



# Moon Rover



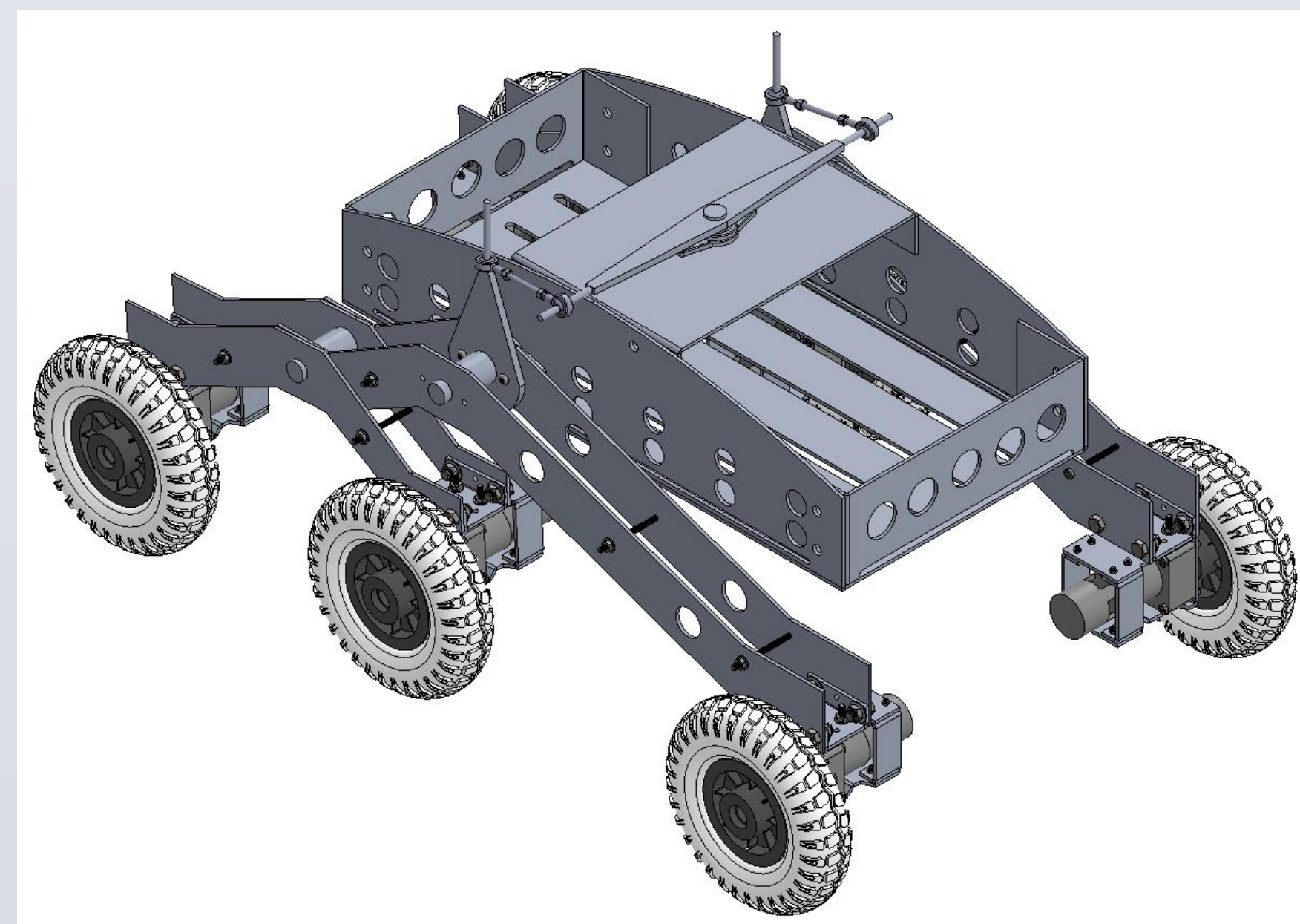
## Introduction

Our Moon Rover is an autonomous vehicle that can maneuver on the surface of the moon with attachment can collect samples from the surface of the moon and return them safely to the research base.

