

ITSP 2016

TEAM ANVESHAK

Estd. 2016

AUTONOMOUS SURVEILLANCE PLANE

MOTIVATION

Drones are mostly used in surveillance using GPS which is a satellite-based navigation system. But due to some natural disaster or if criminals succeed in disabling the location services, network may not be available and we can't use GPS...then we need something that doesn't need any command, it just goes to a desired place, does its job (takes pictures or drops food packets) and comes back. A quadcopter is not efficient due to low endurance. We need something efficient...That's what we are going to make.

OBJECTIVE

To design and make an AUTONOMOUS SURVEILLANCE PLANE using IMU (instead of GPS) to locate a certain position of interest with minimum error.

HOW WE PLAN TO ACHIEVE

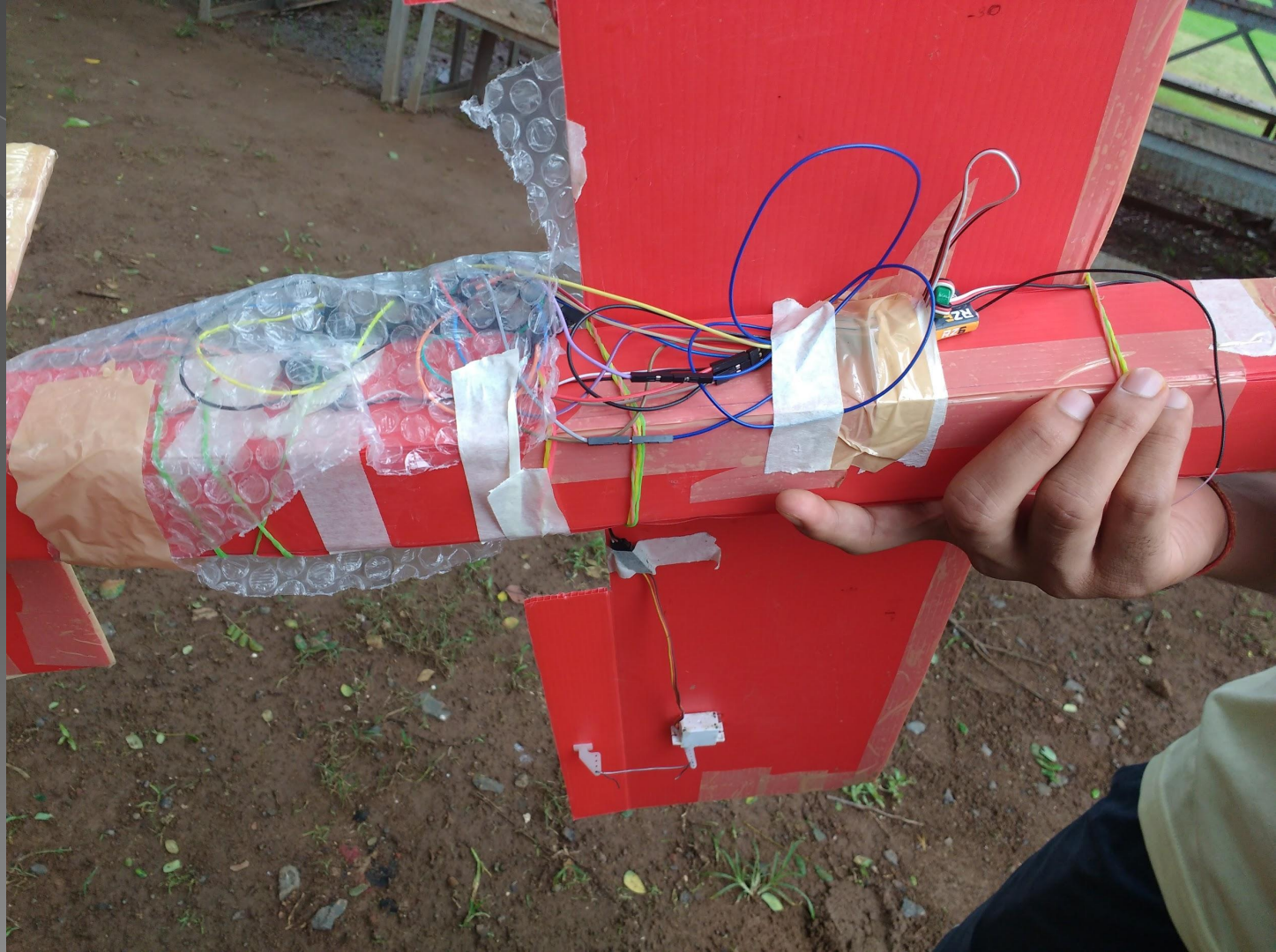
1. MAKING AND TESTING OF RC PLANE.
2. GATHERING DATA FROM ACCELEROMETER & GYROSCOPE
3. CALIBRATING IT TO MINIMIZE ERRORS.
4. MAKING IT AUTOMATED USING ARDUINO CONTROLLED IMU AND TESTING ITS PERFORMANCE.
5. TRYING TO RESOLVE THE PROBLEMS WHICH MAY COME IN AUTONOMOUS MODE.
6. TRYING TO MINIMISE THE ERROR IN LOCATING THE POSITION.
7. TESTING OF THE SPECIFIED OBJECTIVE.

