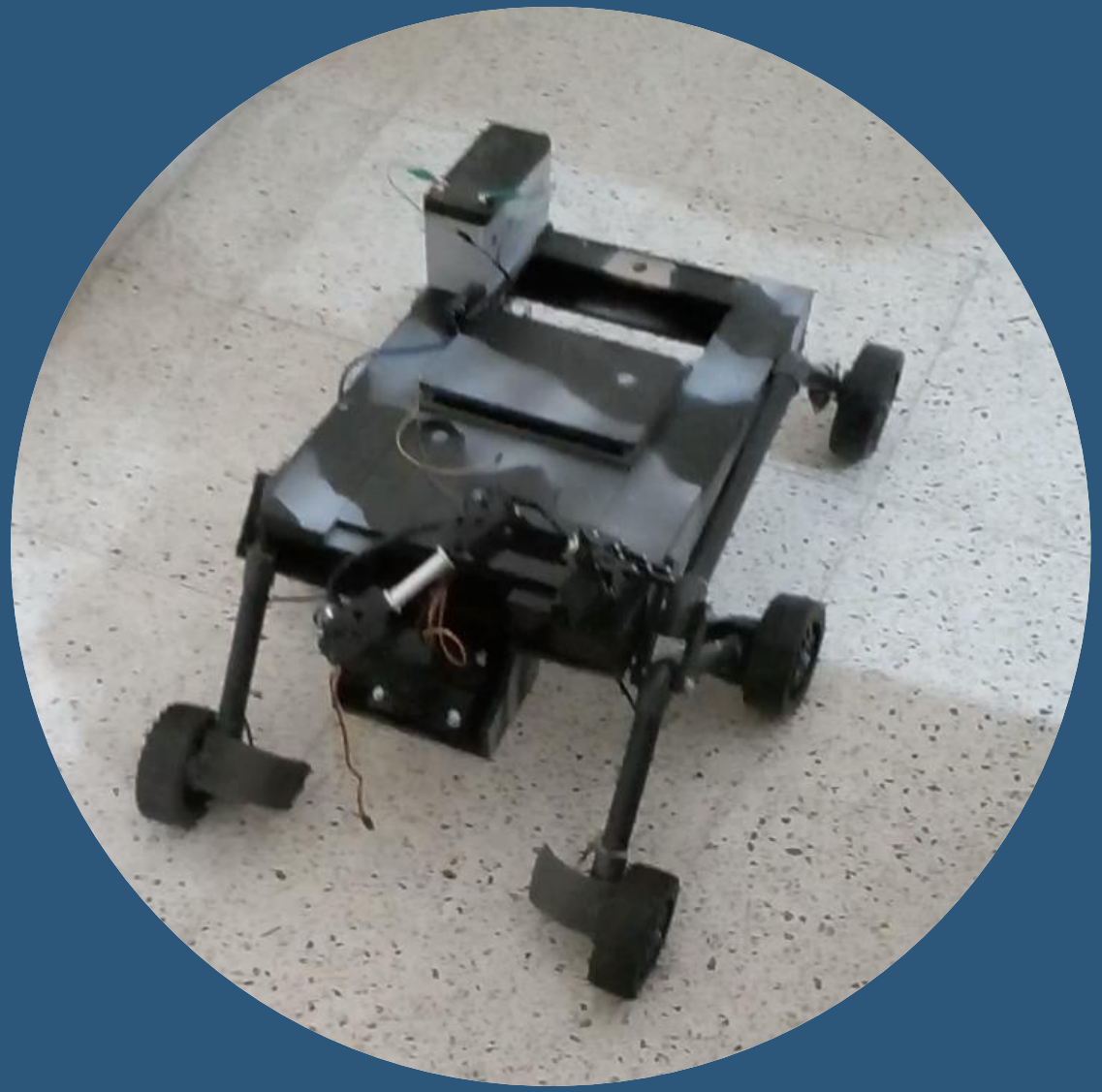


IV.
PROJECT DESIGN

- *Design & Working Principle of Our Solution*
- *Implementation of Our Solution*

