



**Aeromodelling Club
IIT Kanpur**

Fusion 360

Project Mentors:-

Mohit Anand

Raj Agarwal

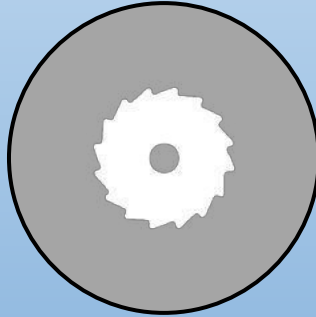
Pranshu Singhal



TASKS TO BE PERFORMED



DESIGN



BUILD

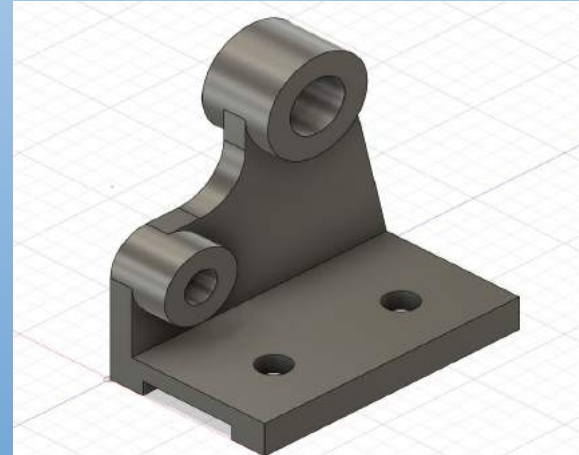
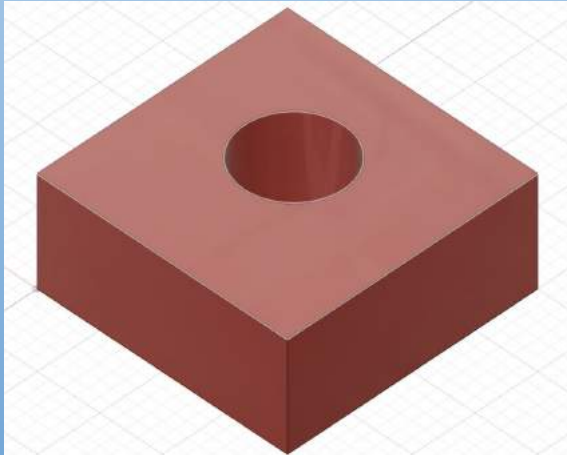


FLY



TOPICS COVERED TILL NOW

- Introduction, Avionics, Types of aircrafts, Terminologies, Installing Fusion 360, Basic functionalities in Fusion 360
- 2D sketching, converting 2D sketch to 3D model
- Getting used to different tools and different features in 3D modelling, In depth 3D modelling