Moon Rover is a six wheeled build on the Rocker-Bogie suspension system allows all six wheels driven by six DC motors to continually be in contact with the ground while climbing over obstacles with a Differential Pivot which provides stability for the rover. The rover structure are designed to be as compact as possible to conserve space while protecting the internal components against foreign debris and collisions with obstacles. In autonomous motion we used Arduino IDE board using C++ programming language using ultrasonic sensor to avoid obstacles and servo motors to determine Rover rotating angle and gyroscope to give a feedback about rover angle and return to initial route.

## Design Goal

- Strong Structure withstand shocks
- High power motors
- Good suspension system to use power of motor to climb over obstacles
- Move with a controller in smooth motion
- Efficient autonomous motion by avoiding large obstacles and pass over small obstacles



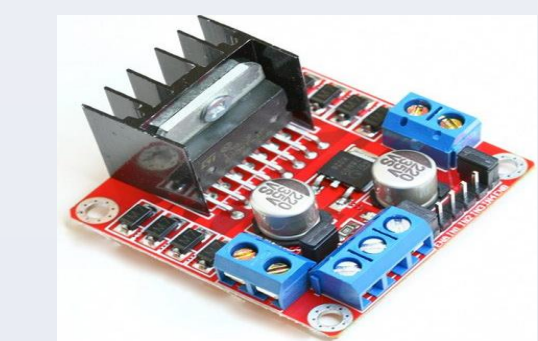
## Components and Connections

### Controller circuit

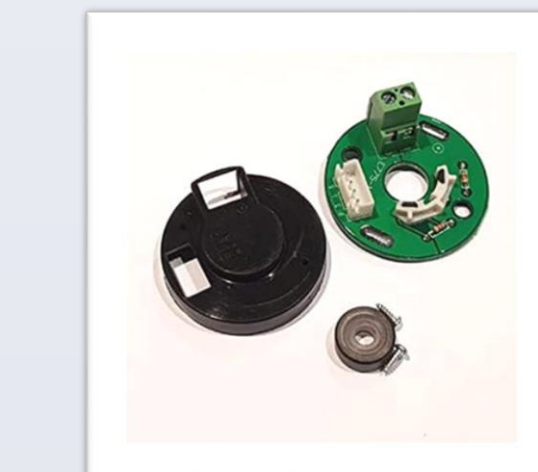
Arduino mega 2560



Motor driver L298N



Encoder MY7775(feedback)



