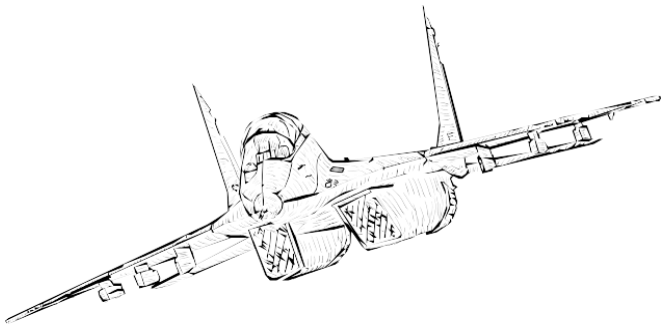


Cadet College Hasanabdal

Aeromodelling Club

Clubs & Societies Booklet



"Soaring Beyond Limits"





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Introduction

The Aeromodelling Club of Cadet College Hasan Abdal is an innovative and high-energy platform where cadets explore the exciting world of aviation and aerospace technology. The club engages cadets in designing, building, and flying model aircraft, drones, and gliders, fostering not just an understanding of aerodynamics but also hands-on technical skills and engineering curiosity.

Through structured activities, teamwork, and national-level competitions, cadets are provided a unique opportunity to experience aerospace concepts practically, laying the foundation for future careers in aviation, robotics, and aerospace engineering.



History

The Aeromodelling Club of Cadet College Hasanabdal, founded in the early 1960s, is one of the college's oldest and most vibrant societies. Starting with simple gliders, it evolved into a hub for powered, radio-controlled aircraft, drones, and flight simulators. The club has played a key role in nurturing cadets' interest in aviation, engineering, and innovation. With a dedicated flying field and workshop, it regularly hosts training sessions and inter-college competitions. Many of its members have gone on to serve in the Pakistan Air Force and aerospace fields. The club consistently performs well in national contests and promotes teamwork, precision, and leadership. Today, it embraces modern technologies like AI-assisted and GPS-guided drones and Autonomous Flight Systems. It continues to inspire cadets to let their dreams take flight.



Purpose

The core purpose of the Aeromodelling Club is to nurture a passion for aviation and aeronautics among cadets. By offering structured experiences, the club seeks to:

- Spark curiosity about the science of flight.
- Encourage practical problem-solving and technical experimentation.
- Provide mentorship for advanced drone and model aircraft building.
- Guide cadets toward academic and professional careers in aviation and STEM.



Aims & Objectives

Educational Exposure: Introduce fundamental principles of flight and aviation engineering.

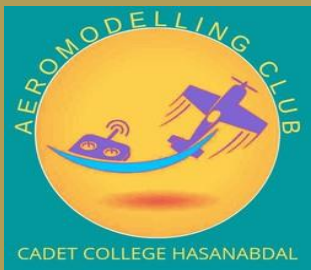
Hands-on Learning: Enable cadets to construct, calibrate, and fly model aircraft.

Innovation & Creativity: Foster design thinking and experimentation.

Team Collaboration: Promote leadership, communication, and group problem-solving.

Competitive Preparation: Prepare cadets to participate in regional and international aero-challenges and drone races.

Mentorship: Provide senior cadets the opportunity to guide juniors and assume instructional roles.



Theory and Learning Approach

The Aeromodelling Club at Cadet College Hasanabdal is a dynamic platform that introduces cadets to the fascinating world of aviation through **Project-Based Learning (PBL)**. This hands-on, experiential approach allows cadets to apply theoretical knowledge in real-world projects, enhancing both their technical understanding and practical skills.

Aeromodelling is more than a hobby—it is an interdisciplinary educational experience that combines elements of **physics, mathematics, engineering, and computer science**. Cadets not only learn how aircraft fly, but also design, build, and test their own models, nurturing creativity, teamwork, and problem-solving abilities.



Key Theoretical Concepts

Fundamentals of Aerodynamics: Understanding how lift, drag, thrust, and weight interact to create stable flight.

Aircraft Structures: Learning the function and design of fuselage, wings, empennage, and control surfaces.

Flight Mechanics: Concepts like angle of attack, stall, roll, pitch, and yaw are explored through flying exercises.

Control Systems: Using servos and linkages to control ailerons, elevators, and rudders.

Radio Control (RC) Systems: Studying communication between ground transmitters and onboard receivers.

Power and Propulsion: Introduction to electric motors, batteries, ESCs, and propeller dynamics.

Safety and Field Protocols: Emphasizing safe design, construction, and operation during flights.