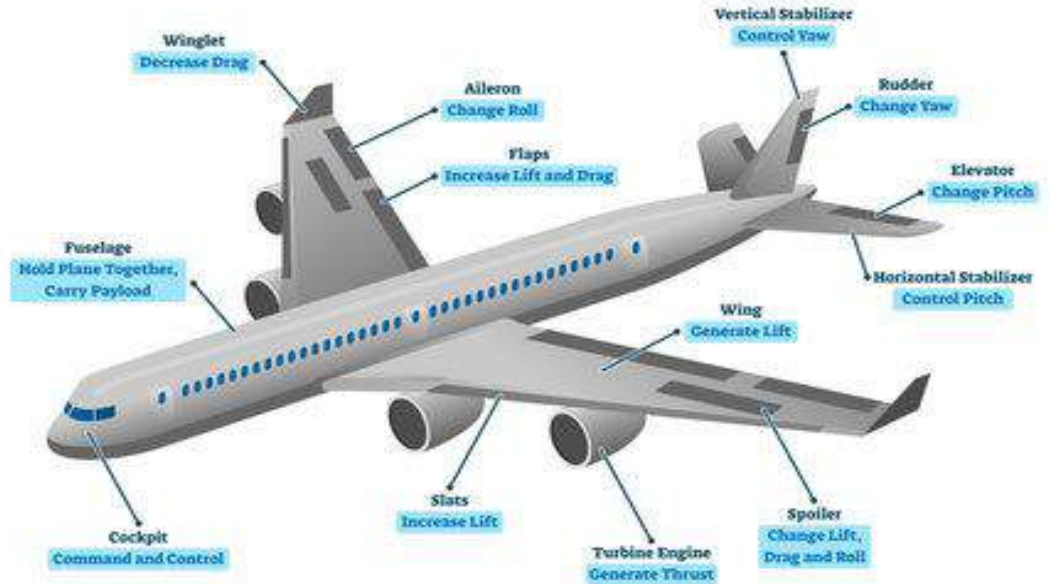


❖ Basics of Aeromodelling

Various parts of a plane:-

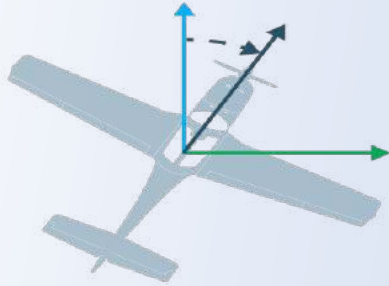
- Wing
- Aileron
- Rudder
- Elevators
- Cockpit
- Fuselage
- Flaps
- Slats

AIRPLANE PARTS AND FUNCTION

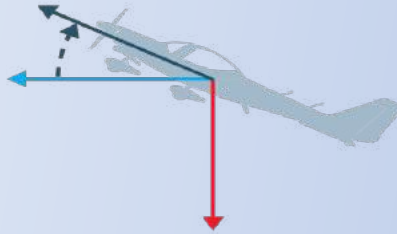


❖ Pitching, Rolling and Yawing motion

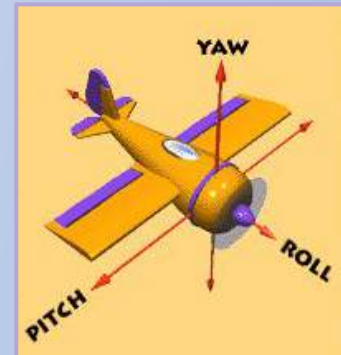
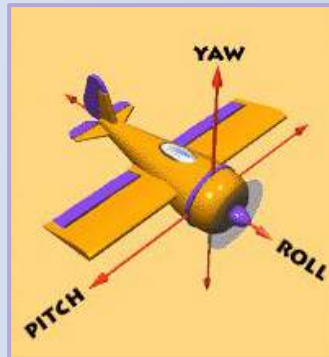
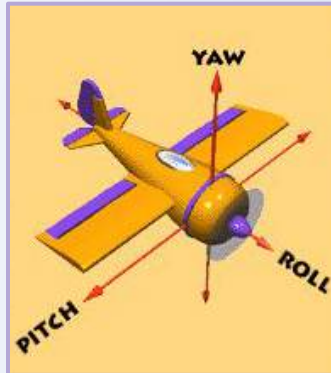
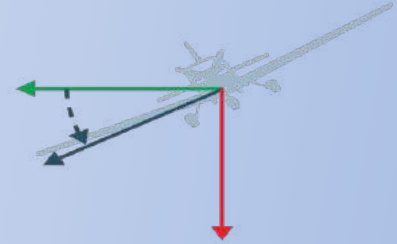
Yaw
(around Z axis)



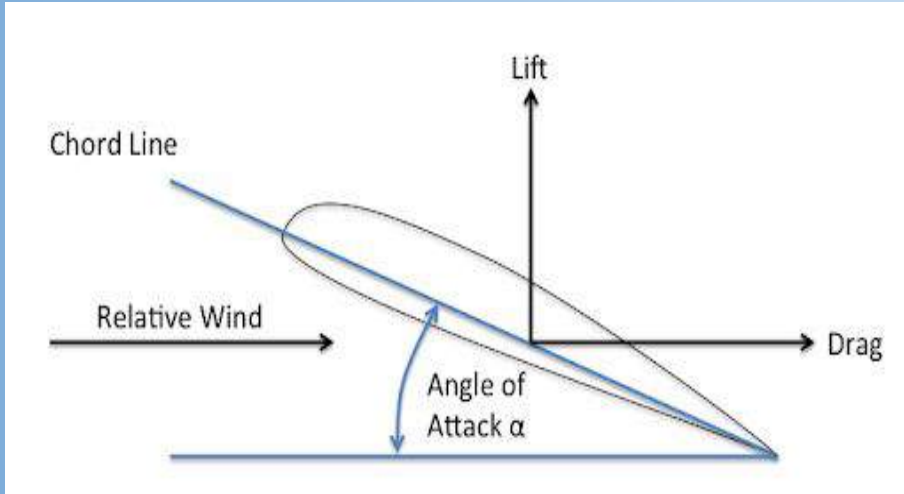
Pitch
(around Y axis)



