Udvas Basak

Last Updated on 4th June, 2023

4th Year Undergraduate
Department of Aerospace Engineering
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Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2020 - Present	B.Tech	Indian Institute of Technology Kanpur	8.5/10
2020	WBCHSE(XII)	Ramakrishna Mission Vidyalaya, Narendrapur	98.4%
2018	WBBSE(X)	Ramakrishna Mission Vidyalaya, Narendrapur	94.43%

Scholastic Achievements

- Selected and qualified among the top **115 national-level teams** for the **Second Round** of the **Embedded Security CTF 2022**, organized by **IIT Madras** and **National Centre of Excellence & C-HERD**.
- Secured **1st Place** in **Formula Bharat 2023 - Electric Vehicle (Class I)**, winning **4th Place** in **CGMR** & **1st Place** in **BPPD**, demonstrating excellence in **engineering**, **cost analysis**, **goal-setting**, and **effective business planning**.
- Successfully completed **Amazon ML Summer School**, gaining hands-on experience and exposure to industry experts
- Awarded the **Silver Medal** in **Inter IIT Tech Meet 10.0** for the **JLR Electric Vehicle** Problem Statement
- Secured **World Rank 197** among 2247 active participants in **Reply Challenges: Cyber Security Challenge 2021**
- Secured **All India Rank 3546** in **JEE Advanced 2020** among the 1.5 Lakh shortlisted candidates
- Secured **All India Rank 2755** in **JEE Mains 2020** among 1.1 million applicants
- Secured **Rank 276** in **West Bengal Joint Entrance Exam 2020** among 80 thousand applicants.
- Secured **Rank 8** in **HS Examination** conducted by **West Bengal Council of Higher Secondary Education**
- Awarded the **National Talent Search Examination(NTSE)** Fellowship 2018 by **NCERT**
- Awarded the **Jagadish Bose National Science Talent Search(JBNSTS)** Fellowship 2019
- Awarded the **Swami Vivekananda Merit-cum-Means Scholarship** Fellowship 2020 by **Government of West Bengal**

Experience

- **Machine Learning Intern, LimeChat, Wavicle Technologies Pvt Ltd** (*May'23 - ongoing*)
  Mentor: Aniket Mohanty, Computer Vision Engineer, LimeChat
  - Learnt and studied the use of **Rasa** and **OpenAI Models** for generating **human-quality AI Conversations**
  - Developed three **end-to-end AI-powered features** to make life easier for the agents:
    - Machine Learning:
      - Using **GPT** and **intent classification transformers** to tag a conversation with a reliability score
      - Using **GPT-4** to rewrite messages written by the agents into professional-quality messages
      - Using **GPT-4** and **NER Models** to summarize a conversation before agent-handoff, to reduce **First Response Time**.
    - Frontend Development: Created UI/UX with **Vue.js**, **HTML**, and **SCSS** for seamless integration.
    - Backend Development: Studied and used **Ruby** and **RubyonRails** to create the backend for these features.
  - Customer Scoring, Hot Lead Generation: Used multiple models to study and analyze customer interactions and signals at multiple, to create a **cohort for targeted marketing**, and prompter responses.
- **Research Intern, SPCRC, IIIT Hyderabad** (*May'22 - Jun'22*)
  Mentor: Dr. Prasad Krishnan, Signal Processing and Communication Research Centre, IIIT Hyderabad
  - Learnt and studied various existing algorithms for **DNA Trace Reconstruction**, including Bitwise Majority Alignment
  - Implemented the algorithms using **Python**, generated datasets for the algorithms to work on, and calculated how the theoretical algorithms agree with practical situations
  - Analyzed the data obtained using **MATLAB** to describe and compare the performance of the algorithms in different situations, and to predict which algorithm performs better in which domain

