



BB-8

Team

— Jedi '4'ce

Team Members:

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Overview

This project is inspired by and named after a droid in Star Wars: Episode 7. The droid has got an interesting mechanism whereby its body (having shape of sphere) rolls yet the head manages to stay upright in its place (What kind of sorcery is this ?). We are planning to create a similar bot by trying to recreate the same mechanism.

Specifications

The idea of how the mechanism works, greatly involves concepts of physics and electronics. It's all about maintaining the right center of gravity.

Construction of Mechanical System:

We are planning to 3D print the spherical body and head. There will be a freely moving horizontal disc where controllers and motors will be mounted. We will also attach weight to the bottom of this disc. A rotatable stick will be present at centre of this disc with magnets at its top. The head will have magnets at its bottom and ball bearings to reduce friction.

Working of Mechanical System:

Weights will keep centre of gravity low. Two wheels are horizontal to rotate body horizontally and two are vertical to move the bot forward. The centre rod can also rotate horizontally so that head can move to (This is important as we are planning to put a camera in head if possible).

Construction of Electrical System:

Arduino, metal gearbox and bluetooth module are connected such that information received by bluetooth module is sent to arduino which controls motor driver to move the bot.

Working of Electrical System:

Command to the droid will be given via mobile app to the bluetooth module. Arduino interprets this information and accordingly switches on the motors through motor driver.


Plan OF Action:

Week 1:

Gather parts and materials. Two members start to learn coding for making bluetooth app and arduino. Two members begin to design a 3-D model for body and head.

#DO NOT buy parts. First make a solidworks model of what you are thinking before even thinking about materials. Get it confirmed from someone. Then decide about buying

Week 2:



Construct body from parts printed. Start making app. Start electric connections on disc.

Week 3:

Complete the app. Connections on disc are thoroughly checked with app.

Week 4:

Fit the disc inside body and test with varying weight at its bottom to get a perfect combination of speed and balance.

Week 5:

Buffer for any emergencies and thorough testing.

#Explain components (acceptable for change later when you make the body). Explain cost

Components

1. Arduino Uno
2. Pololu Dual VNH5019 Motor Shield
3. 2x Pololu (19:1) 37D Metal Gearbox
4. HC05 Bluetooth Module
5. Inertial measurement modules
6. Servo motors
7. 4 Cell Lithium Battery Pack (2x)
8. Neodymium Magnet
9. Wheels

10. Miscellaneous

Estimate Cost:

Rs. 10,000-12,000

Learning:

1. Implementing balance algorithms and designing mechanical structures to balance out the motion of a spherical robot.
2. Working with arduino.
3. Implementing communication and streaming data.

Further ideas to be implemented:

We are planning to install a camera in its head and connect it wirelessly so that we can stream live video of what bot can see.

It will require a camera module,transmitter module.

We may use a raspberry-pi instead of arduino for this purpose if required.