ROBOWARS RO1171

Our Robot type is Combat Robot. And It is mainly made for Robowars. And we made our Robot under the rules of Techfest- IIT Bombay.\

And our TEAM NAME is ----- **_ELIGHT-SPM_**
And Registration ID -----   RO1171
Participants Names------ 1. Muhammad Anas Alam (Leader)
         2. Sahil Goyal
         3. Udit Sharma
         4. Himanshu Dixit
         5. Rahul Aggarwal

1.Design Specifications
- Basic Specifications
- Mobility
- Robot Control Requirements
- Battery and Power
- Pneumatics
- Hydraulics
- Weapon System

TASK

Design and construct a remote-controlled robot capable of fighting a one on onetournament.

DESIGN SPECIFICATIONS

Specifications:
Dimensions and Fabrications:

- The machine should fit in a box of dimension 800mm x 800mm x 1200 mm (l x b x h) at any given point during the match (considering all weapon movement also). The external device used to control the machine or any external tank is not included in the size constraint.
- The machine should of weight including the weight of pneumatic source/tank. All pneumatic tanks/source and batteries should be on board. Only the weight of remote controller will not be counted.

Mobility:
All robots must have easily visible and controlled mobility in order to compete. Methods of mobility include:
- Rolling (wheels, tracks or the whole robot).

Robot Control Requirements:

- The robot controlled through wireless remote , while all power supply are on board only.
- There should be binding capability between transmitters and receivers and they must connect between polycarbonate (20mm), metal bars and barriers. The remotes with such facility will only be allowed.

Battery and Power:
- The machine can be powered electrically only. Use of an IC engine in any form is not allowed. On board batteries must be sealed, immobilized-electrolyte types (such as gel cells, lithium, NiCad, NiMH, or dry cells).
- The electric voltage between 2 points anywhere in the machine should not be more than 48V DC at any point of time. Participants will have to bring their own converters for standard power supply according to Indian standards. (A detailed document for
- All efforts must be made to protect battery terminals from a direct short and causing a battery fire, failure to do so will cause direct disqualification.
- Use of damaged, non-leak proof batteries may lead to disqualification.
- Special care should be taken to protect the on-board batteries. If judges find that the battery is not properly protected, then team will be disqualified immediately.
- The supply from the battery to all the weapons and power systems should qualify the following fail-safes:

Weapon Systems:
Robot have any kind of lifting devices, spinning hammers, roller etc. as weapons.

E.SPM

Drums are medium-to-large vertical spinning weapons which are generally wider than flywheels. The first Robot Wars competitors to be equipped with them were Suicidal Tendencies, Blade and Challenger 2, all of which appeared in Series 3. Despite their popularity in domestic and international live events.

Contents

Drums are usually cylindrically-shaped weapons thicker than vertical flywheels, which cover a wider surface area than a conventional disc and are always mounted vertically. They often use barbs or sharp teeth attached to the drum in order to grind, tear and flip opponents over, and can be built in a variety of shapes and sizes, from the narrow disc-like drum of Tornado, to wider weapons like Slicer's or even full-bodied drums in the case of the Barber-Ous series of robots. Some roboteers refer to narrow drums as driscs, so-called because of their closer resemblance to vertical flywheels.
Drums could also be built out of any cylindrical object; for example, Blade's drum consisted of lawnmower blades attached to the weapon.

Advantages

Terrorhurtz vs sabretooth 2
Sabretooth rips Terrorhurtz's rear stabilisers off

Beast vs pulsar 2
Pulsar immobilises Beast with two quick strikes
Slicer botwork
Slicer flips Botwork over
Drums are broader and sturdier than flywheels or heavy rotating blades, offering a wider range of attack while generally being more durable than a flywheel or rotating blade.

As with vertical flywheels, drums can allow a robot to remain stable while attacking opponents, enabling them to inflict several quick attacks in succession and 'churn' away at opponents upon sustained contact with them. Sabretooth was able to cause extensive damage to the armour of TMHWK and Terrorhurtz in Series 9, while Pulsar immobilised Beast in Series 8 with two hits landed within seconds of each other.

