Two-Week Short Term Course On

Design of Fixed Wing Unmanned Aerial Vehicles (UAV)

(Sponsored by Ministry of Human Resource Development (MHRD), Government of India under the 'Global Initiative of Academic Networks' (GIAN) Program)

12th – 23rd December, 2016

Course Overview

Starting with radio controlled model aircraft flown by hobbyists and the military, the proliferation of inexpensive UAV platforms or Drones has largely been the result of rapid development of sensors, batteries, motors and control electronics prevalent in consumer devices like mobile phones. Encouraged by the update of regulations by the U.S. Federal Aviation Administration on UAVs in 2015, small drones continue to rapidly make headway into all aspects of our life. Today, typical UAVs range from 50-gram electrically powered quadcopters for recreation and aerial photography to large fixed wing 10-ton aircraft for surveillance and precision strikes. UAV platforms have also been used to monitor atmospheric pollution and to gather in-situ data in dangerous environments, such as over volcanoes or forest fires. As the uses of UAV platforms proliferate, their operational envelope continues to be extended by demand for longer flight times, larger payloads and safe automated operation under very windy and gusty conditions. At the same time, one must keep costs low and maintain ease of launch and recovery. This course aims at familiarizing students with current practice of UAV design, integration of platforms with required payloads and actual flight operations. The course will be a very hands-on course with group projects.

Course Contents

The course introduces an approach for developing specifications for UAV platforms based on mission requirements. Starting with general requirements and a survey of existing drones, multiple potential solutions will be considered. These will then be subject to additional constraints driven by availability; technological maturity and cost of critical components. To minimize cost, the prototyping will involve

using selected off the shelf components typically used by radio controlled aircraft hobbyists and do-it-yourself drone enthusiasts. Components include flight motors, controllers, auto-pilots, sensors / telemetry equipment and cameras. The goal of course will be to teach the students how to use flight data to remove design flaws and prove through subsequent re-tests. The course will be based on imparting knowledge through a hands-on conceptualize-design-build-fly-modify experience. Additionally, techniques for analyzing flight data and reconstructing the reasons for a crash will be taught. Techniques for both line of sight flight and first person view (FPV) flight will also be introduced.

Who Can Attend?

This course is targeted towards students (senior undergraduate and postgraduate) in the disciplines of mechanical engineering, aerospace engineering, electrical & electronics engineering, and climate sciences. Typically, the course attendees will be divided into project teams. Ideally, a project team will consist of four individuals, an airframe designer (Aerospace Engineer), a controls/telemetry specialist (Electrical Engineer), a mission specialist (Climate Scientist) and a systems integrator (Mechanical Engineer). This course will also be useful scientists, researchers, teachers, and practicing engineers working in the above listed areas.

Course Duration & Venue

12th December – 23rd December, 2016
School of Mechanical Sciences,
Indian Institute of Technology Bhubaneswar
Samantapuri, Bhubaneswar 751 013, Odisha, India.

Course Fee

- Participants from industries: Rs. 9000
- Participants from academic / technical institutions and R&D units: Rs. 4500
- Students: Rs. 2000
- Participants from abroad: USD 200.

The fee includes all instructional materials, cost of equipment, and laboratory equipment usage charges. The course fee does not include accommodation. However, the participants will be provided accommodation in the Institute hostel and food on payment basis.

Registration

Register for the course online at http://www.gian.iitkgp.ac.in/GREGN/index The last date of registration is 5th December 2016.
Number of participants for the course is limited to 60.

Course Faculty

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Dr. Sumon K. Sinha, a B.Tech., in Mechanical Engineering from IIT Kharagpur and MS & Ph.D. in Fluid Thermal Sciences from the University of Miami, is the Founder and President of Sinhatech, an Aerospace and Fluid Dynamics Research & Development company based in the USA. Dr. Sinha has over 30 years experience in academia and industry investigating turbulent and unsteady flows and in devising solutions to practical flow problems using his inventions. His solutions have been used for enhancing aircraft performance, increasing automobile fuel efficiency, improving industrial heat transfer and reducing wind noise. He has served on the faculty of the University of Mississippi, University of Nebraska, Florida International University and the University of Miami. His R&D has been supported by the National Science Foundation, NASA, US Army and Air Force and large and small corporations. Dr. Sinha is now focusing on developing UAV systems for acquiring much needed meteorological data during weather events as global climate change places more importance over mitigating weather related catastrophic damage.

Course Coordinators & Contact Information

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Dr. Sathyanarayana is an Assistant Professor in the School of Mechanical Sciences at IIT Bhubaneswar. Currently he works on DNS of turbulent flows using novel Fourier space algorithms, De-aliasing techniques for Fourier Spectral Methods for Compressible Flows as well as developing experimental facilities for compressible turbulent flows.

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Dr. Bhumkar is an Assistant Professor in the School of Mechanical Science at IIT Bhubaneswar. Currently he works on LES of Transonic Flows, Simulation of Transitional Flows, Computational Aeroacoustics and Scientific Computing.