PROJECT DESIGN

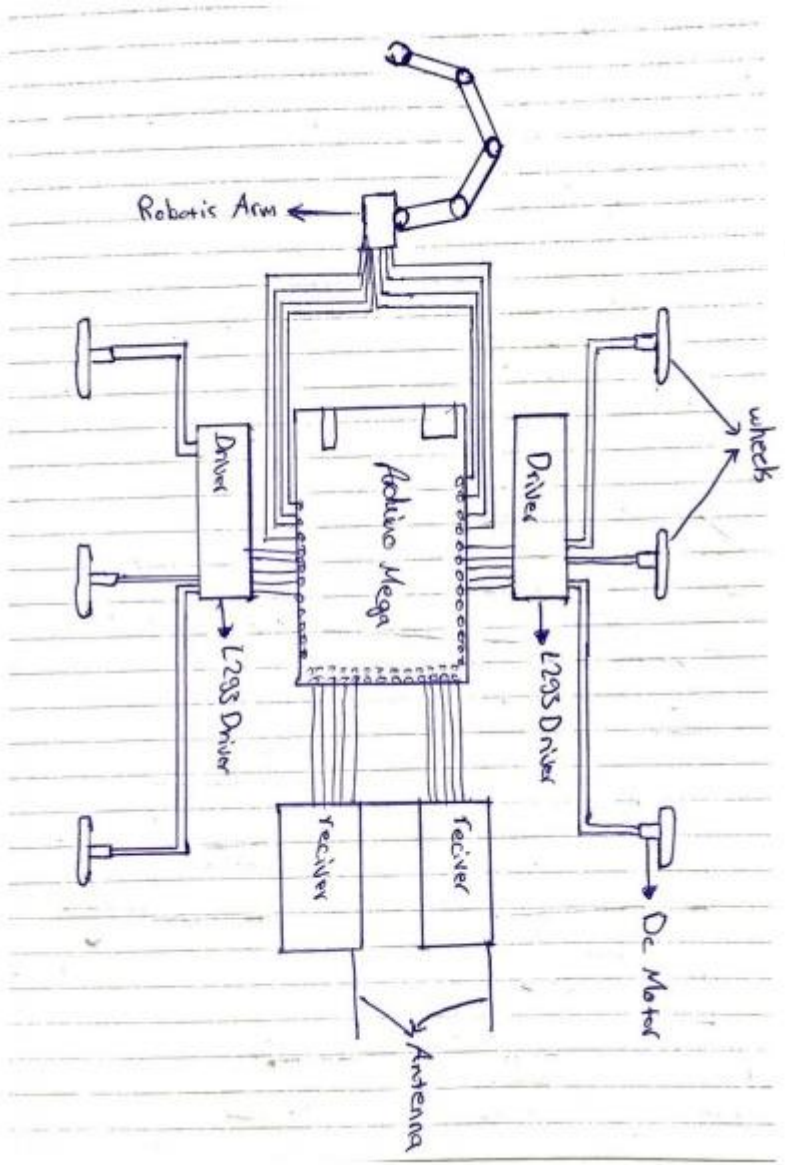
Design & Working Principle of Our Solution

Putting together the components earlier mentioned, we have the circuit of the system portrayed in the figure.

As mentioned earlier, we were privileged to be given the opportunity to work with the robot system designed earlier, and this is the circuit of that system.

However, for our case, we will NOT be making use of the antenna and receiver.

From the circuit, it is seen that our controller, the Arduino Mega2560 is at the centre of our design and will be placed in the robotic car. Other wiring connections including the power source are also placed there. ***The robotic arm*** *is at the hind part of the robotic car.*



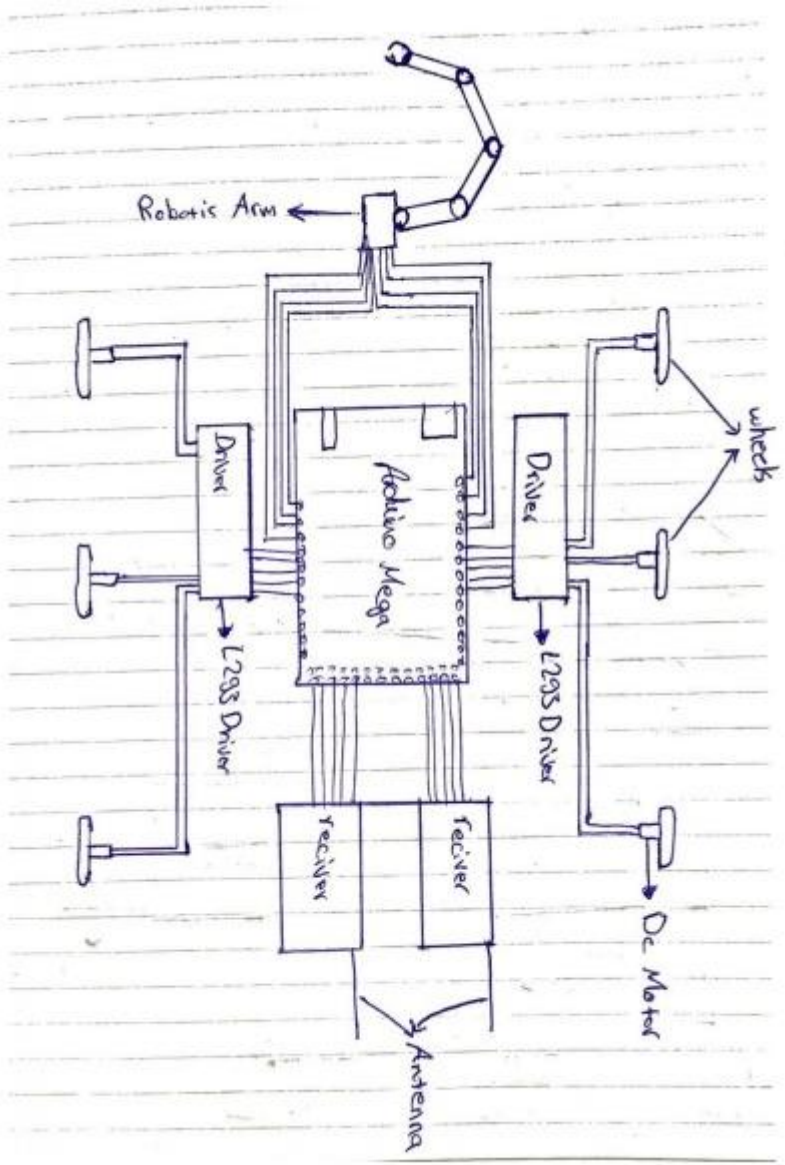
PROJECT DESIGN

Design & Working Principle of Our Solution

Our system does not work by direct control. Rather, it is defined to perform a specific function based on parameters indicated in the Arduino Code.