Project-Based Learning (PBL) in Action

Each term, cadets work in small teams to complete themed aeromodelling projects, progressing from simple gliders to advanced RC aircraft. Every project follows a structured process:

Design Phase – CAD sketches and planning based on flight requirements.

Construction Phase – Cutting, assembling, and integrating materials and electronics.

Testing Phase – Ground testing followed by trial flights and adjustments.

Presentation Phase – Teams document and present their findings, challenges, and innovations.

This cycle of design-build-test-reflect strengthens engineering thinking and instills a sense of accomplishment.

Sample projects include:

Rubber-powered balsa gliders

Electric RC trainer aircraft

Delta-wing foam jets

VTOL (Vertical Takeoff and Landing) concepts

Drone assembly and programming



Materials Used

Structural Materials

Balsa Wood Sheets and Sticks – Lightweight and ideal for wing and fuselage construction.

Foam Board (Depron/EPP) – For modern lightweight and shock-absorbent aircraft.

Plywood and Plastic Sheets – For motor mounts and reinforcements.

Carbon Fiber Rods and Tubes – To provide strength while keeping the weight low.

Adhesives and Finishing

Super Glue (Cyanoacrylate)

Hot Glue and Epoxy Resin

Spray Paints and Covering Films – For final appearance and visibility.

Tools and Equipment

Hobby knives, cutters, and scissors

Rulers, calipers, and set squares for precision

Soldering iron for electronic connections

Sandpaper and files for finishing edges

Electronics and Power System

Brushless Motors

Electronic Speed Controllers (ESCs)

LiPo Batteries (2S/3S)

Radio Transmitters and Receivers (2.4GHz)

Micro Servos – To control flight surfaces

Propellers (various sizes and pitches)



Class-wise Material & Activity Breakdown

Class 8

Concepts: Basic physics of flight – lift, drag, thrust, and gravity.

Models: Paper planes, foam gliders, simple rubber-powered models.

Skills: Understanding airfoil design, symmetry, and balance.

Activities:

- Paper plane distance challenge.
- Design and fly a rubber-band powered balsa glider.



Class 9

Concepts: Introduction to model aircraft parts – fuselage, wings, tail, control surfaces.

Models: Balsa wood gliders with control surfaces.

Skills: Measuring wingspans, adjusting trim for flight stability.

Activities:

- Construct and test-launch simple balsa gliders.
- Launch angle vs. distance experiments.



Class 10

Concepts: Introduction to aerodynamics, drag coefficient, stability, and control.

Models: Fixed-wing model aircraft with RC components.

Skills: Servo motor installation, using flight simulators.

Activities:

- Build an RC glider with rudder and elevator control.
- Simulator sessions using software (e.g., RealFlight).



Class 11

Concepts: Multirotor physics, drone structure, propeller thrust, and flight programming.

Models: FPV drones, racing quadcopters.

Skills: Assembly, soldering, flight controller configuration, troubleshooting.

Activities:

- Team build of a functional FPV drone.
- Indoor flying session with obstacle course.



Class 12

Concepts: UAV mission planning, VTOL (Vertical Take-Off & Landing) models, and AI-assisted drones.

Roles: Senior mentorship, club event organization, competition representation.

Activities:

- Research and build advanced drone prototypes.
- Represent club at AeroFests and inter-college competitions.
- Capstone project (e.g., autonomous delivery drone model).



Resource Links for Cadets

Educational & Technical

- 🌐 FliteTest YouTube Channel – Aeromodelling tutorials and DIY tips.
- 🌐 NASA Aeronautics for Students – Concepts and activities related to flight.
- 🌐 RC Groups Forum – Discussion forum for RC aircraft hobbyists.
- 🌐 Drone Dojo – Drone training and flight programming courses.
- 🌐 Instructables – Aeromodelling Projects – Step-by-step build guides.

Flight Simulators (for practice)

- 🎮 RealFlight Simulator – Commercial RC simulator software.
- 🎮 FPV Freerider – Drone simulator for quadcopters.



Certificate-Based Competitions & Workshops

Online Platforms

🎓 Coursera – Introduction to Aerospace Engineering – University-level course with certificate. <https://www.coursera.org/>

🎓 Udemy – Drone Programming with Python –Intro to autonomous drones. <https://www.udemy.com/>

🎓 edX – Principles of Aerodynamics (MIT) – Free course with optional certificate. <https://www.edx.org/>

🏆 National STEM Challenge – Project-based international challenge.

<https://www.stem.org.pk>

🎓 Coursera: "Drones and Aerial Robotics" by University of Pennsylvania.