They are capable of launching opponents into the air or flipping them over completely. Slicer, Barber-Ous, Pulsar and Concussion were especially effective at this.

With the use of a reversible speed controller, some spinning drums could work in both directions and still be effective even if the robot was inverted. The drum can easily be incorporated into an invertible design, as proven by Tornado, Slicer, Pulsar, the Series 3 version of Suicidal Tendencies and, in the most extreme case, Barber-Ous.

A full-bodied drum could also offer the robot a similar degree of protection to a full-body spinner, acting as both the robot's weapon and armour. Barber-Ous's drum was the only one to possess this capability.
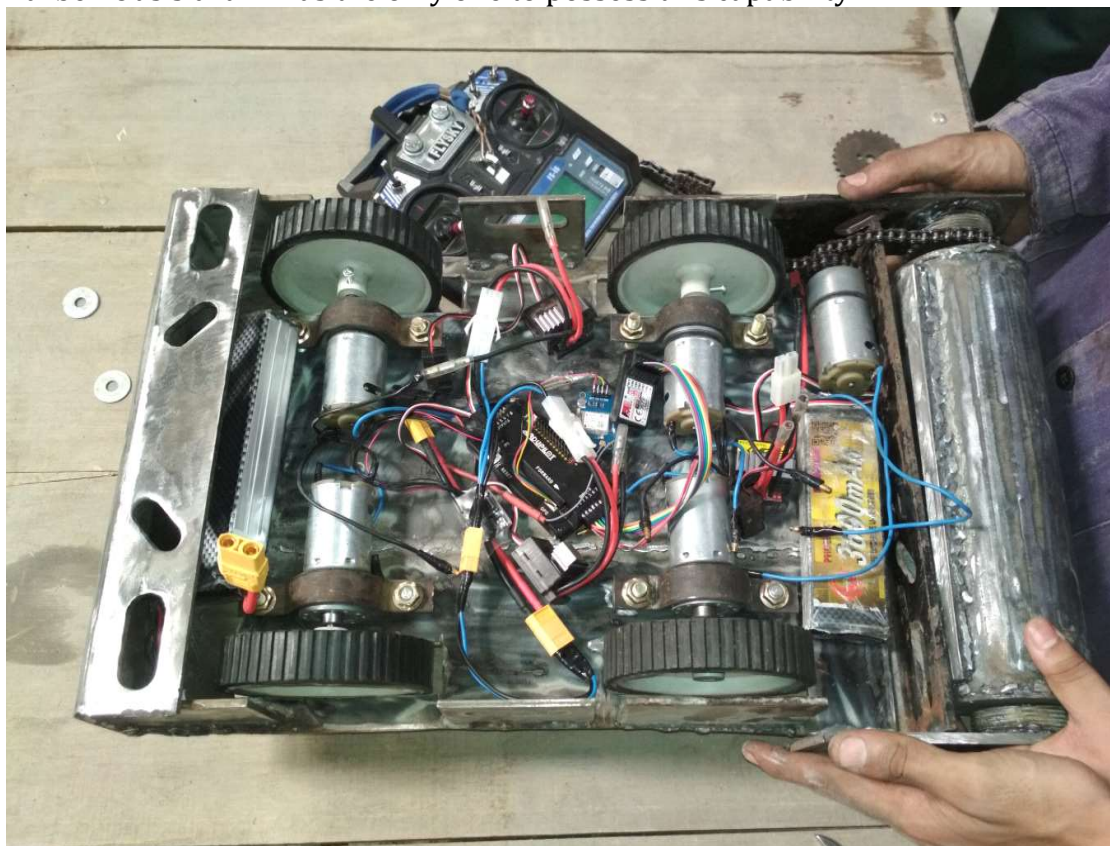
Materials Used In Robot

- High Torque DC Motors
- Tyres of Diameter 11cm.
- Electronic Speed Controller(ESC)
- Battery
- Battery Charger
- Jumper wires
- Transmitter FSI6 + Receiver FS CT6b
- Power Module for APM
- ArduPilot Mega(apm)
- Battery Tester
- Connectors

- ## DC Motors

  High performance DC geared motors with metal gear box used for high torque application and other automation purposes. The motor comes with 6mm off-centred shaft (side shaft). It is very high reliability (mainly of its gears) and the shaft length of 29mm.

