

Curriculum Vitae

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CAREER OBJECTIVE

To face & get the better of the new technical challenges while working in the research and development field of a reputed organization, requiring constant expansion of fresh skills.

EDUCATIONAL QUALIFICATION

Year	Degree	College	Board/University	CPI/%
Pursuing	PhD	IIT Kanpur	IIT Kanpur	9.0
2014	M.Tech.(Aerospace Engineering) Structures and Flight Mechanics	IIT Kanpur	IIT Kanpur	7.61
2010	B.Tech.(Electronics and Communication Engineering)	Birla Institute of Applied Sciences, Bhimtal (Extension of BITS Mesra)	Uttarakhand Technical University	66%
2003	Intermediate	Govt. Inter College Sarainkhet, Almora	Uttarakhand Board	65%
2001	High School	Govt. Inter College Sarainkhet, Almora	Uttarakhand Board	72%

EDUCATIONAL ACHIEVEMENTS

- Completed the designing, fabrication and testing of India's first fully solar-powered aircraft MARAAL-1 and MARAAL-2. (<https://www.iitk.ac.in/aero/maraal/>)
- Secured 99.9 percentile in GATE 2011.
- Got selected for masters for most premier institutes in India including IIT Delhi, IIT Kharagpur, IIT Roorkee and IIT Guwahati.
- Received scholarship in B.Tech for being in top 5 at Birla Institute of Applied Sciences, Bhimtal.
- Received scholarship during High School and Intermediate for being college topper.

PROJECTS

• PhD

Project on development of solar powered aircraft 'Maraal' and implementing optimal strategies for performance enhancement, under the supervision of **Prof. A. K. Ghosh** and **Prof. G. M. Kamath**.

My work can be broadly categorized in two phases. First phase is design and fabrication of solar-powered aircraft '[Maraal](#)', a test flight video can be seen here: [Maraal](#). Second phase is about developing optimal strategies so that a solar-powered

aircraft can harvest maximum energy that is possible and spending the harvested energy in the most economical way.

This research work proposes the methodology for the selection of battery and optimal flight trajectory for a solar powered aircraft to achieve the maximum endurance.

Possibility of an optimal attitude flight is explored and for further enhancing the ability of an aircraft to bank towards the Sun at a lesser penalty of drag, a novel control

surface 'Auxiron' is developed. "Auxiron" helps a solar-powered aircraft to orient itself according to the position of the Sun into the sky to collect more solar power with smaller additional power for the flight than that of without any additional control surface. Using this new control surface an aircraft can cruise in a straight path with a roll angle without any sideslip angle. Further, Maraal specific MPPT and BMS are developed.

• **6 DoF Simulator:**

A simulator was developed in the MATLAB environment for the trajectory analysis and control response of aircrafts.

• **NPTEL:**

Worked as teaching assistant in following courses under National Programme on Technology Enhanced Learning sponsored by Ministry of Human Resource and Development:

- Introduction to Airplane Performance
- Aircraft Stability and Control
- Aircraft Dynamic Stability and Design of Stability Augmentation System

Sample video link: https://www.youtube.com/watch?v=l6Yq9ZrY30&index=24&list=PLtUPB3SCffXPbKOXpvNMI6YI_tUqfFv82

• **M.TECH. THESIS:**

Project based on design of autopilot for a vertical tailless flying wing UAV under the supervision of **Prof. A. K. Ghosh**.

Description:

- i) Finding the equation of motion for six degrees of freedom for a flying wing in incompressible flow.
- ii) Modeling and parameter estimation for vertical tailless flying wing structure using analytical methods.
- iii) Development of controllers using NDI (Nonlinear Dynamic Inversion) technique.

• **TERM PAPERS**(in M.Tech. course)

1. Flight Controller and Tracker

Software: LabVIEW

Description: Designing of hardware to interact with NI DAQ card to control the aircraft control surfaces aileron, elevator and rudder and simulation of aircraft in LabVIEW using aircraft tools to track the position of aircraft.

2. Helicopter Cockpit and Control Design:

Software: Autodesk

Description: Designing of controlling mechanism to controls a mini helicopter.