Challenges:-

- 1.To find the orientation(yaw,pitch,roll) of the plane using IMU sensors.
- 2.To connect arduino and imu properly.
- 3.And code arduino to get data & analyse it .
- 4.Designing a switching mechanism between manual and autonomous mode.
- 5.We are facing a big challenge to measure distance with GY-80.



This is how we managed to protect the arduino and other electrical Components when it was raining. But it seemed to increase drag.



TIMELINE

Week 1(24 May - 31 May)

1. Bring all parts to make the structure of the plane.
2. Assembling the electronic parts like motors,ESC,etc.
3. Make the plane ready to be remote controlled and test it.
- 4.Learn the basics of arduino.

Week 2(1 June - 8 June)

1. Getting to know the working of IMU.
2. Do some testing and take readings from IMU so that we can workout on the errors for further use.

3. Search the resources of arduino programming for IMU(Inertial Measurement Unit) and contact seniors who are experienced in IMU.

Week 3(9 June - 16 June)

- 1. Learn arduino programming for controlling the IMU and motors (for making the plane automated).**
- 2. Then testing the plane for its flying capabilities and designing a switching mechanism for switching between manual and autonomous mode.**
- 3. Correcting the errors which would occur in the part.**
- 4. Then we will program the plane to complete the task like to take off automatically then travel some fixed distance in a straight line then land.**

Week 4(17 June - 23 June)

1. Rectify the errors occurred during the flying of plane like deviations from the desired path.
2. Trying to make the plane move as accurate as possible in a desired direction and come back after doing surveillance.

Week 5(24 June - 29 June)