<https://www.coursera.org>



Certificate-Based Competitions & Workshops

National Physical Competitions & Workshops

AeroFest – Institute of Space Technology (IST) Islamabad

- o Annual competition featuring fixed-wing and multirotor challenges.

<https://www.ist.edu.pk/>

National Science & Innovation Fair

- o Includes robotics, drones, and engineering design competitions.

<https://khwarizmi.org/>

Pakistan Innovation Foundation – Drone Challenge

- o Annual event for student teams to build and demonstrate drone capabilities.

<https://pif.org.pk/>

LUMS SPIE TechFest

- o UAV challenges and flight simulators.



Certificate-Based Competitions & Workshops

National Physical Competitions & Workshops

LUMS SPIE TechFest

- UAV challenges and flight simulators.

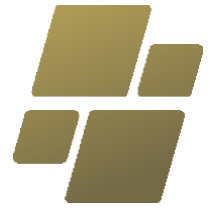
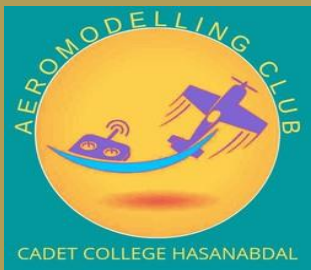
<https://lums.edu.pk/>

HEC National Aeromodelling Competition

- <https://www.hec.gov.pk/english/Pages/default.aspx>

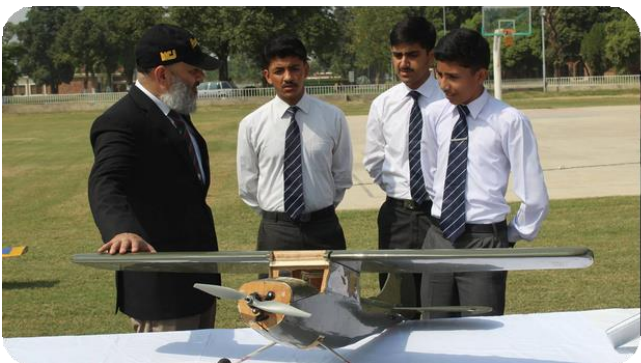
NERC Competition NUST Islamabad

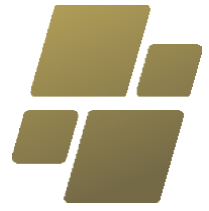
- <https://nust.edu.pk/>



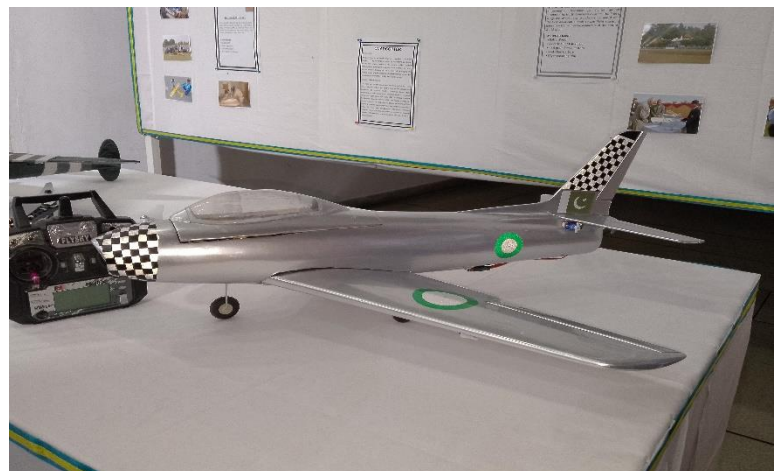
Annual Exhibition

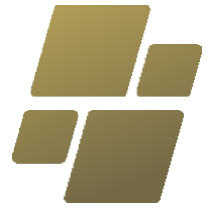
Every year an annual exhibition takes place at Cadet College Hasanabdal in which all the clubs and societies showcase their projects.