In this the sticks and linkage were designed to control the cyclic, collective, pusher and the throttle of the helicopter. Designing of avionics, communication and cockpit with master minimum equipment for visual flight.

3. Digital Matched Filter:

Description: Designing of hardware for digital matched filters to receive digital data in noisy environments. 16 bit PRBS (Pseudo Random Bit-sequence Generator) was designed for generation of bit sequences.

4. IPv4 – IPv6 Multicast Gateway:

Description: We implemented IPv4 to IPv6 translator.

5. Stealth Techniques:

Description: Simulating aircraft surfaces for minimum RCS (Radar Cross Section), Implementation of techniques for reducing active as well as passive signature of aircraft and Installation of electronic counter measure.

• B.TECH. PROJECT

Project was based on development of a web monitored and controlled energy meter undertaken as a part of partial fulfillment of Bachelor of Technology degree, in the final semester of engineering under the guidance of **Dr. Alok Sharma** (HOD, department of electronics and communication).

Title: Web Enabled Energy Meter.

Description: A system to read & record the electricity usage and make it available to the user over the internet. The readings are read fed to a database using 8355 microcontrollers through the RS232 port of the PC. The web server fetches this data from the database and generates usage reports according to the requests made by the web user.

INTERN/WORKSHOPS

- Summer training in IRDE/DRDO Dehradun during B.Tech 3rd year.
- Windy 2013 a workshop on wind tunnel testing.
- Workshop on high performance computing.

EXPERIENCE:

- Project Engineer, Flight Lab IIT Kanpur (Since May 2014 till June 2016) • Tutor Introduction to Airplane Performance
- Tutor Aircraft Stability and Control
- Technical advisor at Elcomponics (Since March 2020 till date)

COURSES UNDERTAKEN

- **M.Tech:** Flight Dynamics, Flight stability and Control, Virtual Instrumentation, Preliminary Design of Helicopters, Theory of Vibrations, Experiments in Flight, Introduction to Aerospace Engineering, Mathematics for Aerospace Engineering, Digital Communication Networks, Aircraft Materials and Process.
- **B.Tech :** Basic Electronics, Basic Electrical Engineering, Basic Mechanics, Electromechanical Energy Conversion, Control System, Digital Electronics, Analog Electronics, Signals and Systems, Digital Signal Processing, Network Analysis and Synthesis, Digital Communication, Analog Communication, Mobile Communication Networks, Computer Networks, Data Structure, Electromagnetics, Antenna, Microwave and Radar, Solid State Devices, VLSI Design,

TECHNICAL SKILLS

Software: Lab View, MATLAB, Simulink, Multisim, AVR Studio, Autodesk, SolidWorks, Photoshop, PageMaker, Origin.

Programing Languages: C, 8085 Assembly, HTML, VHDL.

BEHAVIOURAL SKILLS

Analytical thinking, Strategic perspective, Planning and organization, Team work, Stress handling, Creativity.

EXTRA CURRICULAR ACTIVITIES

- **Coordinator** Gliding Club IIT Kanpur.
- **Hall captain** in intra IIT technical fest TAKNEEK 2012.
- **Network administrator** during B.Tech. final year.
- Member of science and technology council IIT Kanpur during 2012-13.
- Designed & Setup network infrastructure for project **MeLT (Mobile e-Learning Terminal)**; intended to provide e-learning assistance in rural & remote areas financed by MHRD and jointly run by IIT Roorkee & BIAS Bhimtal.
- Got second prize in debate competition in inter college competition.

PERSONAL DETAILS

- Father's name : Mr. Brajnath Dwivedi
- Permanent address : Vill./PO- Sarainkhet, Dist. - Almora, Uttarakhand 263624 •
- Nationality : Indian
- Marital Status : Single
- Category : General
- Languages Known : Hindi, English, Bhojpuri and Kumauni.
- Hobbies : Aeromodelling, Playing Badminton, Carom, Chess, Cricket and Listening Music.