### Actuator

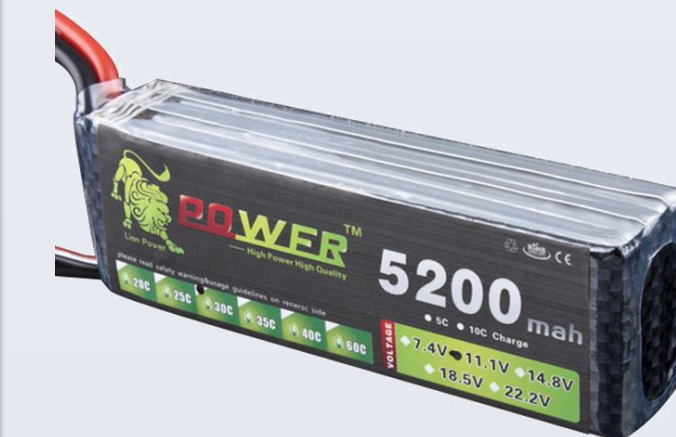
DC Motor



Servo motor

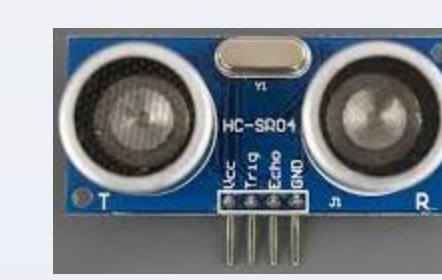


Battery 12 V

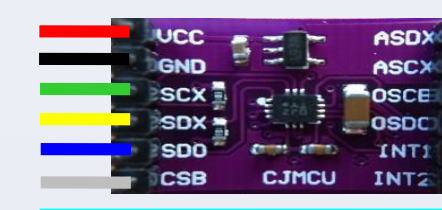