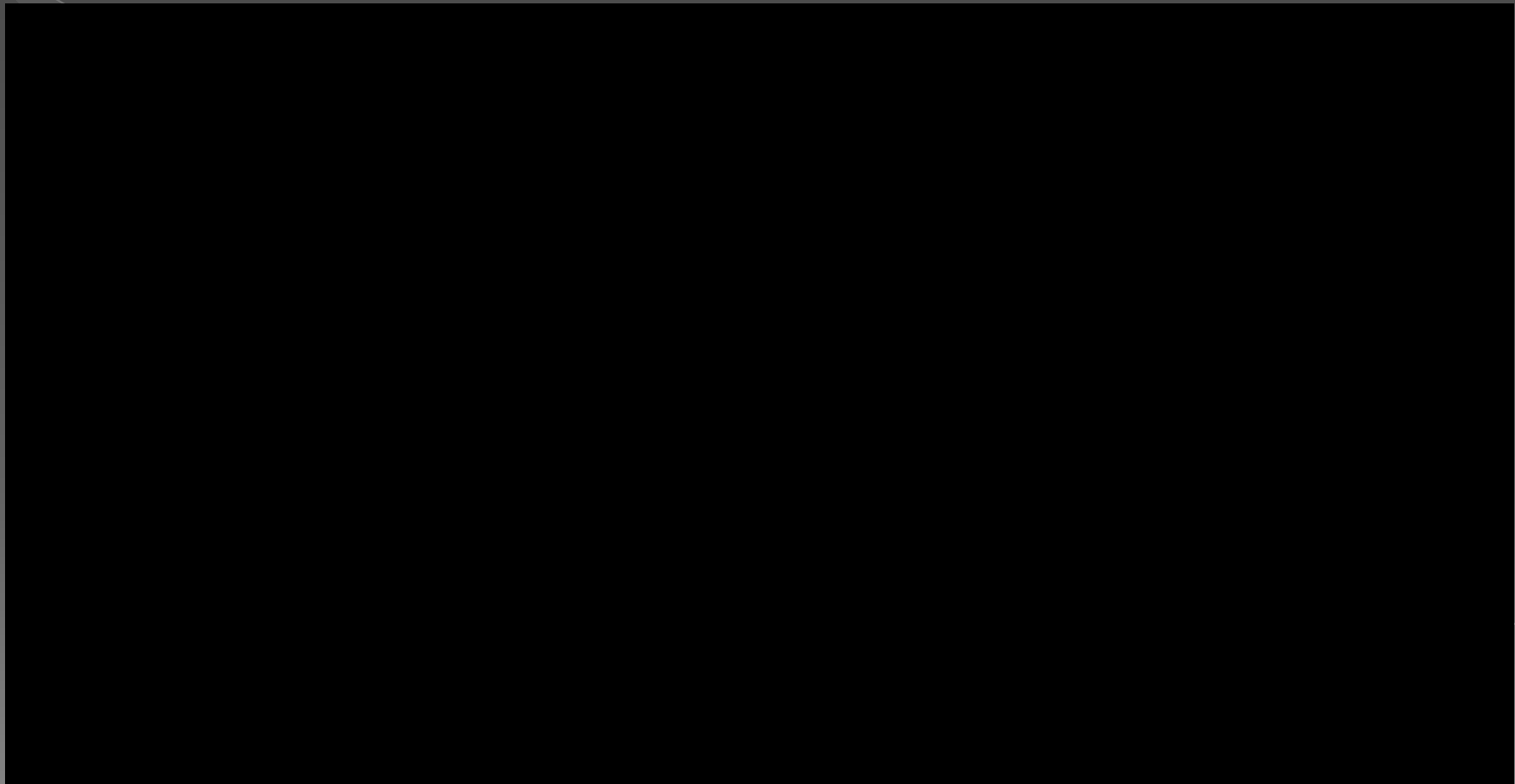
1. Final corrections to the model if required.