The idea behind this is that instead of giving the robot the flexibility of performing multiple functions, it will be better suited to serve a single function, hence no need for constant update.

AN UPDATE TO THE SYSTEM WILL BE NEEDED ONLY WHEN WE DESIRE TO CHANGE THE FUNCTION OF THE ROBOT.



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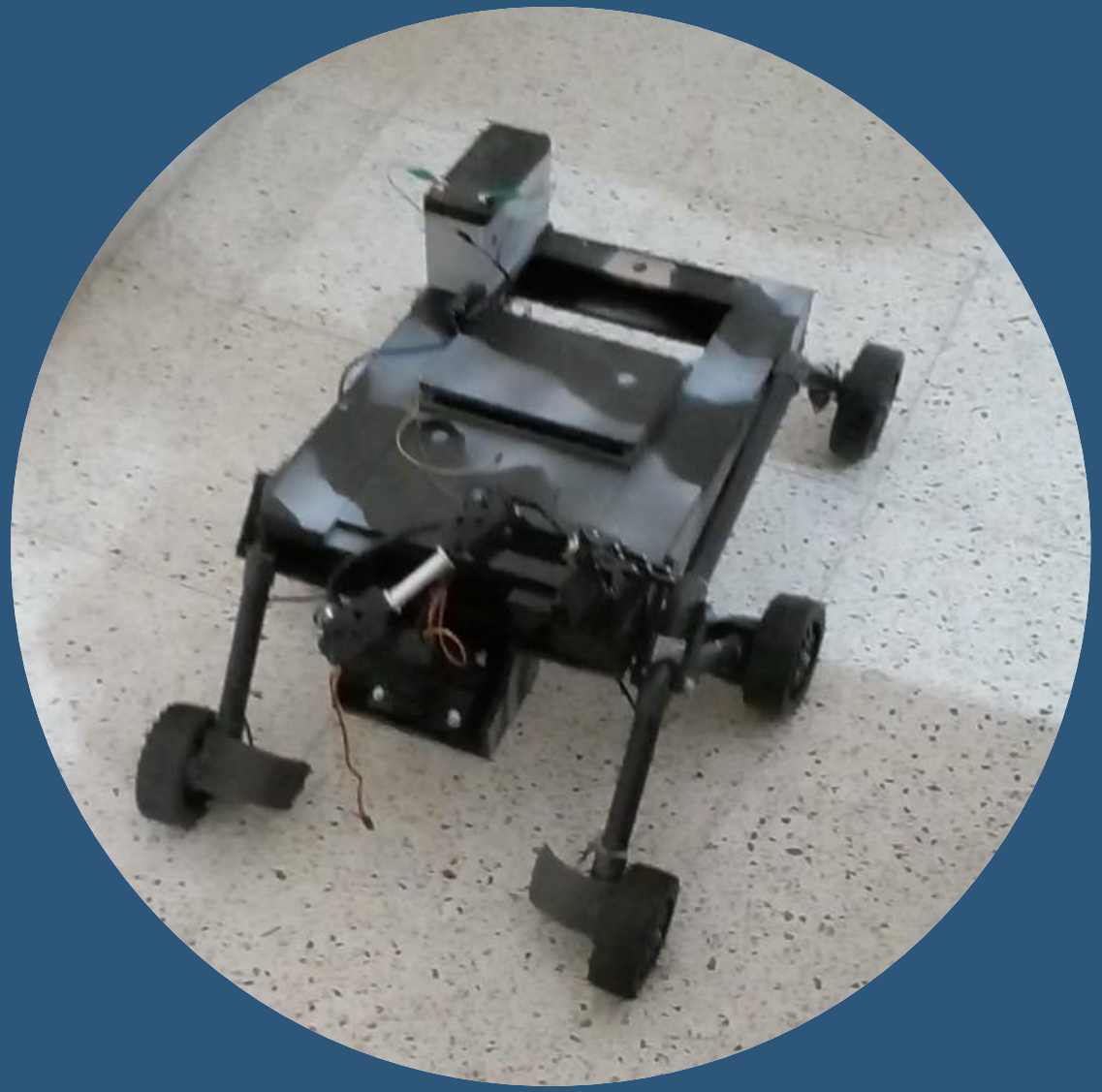

V. PROJECT DESIGN – IMPLEMENTATION

- *Design & Working Principle of Our Solution*
- *Implementation of Our Solution*

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THANK YOU