Key Projects and Papers

- **3 Degrees of Freedom Spacecraft Simulator for Close-Proximity Operations** (*Jan'23-May'23*)
  Faculty Advisor: Dr. Dipak Kr. Giri, *Assistant Professor, Indian Institute of Technology Kanpur*
  Worked on designing an efficient system to test and simulate a spacecraft physically, which will take in a control algorithm as input, and reflect it in the physical world
  - Learnt and formulated the concepts of **magnetic levitation** with **electrodynamic suspension** using **Halbach Arrays**, and created a **well-packaged RPM Sensor** for **feedback control**
  - Collaborated with the team to create a comprehensive **Simulink Model** to reflect the airflow through the cube,
  - Created 3D printed components for precise positioning of the components, ensuring **packaging** and **accessibility**
- **JLR's Powered Bonnet for Electric Vehicle** (*Mar'22*)
  IITK Contingent, Inter IIT Tech Meet 10.0, IIT Kharagpur
  - Learned and studied the various kinds of linkages and mechanisms that can be used for mechanizing the required bonnet
  - Collaborated with the team to decide on a final mechanism to automate the bonnet in the required limits
  - Used **Four Bar Linkage Mechanism** to actuate the bonnet with minimal power consumption and ensure smooth motion
  - Created and debugged the CAD files of the bonnet model used for simulations
- **FSEV Sidepod Design for Formula Bharat 2022** (*Dec'21-Feb'22*)
  ***IITK Motorsports*, IIT Kanpur**
  - Learned and studied the variations in **Sidepod Designs** of Formula Vehicles

  - Designed basic **Sidepods** of various shapes and analyzed them to arrive at an optimal shape of a Sidepod on the basis of ideal Radiator design and dimensions using **Autodesk CFD Simulations**.
  - Simulated the sidepods under various conditions to arrive at the ideal design parameters of the sidepod
- **FSEV Chassis Design for Formula Bharat Virtuals 2021 and Formula Bharat 2023** (*May'21 - Apr'23*)
  Faculty Advisor: Dr. Santanu De, *IITK Motorsports*
  - Assisted in the overall designing of a **FSAE Electric Vehicle** for the events
  - Collaborated on the basic tubular spaceframe design of a standard **FSAE Electric Vehicle Chassis** using **Solidworks** compliant with rule constraints in a team of 6 members
  - Assembled the other components of a **Electric Vehicle** into the Chassis, ensuring **electrical and thermal safety**, and the safety of the driver in various impact and crash situations
  - Analyzed the **Chassis design** on the basis of various **stress and strain factors** using **Solidworks Simulation**, and modified the design to ensure safety of the driver
- **Intro to Game Development - Summer '21** (*May'21- July'21*)
  Mentors: Coordinators, GameDev Society, IITK
  - Collaborated and created **Dr. Madman**, a 3D-First Person Survival Game using Game Engine **Unity**. Worked on **UI Elements and Physics Simulations** in the backend coding of the game.
  - Learnt the extensive use of **Git** and **Github** for collaborating on a team project.
  - Designed 3D models of **Game Elements and Landscapes** for the game using **Blender**
- **Discord Bots using Discord API** *(self-project)*
  - **The StoryTeller Bot**: A Discord Bot designed with **Python** that automates a detective story in a escape-room format
  - **Bartomew**: A Multipurpose Discord Bot designed with **Python** that automates football scores and lineups, automates tournaments of any online game in both league and knockout formats. Tested in a Discord Server of **1.6K members**, and a Round-Robin-cum-Knockout Tournament of **32 members**
  - **Bots for Online Quizzes**: A pair of Discord Bots designed with **Python** for automating an online quiz with moderation and invigilation. Tested in RKMV Narendrapur Annual Quiz 2k21 with **5 teams and 20 members**
- **Miscellaneous Small-Scale Projects** *(self-project)*
  - **Music Recommender**: Developed a sophisticated music recommender system, leveraging the extensive Spotify Dataset 1921-2020 to deliver personalized music recommendations tailored to individual user preferences.
  - **Automatic Assignment Submission**: Leveraged advanced tools like **BeautifulSoup4** and **Selenium-Webdriver** to streamline and optimize the process of submitting assignments on the Hello IITK portal

Positions of Responsibility

Team Vice-Captain Team IITK Motorsports	*April'22 - April'23*	**Leadership**	Leading a **3-tier team** of **40+ dedicated students** to work towards the design and manufacturing of a **Formula Student Electric Vehicle**
		Management	Developing and implementing **timelines** and managing the functioning of the **Chassis and Aerodynamics Subsystem** of the Formula Student Electric Vehicle
		Design	Designing the Chassis of the FSEV 2022 of Team IITK Motorsports and implementing and assembling other parts for electrical and safety issues
		Innovation	Started the process for making the institute's first driverless autonomous vehicle
Manager, Web and Design Public Policy and Opinion Cell	*May'22 - April'23*	**Leadership**	Leading a **2-tier team** of **5 dedicated students** to work towards the design and implementation of the new Public Policy and Opinion Cell Website
		Training	Training 3 undergrad students in **HTML5**, **CSS** and **Javascript**, along with **SCSS** and **Creative Design**
		Design	Designing the revamped website of PPOC IITK to include new and advanced UI elements to provide it a modern look