Roll
(around X axis)



❖ Types of angles in a plane



❖ Forces acting on an aircraft

- Lift
- Weight
- Thrust
- Drag



❖ AVIONICS

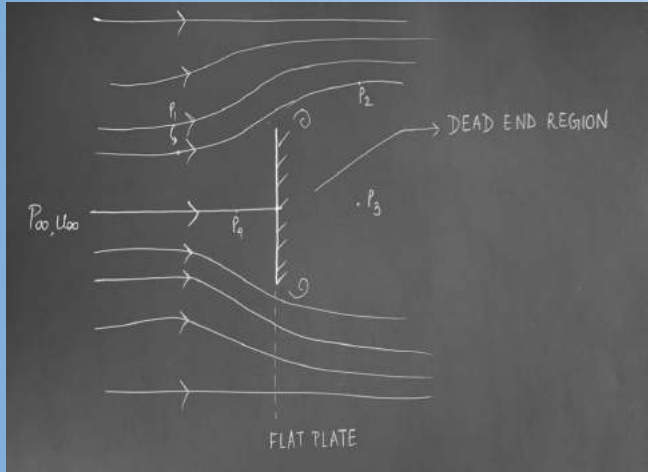
Avionics are **the electronic systems used on aircraft, artificial satellites, and spacecraft**. Avionic systems include communications, navigation, the display and management of multiple systems, and the hundreds of systems that are fitted to aircraft to perform individual functions.

SUBSYSTEMS OF AVIONICS:

1. **Communications**
 - a. Radio Telemetry
 - b. Radio Transmitter
 - c. Radio Receiver
2. **Navigation**
 - a. GPS
 - b. Compass
3. **Aircraft Flight-Control System**
 - a. Autopilot
 - i. IMU
 - ii. Onboard Processor
4. **Black Boxes**



❖ BASIC CONCEPT OF PRESSURE DRAG



Here, P_i are pressures at different points of the streamline flow.

USING BERNOULLI EQUATIONS,

$P_4 > P_\infty$ (Since point 4 is nearer to stagnation point)

$P_1 \approx P_\infty$ (nearly undeflected)

$P_2 \approx P_1$ (nearly undeflected)

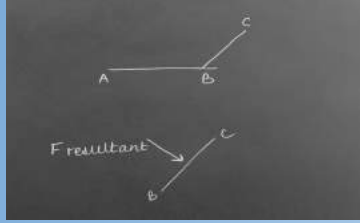
$P_2 \approx P_3$ (due to wake)

CONCLUSION : $P_4 > P_3$

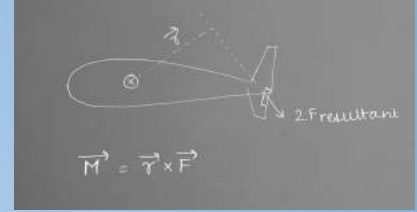
which causes pressure drag.

❖ BASIC PHYSICS INVOLVED IN FLYING

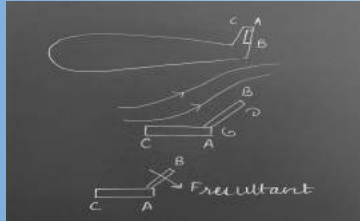
❖ WORKING OF ELEVATOR IN PITCHING MOTION



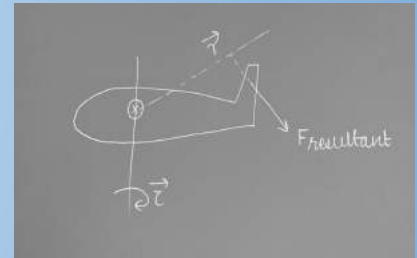
Here B-C are Elevators, which produces a resultant force due to pressure difference. This resultant force produces a torque which produces the pitch motion