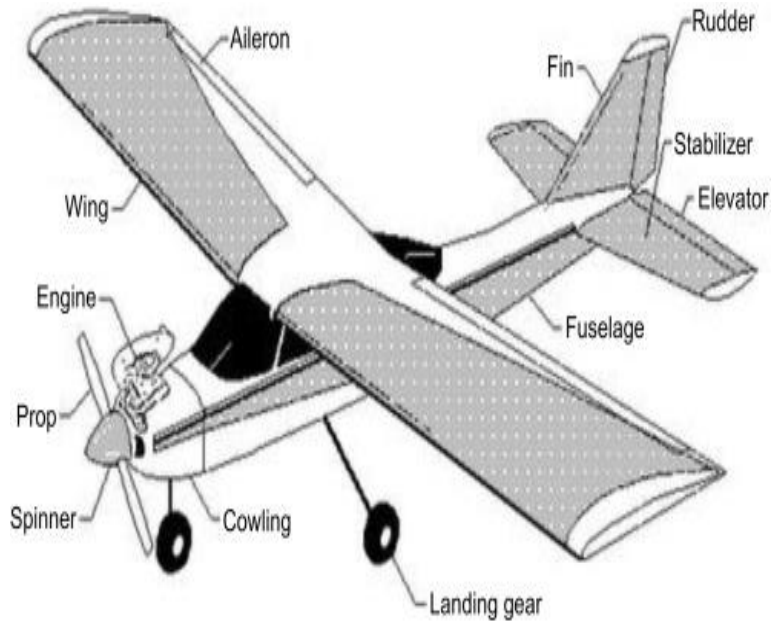
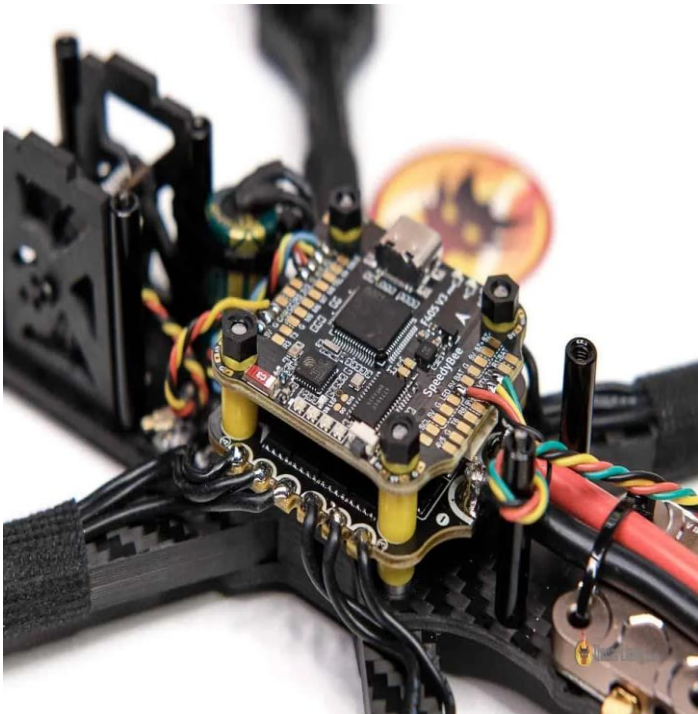
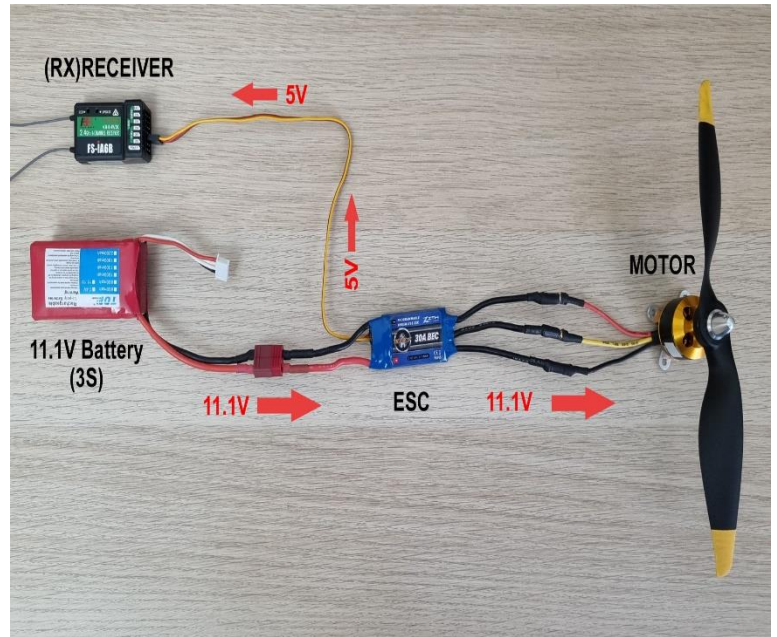


Picture Gallery





Picture Gallery



Basic trainer



Conclusion

The Aeromodelling Club empowers cadets to explore the skies through innovation and discipline. By blending theory with practice, we aim to shape future leaders in aerospace engineering. Join us to design, build, and soar!

For inquiries, feel free to contact:

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"The sky is not the limit—it's just the beginning."