Interests and Skills

Areas of Interests	**Electric Vehicles**	Chassis Design, CFD Analysis, Aerodynamic Optimization, Flow Visualization, Autonomous Vehicle Architectures, Path Planning Algorithms, Computer Vision
	Machine Learning	Data Analysis, Driverless Vehicles, Neural Networks, Natural Language Processing, Conversational AI, Data Collection and Annotation for Autonomous Driving
	Control Systems	System Modeling and Analysis, Feedback Control, Matlab/Simulink, PID Control, Data Analysis and Visualization, Control System Design , Aerospace Applications

Areas of Expertise	**CAD Design, Structure Analysis, 3D Printing**	Proficient in CAD designing with any software, Created 30+ detailed 3D solid models from concepts, Analyzed stress concentrations and deformations in trusses, Contributed to aerodynamic component design
	Python and MATLAB	Proficient in Python across multiple domains, Developed programs for data analysis, machine learning, and more, Utilized MATLAB for data analysis and mathematical modeling, Applied MATLAB to analyze electric vehicle components and helicopter dynamics
	Arduino	Skilled in using Arduino and its corresponding IDE, Proficient in building systems with basic electronic components

Technical Skills

- **Programming Languages:** C, C#, Python, HTML5, CSS, SASS, Javascript, Vue, Ruby, RubyonRails, LaTeX, MATLAB
- **Softwares:** Git, Micro-Cap, UNITY, Solidworks, Autodesk CFD, NI LabView, Microsoft Office
- **Libraries and Modules:** Numpy, Pandas, Matplotlib, Jupyter, Scikit-learn, Transformers, Tensorflow
- **Certifications:** Machine Learning, Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization

Relevant Courses **Coursera*

Aircraft Control Systems	Flight Mechanics	Optimal Space Flight Control
Introduction to Machine Learning	Neural Networks and Deep Learning*	Improving Deep Neural Networks*
Aerospace Structures	Mechanics of Solids	Aeromodel Design & Fabrication
Incompressible Aerodynamics	Compressible Aerodynamics	Airbreathing Propulsion
Complex Variables Fundamentals of Computing Manufacturing Processes	Differential Equations Data Structures and Algorithms Thermodynamics	Linear Algebra Introduction to Electronics Fluid Mechanics and Rate Processes

Extra-Curricular and Voluntary Activities

- Secured **Rank 4** in **Annual All India Elocution Competition 2019** organized by **Ramakrishna Mission Institute of Culture, Kolkata**
- Secured **1st** position in **Kolkata Chapter** in **Brahm Prakash Memorial Materials' Quiz 2019** organized by **Indian Institute of Metals** and participated in **All India Finals** held at **Madras Atomic Power Station, Kalpakkam**
- Secured **1st** Rank in **State Level Essay Writing Competition 2016-17** organised by **Department of Parliamentary Affairs**, Government of West Bengal
- Secured **1st** position in **Clash of Coders** event in **Logique**, an **Annual Inter-School Tech Fest**, organised by **Delhi Public School, Ruby Park**
- Secured **3rd** position in **Beat the Curve** Event, a **Business Pitch Event** in Euphoria, an Inter-School Fest organised by **BDM International School, Kolkata**
- Secured **2nd** position in **Mathematics Quiz Competition** held at **Maths Fair 2019**, organised by the **Calcutta Mathematical Society**
- Extended voluntary service for the benefit of differently abled as an amanuensis for 10th, 12th and UG Examinations
- Selected as the **Student Editor** for **Phalguni**, the **annual magazine of RKMV Narendrapur, with 150+ pages and 1000+ readers**
- Organised and conducted the **Annual Quizzes** of **RKMV Narendrapur** for two consecutive years **2021(online)** and **2022(offline)** with 5 teams and 25 members and **800+ audience**
- Demonstrated exceptional aptitude in the interdisciplinary fields of **philosophy**, **biological sciences**, **cognition**, **psychology**, and **psychiatry**, as evidenced by consistently securing exceptional grades **(A*)** in all relevant coursework