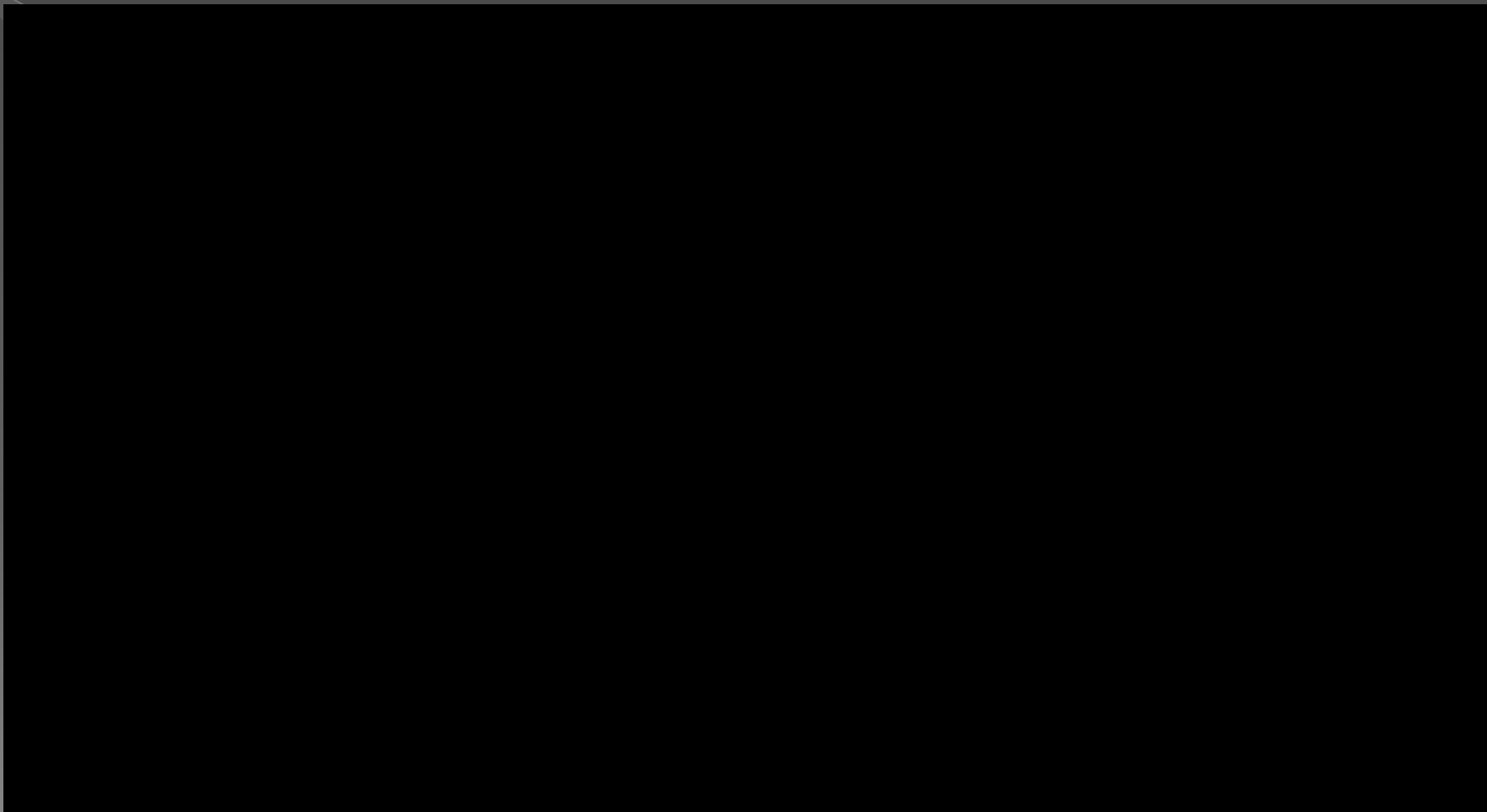
THINGS WE HAVE ACHIEVED

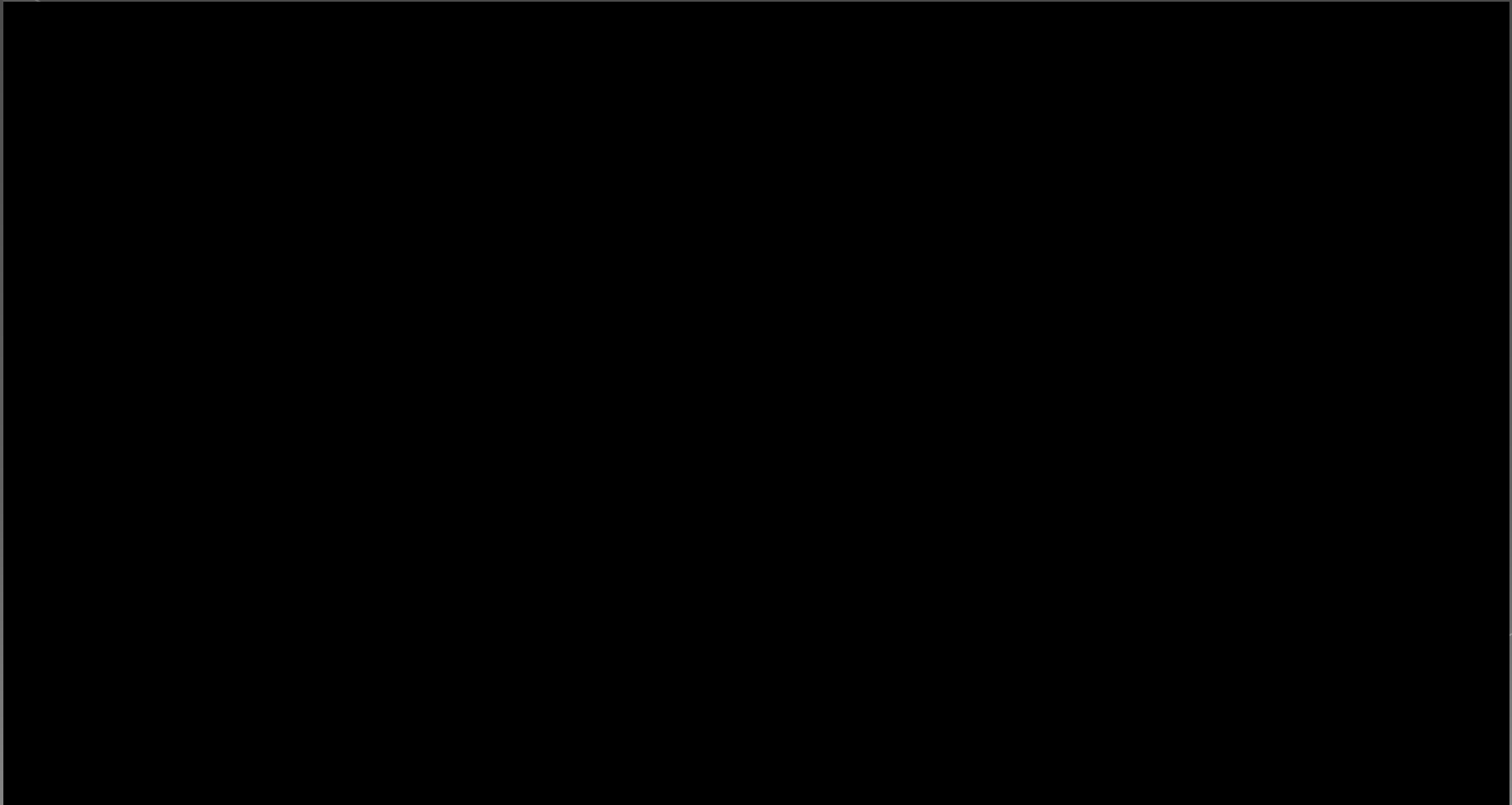
1. We have mounted arduino and GY-80 on the plane and now it can move its ailerons and elevators according to its orientation.
2. We have made a switching system to switch between manual and autonomous mode with the help of arduino (without using any relay switch or gates).
3. We have a compass ready to show the direction.
4. We have made the plane able to hold a specific altitude on its own.
5. We have programmed the plane to move in a desired direction.