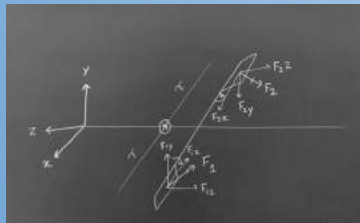
❖ WORKING OF A RUDDER IN YAWING MOTION



Here, AB indicated are rudders on vertical stabilizers and again due to pressure difference resultant force is produced which results in torque.



❖ WORKING OF AILERONS IN PRODUCING ROLLING MOTION



Here, two ailerons are indicated and if one aileron goes in one direction the other goes in the opposite direction. Moreover no torque is produced due to x components of the resultant forces.

$$\begin{aligned} F_1 &= F_{y1}\hat{j} - F_{z1}\hat{k} \\ F_2 &= -F_{y2}\hat{j} - F_{z2}\hat{k} \\ \vec{M}_{\text{due to } F_1} &= (r\hat{i}) \times (F_{y1}\hat{j} - F_{z1}\hat{k}) \\ &= rF_{y1}\hat{k} + rF_{z1}\hat{j} \\ \vec{M}_{\text{due to } F_2} &= (r\hat{i}) \times (-F_{y2}\hat{j} - F_{z2}\hat{k}) \\ &= rF_{y2}\hat{k} - rF_{z2}\hat{j} \\ \vec{M}_{\text{resultant}} &= 2rF_y\hat{k} \end{aligned}$$



Installing Fusion 360 for personal use

- Visit “Autodesk Fusion 360”
- Find and click on “Personal use”
- Click on “Get started”
- Fill up the email and other required details
- Create an account
- click on the “download link”
- Install to your device.
- Login with details
- Start sketching