  Specifications:
  - RPM: 450 rpm @12V
  - Voltage: 4V to 12V
  - Torque: 25kg/cm
  - Gear: Metal (spur)
  - Shaft size: 6mm dia
  - Shaft length: 29mm
  - Motor weight: 180gms

- ## Wheels (Tyres)

  The wheel is the most common moving element among other possibilities including legs, flying, swimming and rolling. A wheel provides at least speed, accuracy and stability for a robot, three characteristics very important in designing and build robots. Finding inspiration in everything, the researchers design many types of wheels including standard, orientable, ball, and omnidirectional wheels.

Depending on the design and requirements, standard wheels are used especially for classical methods of driving and steering while orientable and ball wheels are included in the same category and user for balancing a robot. Omnidirectional wheels are very good for driving and steering and are used when the robot should have the ability to move in all directions.

- # Electronic Speed Controller

  An electronic speed control or ESC is an electronic circuit with the purpose to vary an electric motor's speed, its direction and possibly also to act as a dynamic brake. ESCs are often used on electrically powered radio controlled models, with the variety most often used for brushless motors essentially providing an electronically generated three-phase electric power low voltage source of energy for the motor.

  An ESC can be a stand-alone unit which plugs into the receiver's throttle control channel or incorporated into the receiver itself, as is the case in most toy-grade R/C vehicles. Some R/C manufacturers that install proprietary hobby-grade electronics in their entry-level vehicles, vessels or aircraft use onboard electronics that combine the two on a single circuit board.
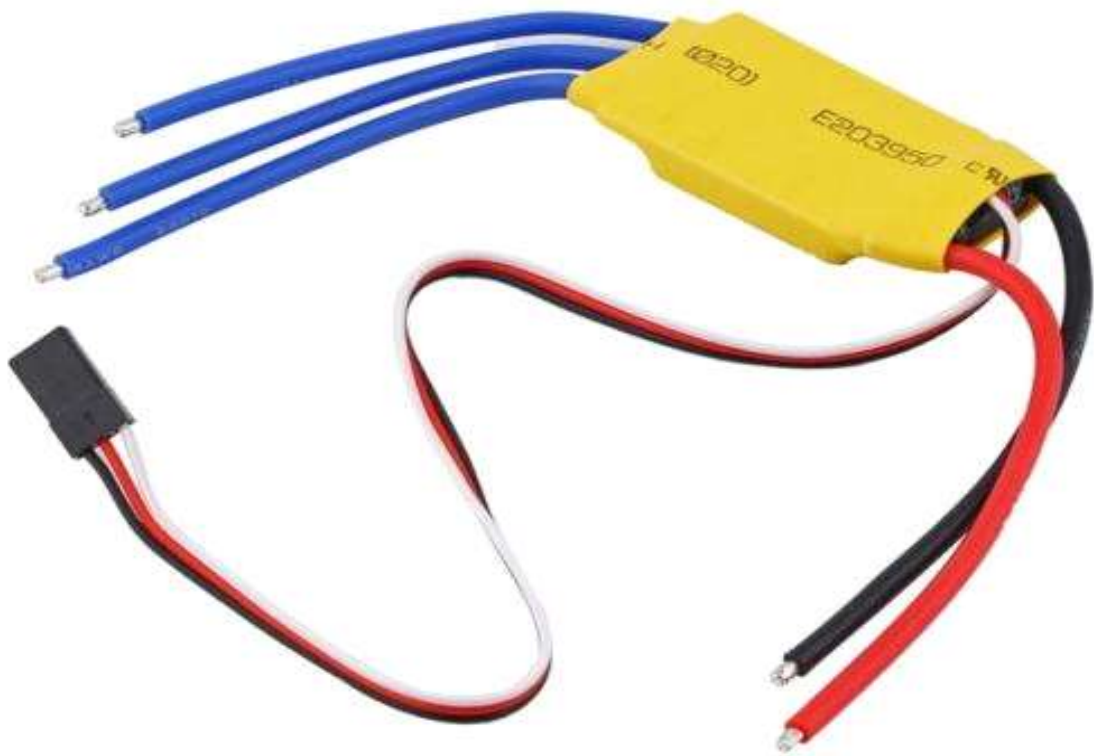
- Battery