### Sensors

Ultrasonic sensor

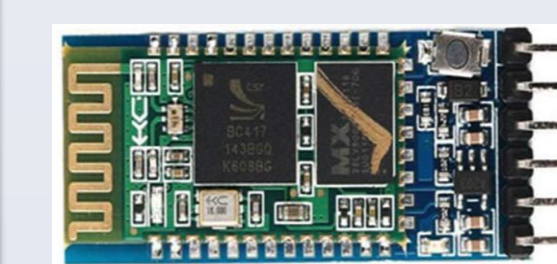


Gyroscope BMI 160

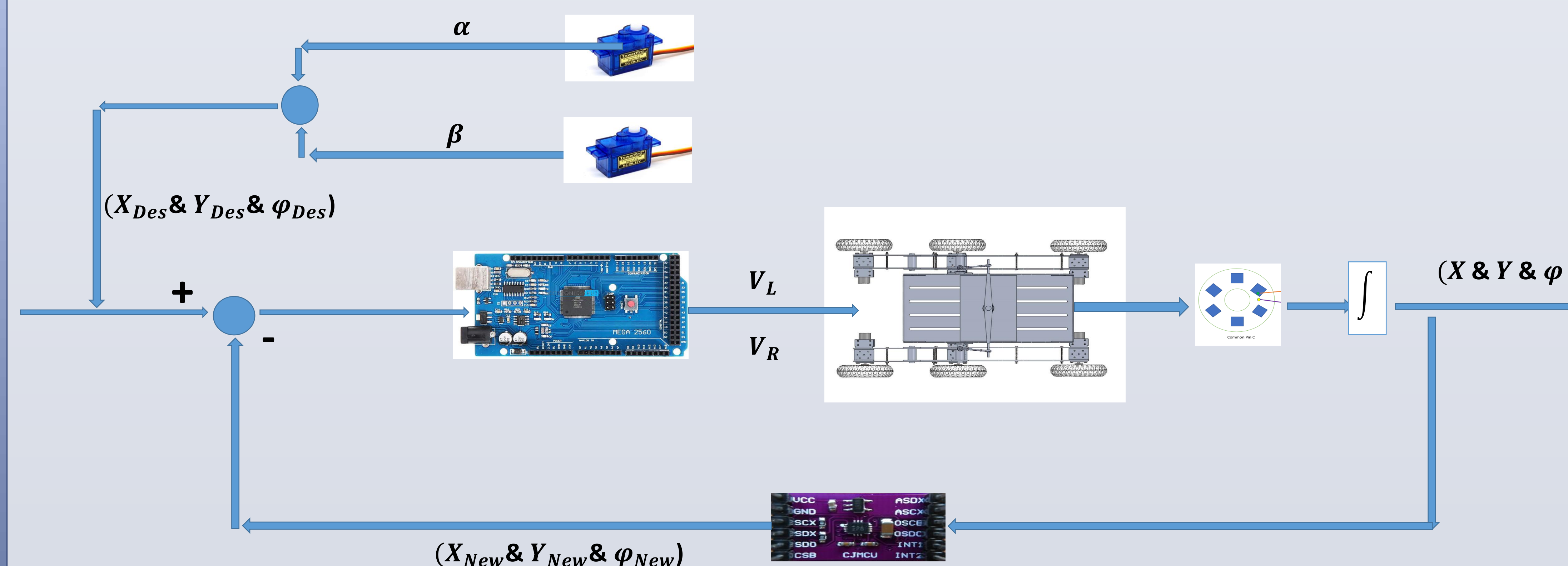
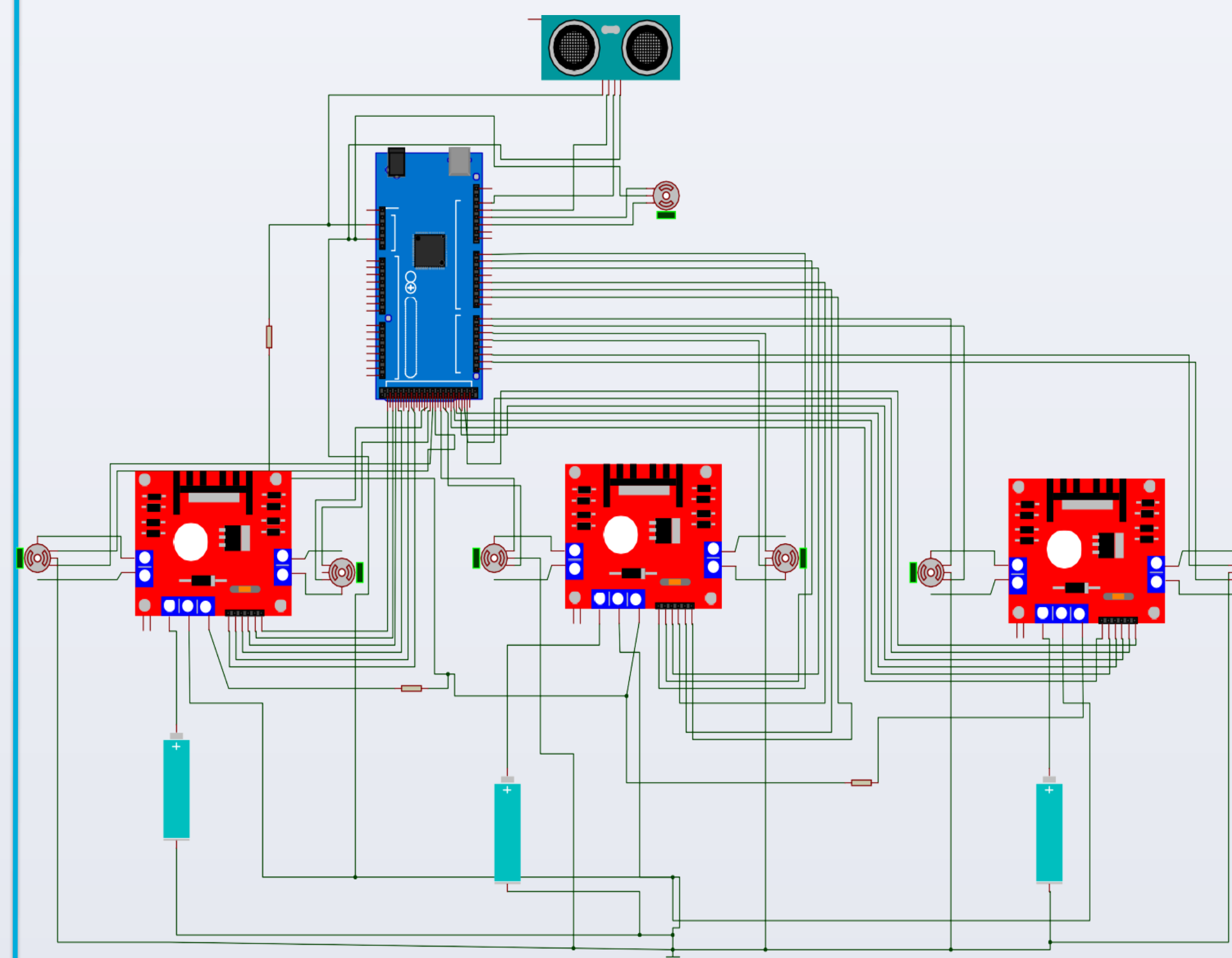