AUTODESK® FUSION 360™

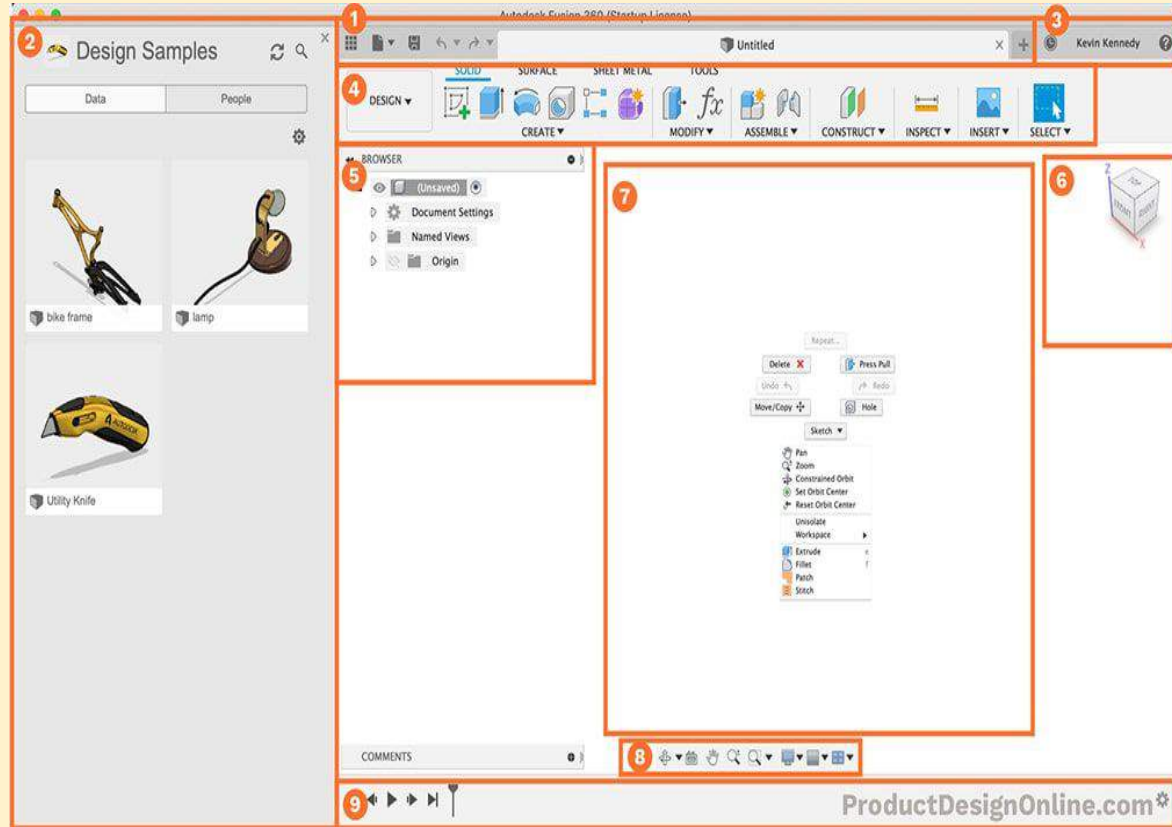


AUTODESK.



Basic functionality of Fusion 360

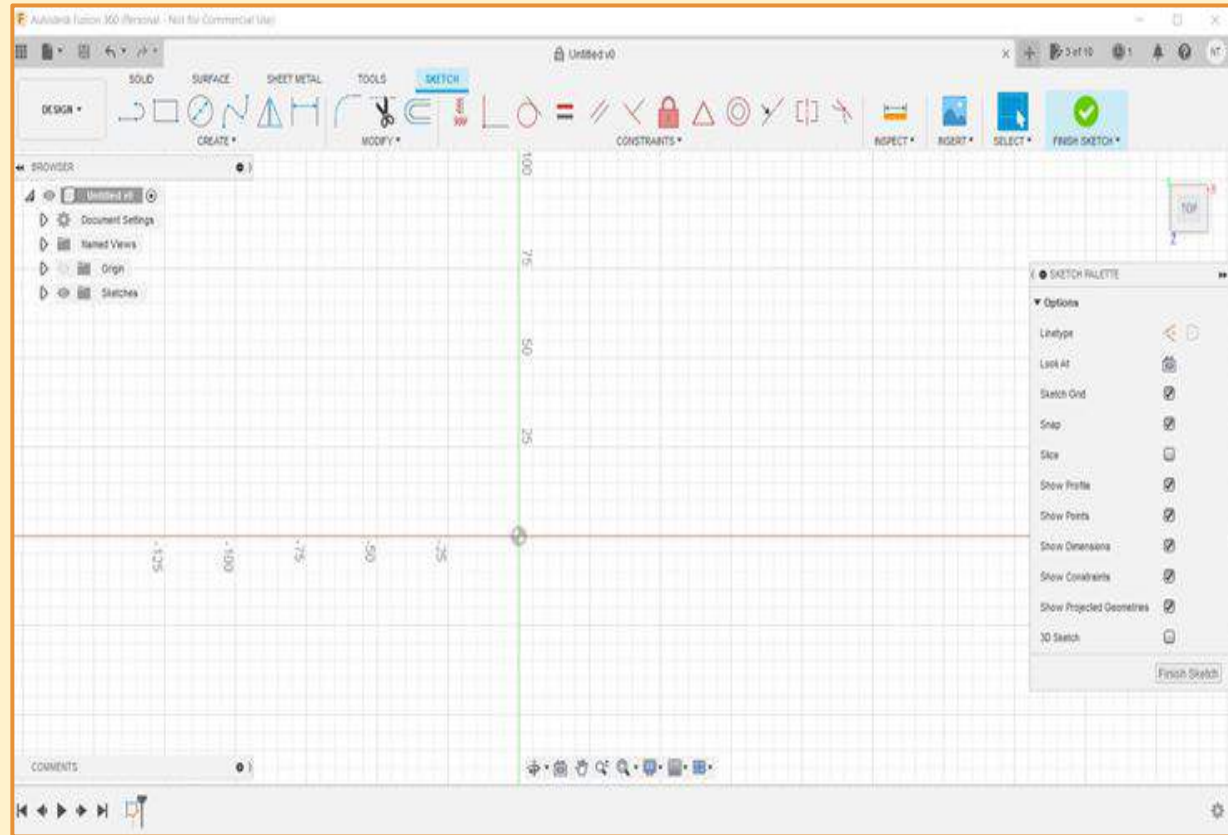
- Application Bar
- Data Panel
- Profile and Help
- Toolbar
- Browser
- ViewCube
- Canvas and Marking Menu
- Navigation Bar and Display Settings
- Timeline