  Battery is used for provide current to the components. The capacity of Battery is 11000mah. Battery has 3S 12Volts. Battery has True 40C rating.

- Battery Charger (B6)

- # Jumper Wires

  A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.[1]

  Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.
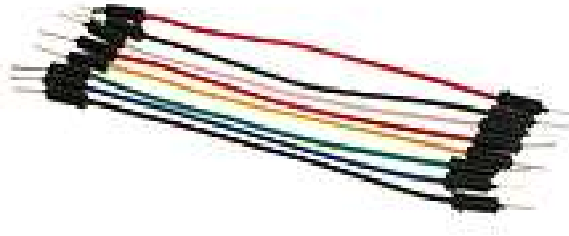
- # Transmitter FSI6 + Receiver fs ct6b

Description:
Brand Name:Flysky
FS-i6 Specifications:
Channels: 6 Channels
Model Type: Glider/Heli/Airplane
RF Range: 2.40-2.48GHz
Bandwidth: 500KHz
Band: 142
RF Power: Less Than 20dBm
2.4ghz System: AFHDS 2A and AFHDS
Code Type: GFSK
Sensitivity: 1024
Low Voltage Warning: less than 4.2V
DSC Port: PS2;Output:PPM
Charger Port: No
ANT length: 26mm*2(dual antenna)
Weight:392g
Power: 6V 1.5AA*4
Display mode: Transflective STN positive type, 128*64 dot matrix VA73*39mm,white backlight.
Size: 174x89x190mm
On-line update:yes
Color: Black
Certificate: CE0678,FCC
Model Memories: 20
Channel Order: Aileron-CH1, Elevator-CH2, Throttle-CH3, Rudder-CH4,Ch 5 & 6 open to assignment to other functions.

FS-iA6 Specifications:
Channels: 6 Channels
Model Type: Fixed-wing/Glider/Airplane
RF Range: 2.40-2.48GHz
Bandwidth: 500KHz
Band: 142
RF power:less than 20dBm
RF.receiver sensitivity:-105dBm
2.4ghz System: AFHDS 2A
Code Type: GFSK
ANT length: 26mm
Weight:6.4g
Power:4.0-6.5V
Size: 40.4x21.1x7.35mm
Color: Black

Certificate: CE,FCC
i-BUS port: NO
Data Acquisition port:NO

Features:
Works in the frequency range of 2.405 to 2.475GHz.This band has been divided into 142 independent channels,each radio system uses 16 different channels and 160 different types of hopping algorithm.

This radio system uses a high gain and high quality multi directional antenna,it covers the whole frequency band. Associated with a high sensitivity receiver,this radio system guarantees a jamming free long range radio transmission

Each transmitter has a unique ID,when binding with a receiver,the receiver saves that unique ID and can accepts only data from the unique transmitter.this avoids picking another transmitter signal and dramatically increase interference immunity and safety.

This radio system uses low power electronic components and sensitive receiver chip.The RF modulation uses intermittent signal thus reducing even more power consumption.

AFHDS2A system has the automatic identification function,which can switch automatically current mode between single-way communication mode and two-way communication mode according to the customer needs.