PHOTO



List of Publications

Patent

- Vijay Shankar Dwivedi "A Novel Control Surface "Auxiron" To Optimize Solar Power Collection Of Solar Aircraft," IPA: 201911054467

Journal Papers

- V. S. Dwivedi, Salahudden, D. K. Giri, A. K. Ghosh and G. M. Kamath "Optimal Energy Utilization for a Solar-Powered Aircraft Using Sliding-Mode-Based Attitude Control," IEEE Transactions on Aerospace and Electronic Systems, Vol. 57, No. 1, pp. 105-118, Feb. 2021., DOI: [10.1109/TAES.2020.3015310](https://doi.org/10.1109/TAES.2020.3015310).
- Dwivedi VS, Dwivedi PN, Giri DK, Ghosh AK "Aircraft flat-spin recovery using sliding mode based attitude and altitude control," Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering, October. 2020, DOI:[10.1177/0954410020964674](https://doi.org/10.1177/0954410020964674).

Conference Papers

- V. S. Dwivedi, J. Patrikar, A. Addamane and A. K. Ghosh, "MARAAAL: A Low Altitude Long Endurance Solar Powered UAV For Surveillance and Mapping Applications", 2018 23rd International Conference on Methods and Models in Automation and Robotics (MMAR), Międzyzdroje, Poland, 2018, pp. 449-454, DOI: <https://doi.org/10.1109/MMAR.2018.8485805>.
- Vijay Shankar Dwivedi, Prashant Kumar, Ajoy Kanti Ghosh, G.M. Kamath, "Selection of Size of Battery for Solar Powered Aircraft", 11th IFAC Conference on Control Applications in Marine Systems, Robotics, and Vehicles CAMS 2018, Opatija, Croatia, Volume 51, Issue 29, Pages 424-430, 10-12 September 2018 DOI: <https://doi.org/10.1016/j.ifacol.2018.09.450>.
- V. Shankar Dwivedi, Salahudden, A. K. Ghosh and G. M. Kamath, "Design Studies to Achieve Energy Optimal Attitude for a Solar-Powered Aircraft", 2019 IEEE Aerospace Conference, Big Sky, MT, USA, 2019, pp. 1-8, DOI: [10.1109/AERO.2019.8741733](https://doi.org/10.1109/AERO.2019.8741733).
- S. Dey, V. Shankar Dwivedi, Salahudden and D. Kumar Giri, "Fixed-Time Attitude Control of Satellite Using Combined Magnetic and Magneto-Coulombic Actuators", 2019 IEEE Aerospace Conference, Big Sky, MT, USA, 2019, pp. 1-9, DOI: [10.1109/AERO.2019.8742218](https://doi.org/10.1109/AERO.2019.8742218).
- Salahudden, V. S. Dwivedi and A. K. Ghosh, "Roll Angle Optimization in Coordinated Level Turn Flight and its Analytical Validation for UAV", 2019 IEEE Aerospace Conference, Big Sky, MT, USA, 2019, pp. 1-6, DOI: [10.1109/AERO.2019.8742243](https://doi.org/10.1109/AERO.2019.8742243).
- Salahudden, P. Kumar, V. S. Dwivedi, D. K. Giri and A. K. Ghosh, "Quaternion Based Optimal Controller for Momentum Biased Nadir Pointing Satellite", 2020 IEEE

Aerospace Conference, Big Sky, MT, USA, 2020, pp. 1-10, DOI: [10.1109/AERO47225.2020.9172570](https://doi.org/10.1109/AERO47225.2020.9172570).

- Salahuddin Salahuddin and Vijay Shankar Dwivedi and Ajoy Kanti Ghosh, "Flight States and Control Inputs Computation using Nonlinear Programming for Unmanned Air vehicle", AIAA AVIATION 2020 FORUM, June 15-19, 2020, DOI: [10.2514/6.2020-2639](https://doi.org/10.2514/6.2020-2639).
- "Robust controller design for bank to turn asymmetric high speed projectile with uncertainties", 2019 IEEE Aerospace Conference, Big Sky, MT, US. 7-14 March 2019