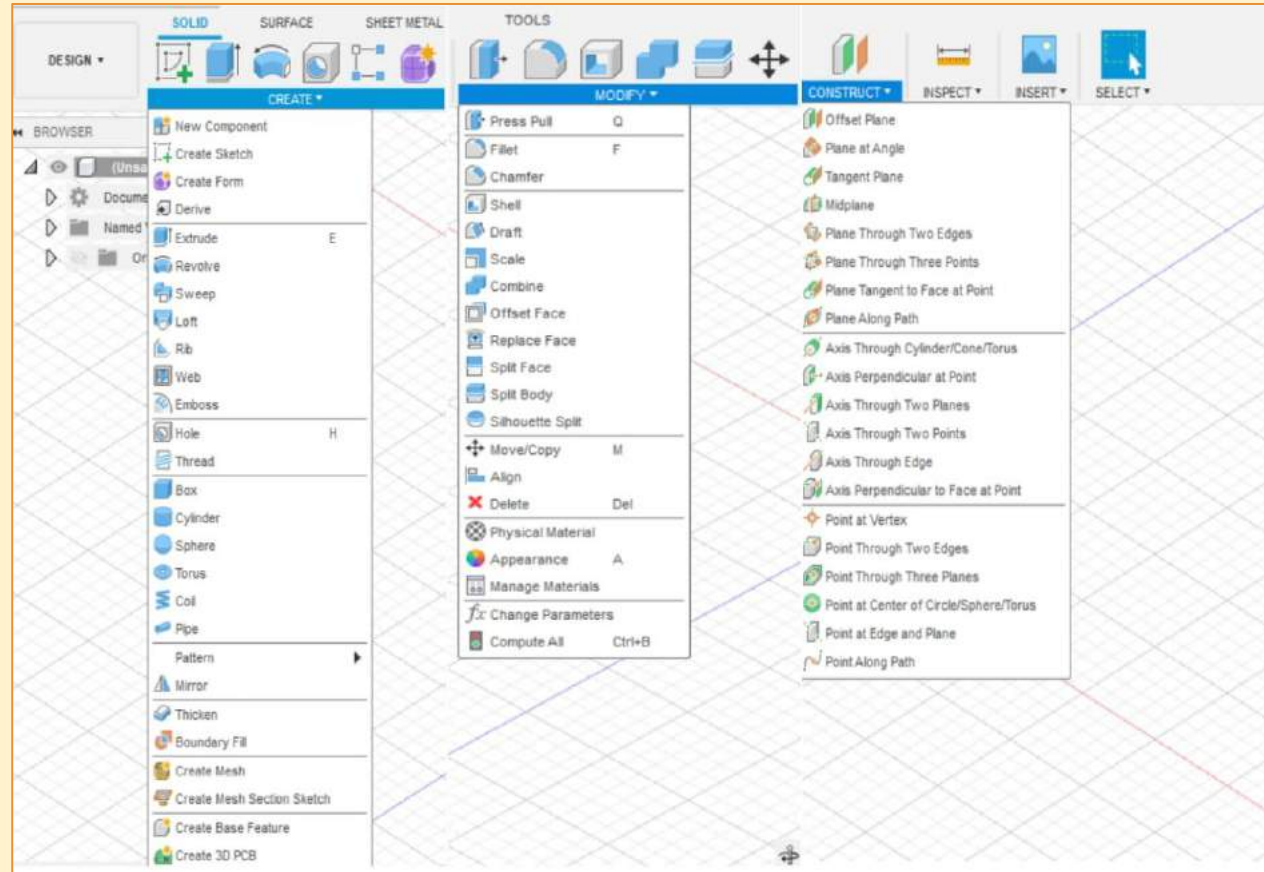
2D sketching

- Line
- Rectangle
- Circle
- Dimension
- Fillet
- Trim
- Equal
- Parallel
- Perpendicular
- Symmetry