AFHDS2A has built-in multiple channel coding and error-correction,which improve the stability of the communication,reduce the error ratio and extend the reliable transmission distance.

- # Power Module

  Power Module is a simple way of providing your APM/Arduflyer with clean power from a LiPo battery as well as current consumption and battery voltage measurements, all through a 6P cable. The on-board switching regulator outputs 5.3V and a maximum of 3A from up to a 7S LiPobattery.Special for APM2.5.2 APM2.6 Pixhawk flight controller Note: The Power Module is only designed to power APM/Arduflyer, a RC receiver and accessories (GPS, Radio telemetry). It is not designed to power servos. Use your aircraft's own ESC/BEC for that. Features: - XT60 Connector - Max input voltage: 30V - Max current sensing: 90A - Voltage and current measurement configured for 5V ADC - Switching regulator outputs 5.3V and 3A max - 6P molex cable plugs directly to APM/Arduflyer 2.5's 'PM' connector
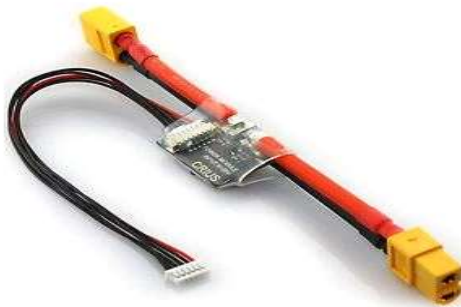
- ## AurdoPilot Mega (APM)

  This is the new APM 2.8 autopilot module. The sensors are exactly the same as with APM2.6, this version is ideal for use with multi-copters and rovers. The APM 2.8 is a complete open source autopilot system and the bestselling technology that won the prestigious 2012 Outback Challenge UAV competition. It allows the user to turn any fixed, rotary wing or multirotor vehicle (even cars and boats) into a fully autonomous vehicle; capable of performing programmed GPS missions with way points. Available with top or side connectors. This revision of the board is designed for vehicles (especially multi-copters and rovers) where the compass should be placed as far from power and motor sources as possible to avoid magnetic interference. On fixed wing aircraft it's often easier to mount APM far enough away from the motors and ESCs to avoid magnetic interference. APM 2.8 does not have onbooard compass so this is designed to be used with the 3DR uBlox GPS with Compass, so that the GPS/Compass unit can be mounted further from noise sources than APM itself.

  Features:
  Arduino Compatible
  Includes 3-axis gyro, accelerometer and magnetometer, along with a high-performance barometer
  Onboard 4 Mega Byte Data flash chip for automatic data logging
  Optional off-board GPS, uBlox LEA-6H module with Compass.
  One of the first open source autopilot systems to use Invensense's 6 DOF Accelerometer/Gyro MPU-6000.
  Barometric pressure sensor upgraded to MS5611-01BA03, from Measurement Specialties.
  Atmel's ATMEGA2560 and ATMEGA32U-2 chips for processing and USB functions respectively.

  Data Sheet:
  3-Axis Gyro
  3-Axis Accelerometer
  High Resolution Altimeter
  5Hz GPS Module
  Dimension: Approx. 70.5x45x13.5mm
  Weight: 31g

- # Battery Tester
  Description:
  1. Brand New & High Quality.
  2. Use for 1-8s Lipl/Li-ion/LiMn/Li-Fe.
     Voltage detection pricision: 0.01V.
     Unit voltage display range: 0.5V-4.5V.
     Total voltage display range: 0.5V-36V.
     1S test mode voltage range: 3.7v-30v.
     Low voltage alarm mode for 2-8S.
     Alarm set value range: OFF-2.7V-3.7V.
  3. When the voltage is below the set value,it will buzzer with red LED light,pre-set value 3.3V.
  4. Push key which can change the voltage settings and save.
  5. Size: 3.9cm x 2.4cm x 0.9cm.
  6. For 1S-8S / Lipo / Li-ion / Li Mn / Li-Fe Battery.

