

PROPEL LAB-3
AEROSPACE, BMSCE
REPORT
R&D CENTER



Completed major projects

Sl. No	Work Completed	Projects Name	Descriptions
1	SAE INDIA Aero Design Challenge secured 3 rd place in fabrication report.	Competition (Blue impulse).	Two prototype RC plane of 0.9 kg pay load with 3D wing analysis.
2	Creation of micro channel in PMMA using CO ₂ laser for the purpose of fabricating micro fluidic devices. Re-objective is to achieve a channel using micro meter width with minimum HAZ and defects.	Acrylic 3 mm 100 Nos.	Laser machining, engraving and cutting.
3	Study on quad-copter and tri-copter stability	Major project for final year students.	4 motors using manual control mode.
4	Hybrid EVTOL with three rotors Design and Development.	Quad-copter.	
5	SAE aero design west U.S.A	Competition (Team Yaksha).	One prototype RC plane and final model with 1 kg pay load
6	Introduction to advanced machining processes and testing workshop.	Workshop Organised by M.E.A.	Laser machining, engraving and cutting.
7	Line following boat.	E-Yantra.	Designed and cut with Non-metal on laser machining.
8	Tested effect defocusing (Z direction) varies dot pattern and parallel channel effect S47-S63 samples PMMA	Acrylic 3 mm 100 Nos.	Laser machining, engraving and cutting.
9	Final and Prototype type RC plane for sae India aero design challenge.	Fabricated.	Fuse large, elevator rudder, air foil designed and laser cutting for Remote controlled UAV plane.
10	Micro machining.	PMMA Cut 10 mm 10 mm for SEM.	Laser machining, engraving and cutting.
11	Hb to O ₂ landing robotic arm gripper model.	Robotic arm.	Laser machining, engraving and cutting.

Report on SAE India Workshop online

This report is regarding the 2-day online workshop held by SAE India on 05-02-2022 from 10 am to 12 pm and on 12-02-2022 from 10 am to 12 pm and from 2 pm to 4 pm. As the team representing BMSCE, we attended the online workshop, which also carries some points that will be considered in the upcoming SAE India 2022 Aero Design Challenge.

The workshop mainly focused on the introduction to aerodynamics and aerofoils followed by a brief on parts of a plane. It was then followed by a detailed session on using Ansys as the software to perform CFD on a particular aerofoil.

SAE India Team ID: ADC20220175

Student Training

Workshop on RC Airplane Design, Analysis and Fabrication of wing

This workshop was conducted to create awareness among the students of BMSCE on designing an RC airplanes to carry a payload and have a hands on experience on fabricating wing, fuselage...., etc.

Publications

Title: A practical approach to designing, manufacturing and testing a hand-launched fixed-wing UAV.

Propulsion

Tests were executed to evaluate the performance of various motor, battery, and propeller combinations. Force balance was used to measure the thrust produced at various flight speeds. A simple L-shaped arm setup was fabricated on which the motor was mounted, and thrust was measured at different RPMs of the selected motors. The arm converts horizontal thrust of the propulsion system to a vertical force that a digital scale could measure. Thrust meter was designed and assembled using balsa sections, which gave us a good idea of the thrust generated by different motors as well as different propellers through which our team was able to calculate and compare with minimum possible error.

Student Training for RC Simulator Phoenix5



In propel lab-3 we give hands on training on flying to UG students using a RC simulator. An RC flight simulator training is a computer program that allows pilots of radio-controlled aircraft to practice on a computer, without the risk and expense of damaging a real model. Besides the obvious use of training beginners, they are also used for practising new aerobatics, evaluating a model before buying and build it. Simulator allow flight practice when conditions are otherwise unsuitable. Most simulators allow the use of real R/C transmitters to control the plane.

Student Training on fixed wing foam plane



The students of our lab are allowed to fly the sky surfer (foam model plane) in outdoor (APS ground). Support towards outdoor flying is very essential and in the future more external support for flying is necessary.

Exposed to CNC Draft Sight Software.

Draft Sight is a proprietary freemium 2D Computer-Aided Design (CAD) software application developed by Dassault Systems. It lets users create, edit and view DWG and Auto-CAD DXF files. The user interface is quite similar to AutoCAD.



List of Major Equipment's

1. Laser Machine (Cutting & Engraving) 3Axis.
2. CNC Milling Machine.
3. Fat Shark Attitude SD Goggles with MIG v5 Head Tracking.
4. Grupuner MZ-2412 Channel Transmitter.
5. Turnigy HD Wi-Fi Camera.
6. Dremel 4000 machine.
7. Stanley 53 Set tool box.
8. Turnigy Thrust Measuring Stand.
9. Two Sky surfer trainer planes.
10. Apple Work station (Design, Analysis, and Report etc.)
11. Bosch GLM 80 Laser Rangefinder.

Achievements

- Secured 1st place at IITM Shaastra 2011 Top Gun.
- Secured 3rd place at IITM Shaastra 2011 Wright Design.
- Secured 1st place at IITKGP Kshitij 2012 Laws of Motion.
- Secured 1st place at NIT Warangal 2012.
- Secured 1st place at NIT Trichy 2012.
- Secured 23rd rank in SAE Aero Design East 2012 held at Atlanta, USA.
- Best presentation at IITM Shaastra 2013.
- Secured 18th rank in SAE Aero Design West 2013 held at Los Angeles, USA.
- Secured 15th rank in SAE Aero Design West 2014 held at Texas, USA.
- Secured 14th rank in SAE Aero Design West 2015 held at Los Angeles, USA.
- Secured 13th rank in SAE Aero Design West 2016 held in California, USA.
- 2nd place in Boeing competition out of 174 teams across India.
- Secured 14th rank in SAE Aero Design East 2016 held in California, USA.
- 17th place out of 30 teams in Boeing 2017 held at IITM Chennai.
- Best innovation in the micro class of Manovegam Aero Championship 2017 in SAE India held at SIT Tumukur.
- Secured 23rd rank in SAE Aero Design East 2018 held in Lake Land, Florida, USA.
- Overall 3rd rank, 2nd place in a design report, in SAE India Southern Section 2018, Anna University, Chennai.
- Participated in SAE Indian Southern Section 2019, Anna University, Chennai.
- Participated Technoxian Quad-copter Challenge 22nd to 25th September 2019, New Delhi.
- Secured in 1st (One lakh) over all (micro) in SAE India competition March 2020, Anna University, Chennai.
- Secured in Design standings in 8th place and Presentation standings 10th place in SAE Aero Design West June 2020 TX, USA.
- Secured in 3rd place in fabrication report in Micro class category SAE India aero design challenge Aug 2021, Chennai.

List of MOUs

- MOU with NAL for technical support.

Significant Research activities

- Perform fault isolation on components and circuits, and maintain error logs on equipment malfunction.
- Assist implementation of new behavioural-based safety process at R&D Aerospace lab.
- Set up and configured hardware and software on the lab equipment.
- Work successfully in a team and also independently under unsupervised conditions.
- Communicates effectively with multiple departments. Establishes strong relationships to gain support and effectively achieve results
- Perform equipment calibration as part of routine preventive system maintenance.
- Set-up and maintain project files.
- Responsible for updating and maintaining office electronic/hard filing system.

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