### Transmitter

HC05 Bluetooth



### Connection



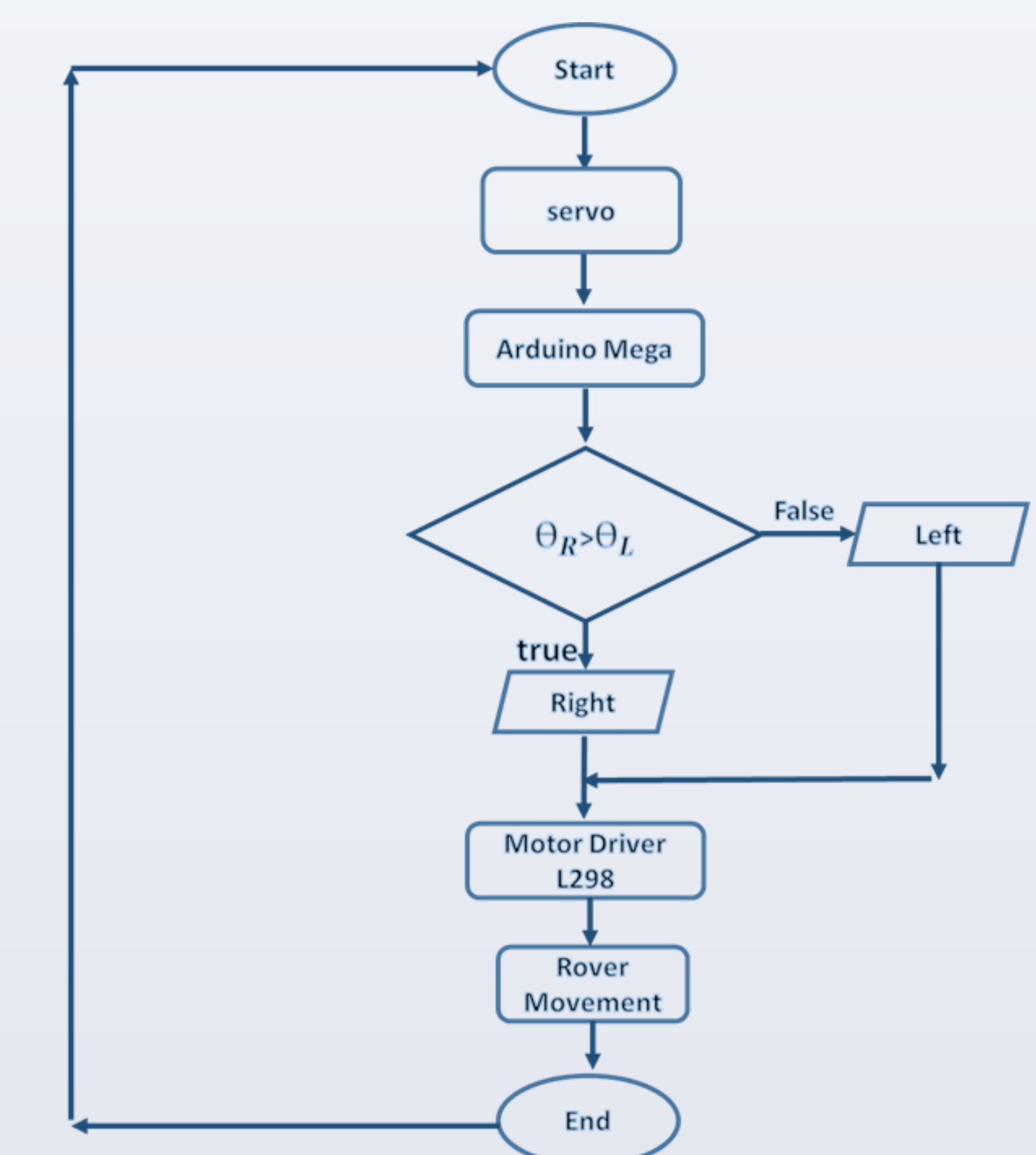
## Software

We use Arduino mega as a microcontroller We build autonomous motion depending on ultrasonic sensors as we use four ultra sonic sensors two in front and one in each side to always detect the region around rover.

As when two front sensors detect an obstacle at critical distance We set Rover stop and using two side sensors to detect region at the rover right and left side and deciding which region is bigger to rotate to this side.

Measuring the rover needed angle of rotation is achieved using servo motor with front ultrasonic sensor located on it as servo rotate until ultrasonic sensor detect a distance more than the critical distance then it is angle rover need to turn with to avoid obstacle and to make sure that rover rotate with correct angle we use a gyroscope to measure the rover angle after rotation and give feedback to compare it with desired angle.

## Flow chart



## Features

We add a six degree of freedom robotic arm to the rover To use it pick up objects which controlled using Mobile App.



## Future work

- Using laser camera with ROS to make slam and using this with Arduino and ultrasonic to improve the rover response.
- Use a hybrid system as an energy source for the rover by adding solar panels with rechargeable batteries.
- use computer vision with ROS to make autonomous robotic arm.

## Team Supervisor

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## Team Members

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