

Task1(minimum space utilization)

The two motors are placed above the board because if we place them inside the board then the height of board we have to increase and it will increase the volume covered by the bot car.

The two motor drivers are placed like this so that it's connection part is near the both motors and the Arduino board and it will decrease the amount of wires needed and the minimum area is utilized.

The Arduino board is placed horizontally like this so that it is symmetrically near to both the motor drivers and it's connecting pins part is near the both motor drivers.

The shape of board is like this so that battery is fitted inside that I shaped part and the board will utilise minimum area.

The holes are made on the board so that the wires from the battery which is placed inside the board can pass through the holes and connect to the desired connections like Arduino board ,motor drivers etc.

At last in this task I want to say that due to lack of perfection in solidworks the whole assembly should be horizontal but it's somewhat tilted, the caster wheels height is so that the whole board is horizontal.

Task 2(jumping of spherical bot)

One motor is connected to the hexagonal type bottom part so that due to conservation of angular momentum if the hexagonal part is rotated in one direction then the bot will rotate about vertical axis in opposite direction in this way the bot can turn about vertical direction.

Two gears one connected to motor and one is fixed on that rod are introduced so that the bot can rotate about horizontal axis.

On One of the hollow type part yellow coloured battery is placed

That part which is responsible for the jumping of bot is placed like this and a parrot like jumping mechanism I tried to introduce and fix in the bot which I saw on the internet You can see it in the photos which I attached as I was unable to show it in solidworks .

Due to lack of solidworks perfection I wasn't able to fix rubber type of material there as it was solidworks 2015 so a rubber type of material is there which is acting as a restoring force but we can fix one rubber at the bottom also so that the bot will jump with greater height .

Task3(docking of bots)

There are two parts for docking are attached to the bot both at opposite sides ,

One part is designed so that during docking the hooks will fix on the four holes ,a canal type of structure is made inside this part .

Electromagnetic coils are fixed on the circular part of both the parts so that when current will flow on these coils then the magnetic field will be perpendicular to the surface the docking part

And in this same way the current wil flow in another part of another bot and then both will feel a force of attraction and magnetic field will put them in correct orientation and then hooks will do thier work.

Another part is designed so that it has four actuators which opens on the command of arduino to increase the length of the four hooks and these four hooks tries to fit into the canal type shape of another part with the help of that sensor which senses the docking surface of another bot.

In order to again split the actuator increases the length and the hooks opens and current on the docking surfaces of both the bots flow is opposite direction so that the repulsion occurs and the bots automatically seperates out at a distance.