

SELF BALANCING BOT

MAIN IDEA:

- 1) To balance an unstable robotic platform on two wheels.
- 2) To design a complete digital control system that provides needed stability.
- 3) To complete basic signal processing which is needed for unicycle.
- 4) To turn through any angle at any position.

WHY DO WE TAKE THIS PROJECT :

- 1) To make a self-balancing robot which occupies less space.
- 2) A prototype for motion of a life interacting robot.
- 3) A prototype for the Segway.
- 4) A good learning experience.

HOW IT IS GOING TO BE DONE :

It will be prevented from falling by giving acceleration to the wheels according to its inclination from the vertical. If the bot gets tilts by an angle, than in the frame of the wheels, the centre of mass of the bot will experience a pseudo force which will apply a torque opposite to the direction of tilt.

PLAN OF ACTION:

- 1) **05-12th may** : A detailed study about all components to be used and the mechanism involved for balancing the bot, list of components to be used.
- 2) **13-19th may** : Designing and Fabrication of model with different platform and rough calculation.

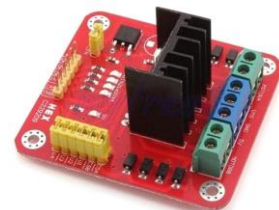
- 3) **20-26th may** : To take reading from accelerometer and gyroscope and solve for realtime using Kalman filter.
- 4) **27th may-2nd june** : Design the PID controller to take data from Kalman filter and maintain balance in realtime.
- 5) **02-09th june** : Integrate all components and testing.
- 6) **10-15th june** : Final touch, Error correction, documentation.

GOAL:

Make a Self-balancing bot that is remotely controlled.



COMPONENTS REQUIRED:



- 1> **Battery**
- 2> **Arduino Mega 2560**
- 3> **6 DOF IMU (3-AXIS Accelerometer ADXL345 Gyroscope Gyro L3G4200D)**
- 4> **I2C Protocol**

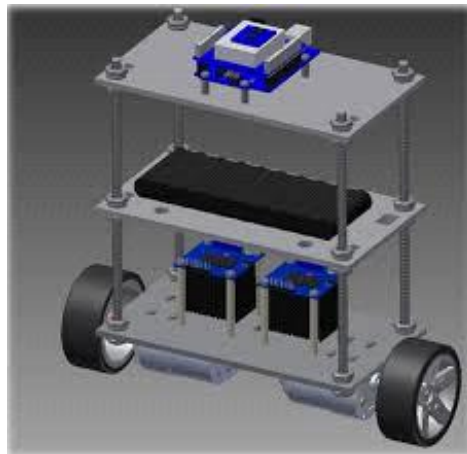
- 5> Kalman Filter**
- 6> PID Controller**
- 7> Motor driver**
- 8> Controller: ATmega328P**
- 9> Chassis board (3 levels)**
- 10> PCB & soldering rod and wire**
- 11> Wheels**
- 12> Screws and Nuts**

ESTIMATED COST:

Around 10,000/-

LEARNING OBJECTIVES:

1) We will be learning applications of coding.



2) 1st time of building of bot.

3) Learning of working of microcontroller.

4) Working with circuits and PCBs.

5) Learning basic signal processing which will be required in making a unicycle.

FURTHER DEVELOPMENT:

- 1) Cameras and sensors can be installed for surveillance.**
- 2) Can be used by blind person as transport vehicle.**
- 3) Transportation of things in labs as it takes less space.**
- 4) Concept can extended to build variety of life interacting bots.**
- 5) We can make it fully automated if we introduce another feature i.e spotting an obstacle and turning accordingly which can be done by adding IR sensors and changing our algorithm to make the necessary changes.**
- 6) The basic signal processing used in an balancing unicycle (well commercialised as aircycle but lacks popularity in India) is the same as our bot.**
- 7) If we make it automated as in point1 the Segway can be used by a blind person which will contribute to a huge social cause.**



- 8) Extension of our concept by increasing the load capacity and improving our algorithm and hardware, accordingly, we can create a self-balancing robot Segway which is not popular in India even today.**

TEAM MEMBERS :

- 1) Abhishek Ekka (140100087)**
- 2) Anjan Kumar Patel (140100089)**
- 3) Himani Sinhmar (140010061)**
- 4) Aditi Sharma (140110012)**