  Features:
  -This product is using for detecting 1S-8S lithium battery
  -Detect the voltage of each battery core automatically, support reverse connection protection.
  -To know the working state of your battery anytime, protect the battery from overcharge and over discharge.
  -The red LED will flash,the buzzer will beeping when the voltage is below the set point.
  -The factory default setting is 3.3V, press the button to change the voltage setting, and it will save your current setting automatically.

Mechanical Part of Robot

The parts used in the Robot are Mild Steel Body, Barrings, Gear, Timing chain,
Rotter, Rods, Roller, Tyres.

The **BODY** is made up of a mild steel(**Mild steel** contains approximately 0.05–0.25% **carbon**making it malleable and ductile. **Mild steel** has a relatively low tensile strength, but it is cheap and easy to form; surface hardness can be increased through carburizing).
It helps to make the body of Robot strong. We used mild steel because it is weldable, ductile and cost- effective and it can be carburised and recyclable.

BARRINGS
SKF Deep Groove Radial Ball Bearing Model 6004-2ZJEM UE01
Barrings are made up of Hard and Tempered Iron.

Hard Iron
(Iron or steel which is not readily magnetized by induction, but which retains a hig h percentage of the magnetism acquired).

GEAR

Gear also made up of Hard and Tempered Iron.

Timing Chain

A **timing belt**, **timing chain** or **cambelt** is a part of an [internal combustion engine](#) that synchronizes the rotation of the [crankshaft](#) and the [camshaft](#)(s) so that the engine's [valves](#) open and close at the proper times during each cylinder's intake and exhaust [strokes](#). In an [interference engine](#) the timing belt or chain is also critical to preventing the [piston](#) from striking the valves. A timing belt is usually a [toothed belt](#) -- a [drive belt](#) with teeth on the inside surface. A timing chain is a [roller chain](#).

Spinning Cylindrical Weapon
We use a cylinder of length of 9.5 inches and a weight of 600gm.

Spinner cylindrical weapon are usually cylindrically- shaped weapons thicker than vertical flywheels, which cover a wider surface area than a conventional disc and are always mounted vertically. They often use barbs or sharp teeth attached to the drum in order to grind, tear and flip opponents over, and can be built in a variety of shapes and sizes, from the narrow disc- like drum of Tornado, to wider weapons like Slicer's or even full- bodied drums in the case of the Barber- Ous series of Robots. Some roboteers refer to narrow drums as driscs, so called because of their closer resemblance to vertical flywheels.