Switching system b/w auto and manual modes









Important Links

Center of Gravity EFFECTS ON PERFORMANCE

<http://www.boldmethod.com/cfi-tools/cg-effects/>

Autonomous Quadcopter Docking System

(To get some idea about how make a plane autonomous)

https://people.ece.cornell.edu/land/courses/eceprojectsland/STUDENTPROJ/2012to2013/ssm92/ssm92_report_201305171020.pdf

Intro to Model Airplane Autopilot!!!

<http://www.instructables.com/id/Intro-to-Model-Airplane-Autopilot/>

arduno libraries <https://www.arduino.cc/en/Reference/Libraries>
for connecting sensors

<http://www.rc-airplane-world.com/balancing-rc-airplanes.html>

important for balancing and center of gravity rules.

<https://www.arduino.cc/en/Tutorial/HomePage>

for mpu <http://playground.arduino.cc/Main/MPU-6050>

for PID autotune library <http://playground.arduino.cc/Code/PIDAutotuneLibrary>

How MEMS Accelerometer Gyroscope Magnetometer Work & Arduino Tutorial

<https://youtu.be/eqZgxR6eRjo>

BMP085+Arduino source code for Altitude

<http://bildr.org/2011/06/bmp085-arduino/>

ADXL345 Programming and calibration

<https://learn.adafruit.com/adxl345-digital-accelerometer/programming>

L3G4200D Tripple Axis Gyroscope + Arduino

<http://bildr.org/2011/06/l3g4200d-arduino/>

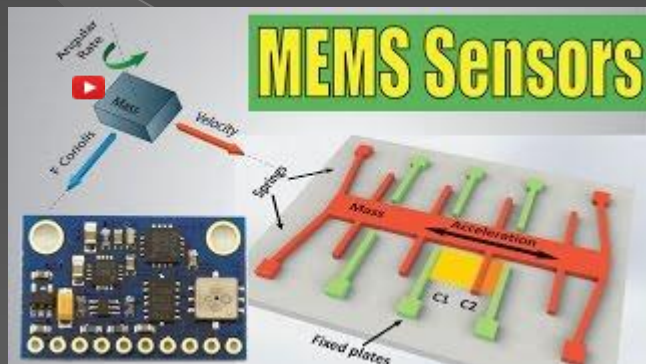
Arduino Tutorial: HMC5883L Compass Magnetometer I2C

<https://youtu.be/VVlwIRTiHTQ>

<http://bluelemonlabs.blogspot.in/2013/08/arduino-simple-compass-with-hmc5883l.html>

MPU 6050 Accelerometer + Gyro

<http://playground.arduino.cc/Main/MPU-6050>



[Preview YouTube video How MEMS Accelerometer Gyroscope Magnetometer Work & Arduino Tutorial](#)
[How MEMS Accelerometer Gyroscope Magnetometer Work & Arduino Tutorial](#)



<https://www.youtube.com/watch?v=VVlwIRTiHTQ&authuser=0>

THANK you