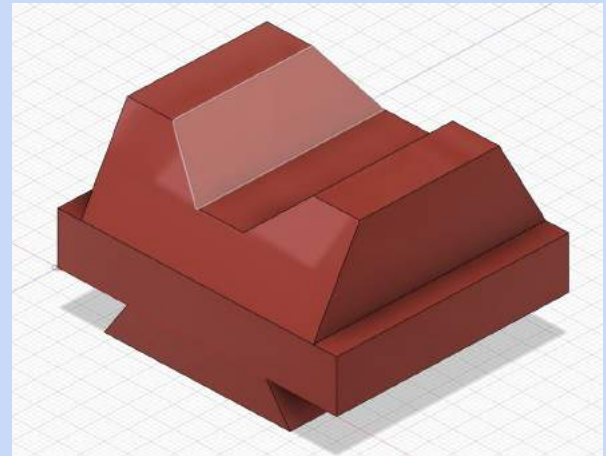
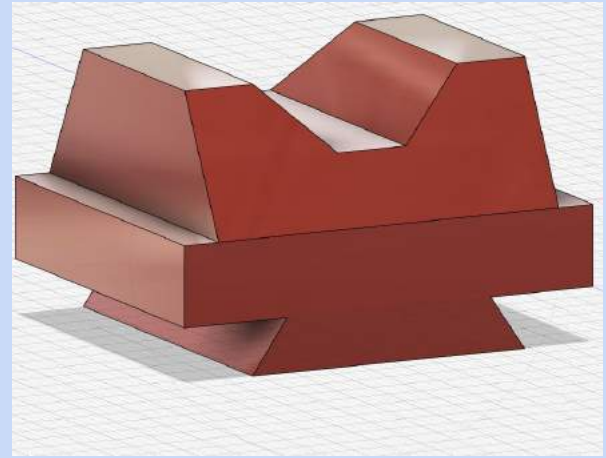


3D Modelling

- Extrude
- Revolve
- Hole
- Fillet
- Chamfer
- Sweep
- Loft
- Construct
- Project

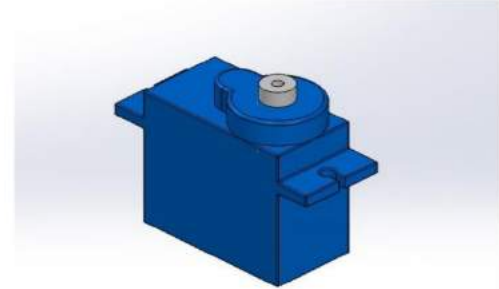


❖ ASSIGNMENT 1



❖ ASSIGNMENT 2

1) Servo motor



2) Radio controller



To be
learned in
the later
part of the
course



**Airfoil DAT
to spline**



**Form
modelling**



**Designing
airfoil in
fusion 360**



**Fuselage,
Empennage
and
Rendering**



**Basic
plane
modelling**

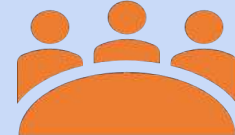


**Propeller
Modelling**



TIMELINE

| WEEK | CONTENTS |
|------|--|
| 1 | Basics of Aeromodelling ,Download and basic of Fusion 360 software |
| 2 | Basic features in fusion 360 |
| 3 | Drawings in Fusion 360 and 3D modelling |
| 4 | 3D modelling in Fusion 360 |
| 5 | Import of Airfoil data ,design wings and propeller in Autodesk |
| 6 | Design of fuselage |
| 7 | Design of empennage of aircraft |



Aman Kumar Singh

Ashish Sharma

Naveen Teja

Padma Ram Rahar

Shubham Kumar

Vasu Paliwal

Abhiyanshu Kumar

Anukriti Singh

Kritika Bansal

Preeti Kumari

Priya Satwika

Rohit Chaudhary

Shivangi

Aastha Sitpal

Aryan Raj

Baishali Das

Keyur Panchal

Prakhar Gupta

Rahbar Shakeer

Sushma



THANK YOU

CAD Designing