PICTURES
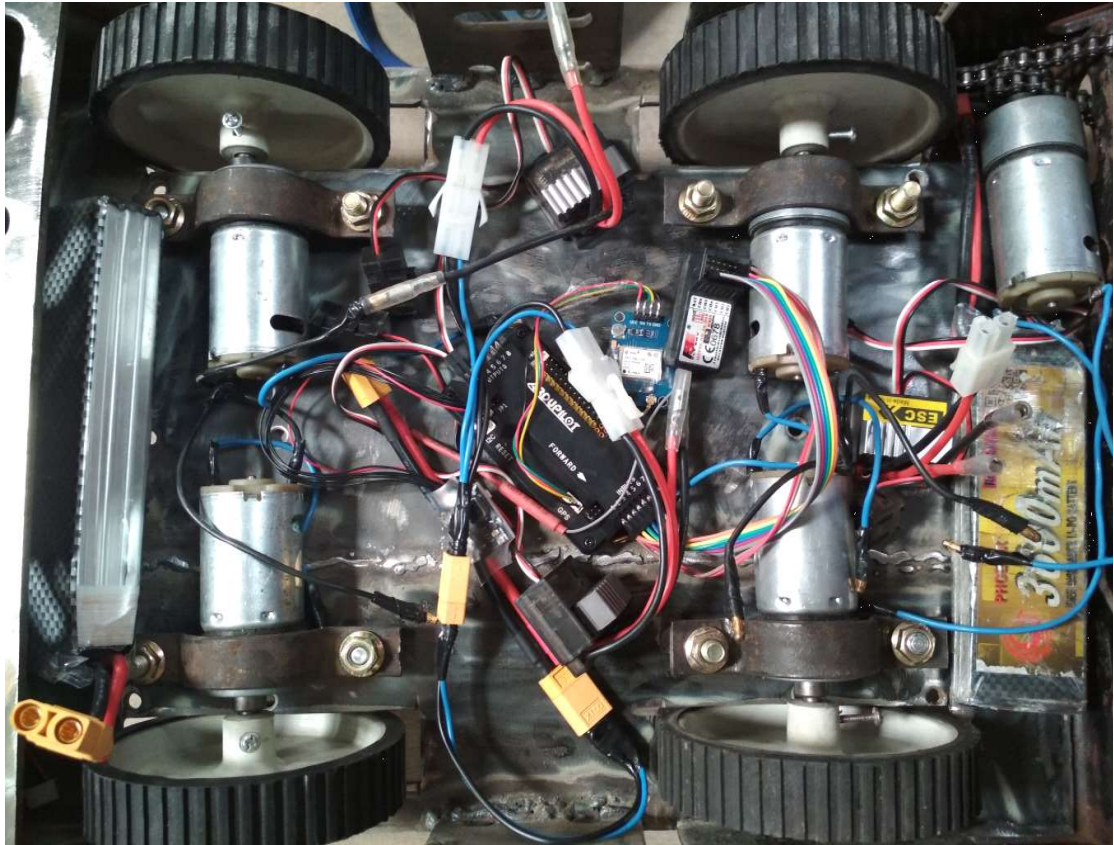
(Picture 1. --- Inside View of ESPM)
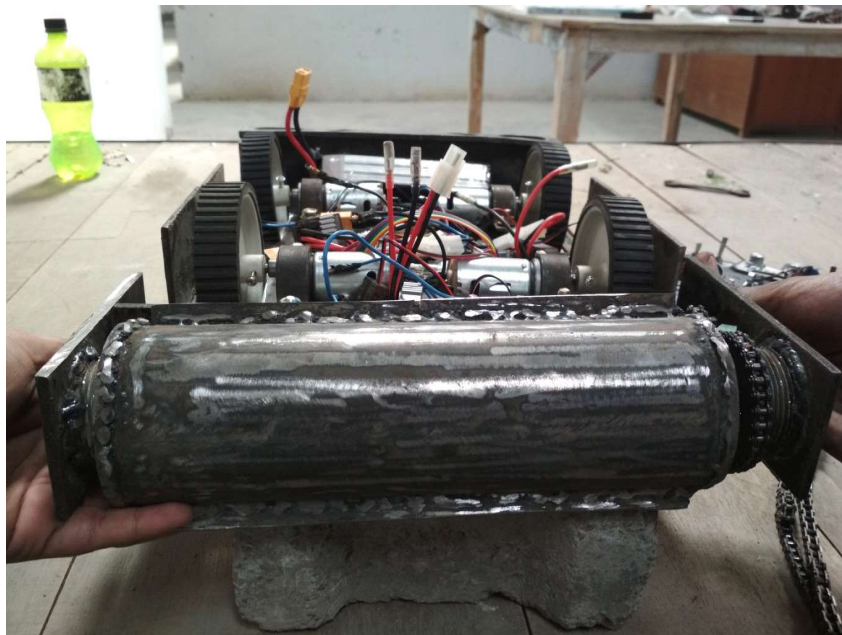
(Picture 2. --- Front View of ESPM)

(Picture 3. --- Top View of ESPM)

IMPORTANT NOTE:

We want to tell you that our E-SPM (Drum Robot) are made by the under the rules of Techfest . We made the chesy as according the rules. And we are still working on it. And we will upload the video of our project and mail it to you soon.
Please, Give us some time.