Kritanu Chattopadhyay

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Education

Delhi Public School Newtown — Kolkata, West Bengal
Class X – 97.8% — *Apr 2021*

Hariyana Vidya Mandir, Salt Lake — Kolkata, West Bengal
Class XII – 92.8% — *Apr 2023*

National Institute of Technology, Durgapur — Durgapur, West Bengal
B.Tech in Mechanical Engineering, CGPA: 7.82 — *Aug 2023 – Present*

Experience

AI-NLP Lab, IIT Patna — July 2025 – Present
Undergraduate Research Intern, Department of Computer Science and Engineering — *Remote*

- Undergraduate Research Intern under the supervision of *Professor Sriparna Saha*, guided by PhD Scholar Sofia Jamil.
- **Summarizing Adverse Drug Events in Cancer Treatment using Large Language Models and Reinforcement Learning**
  - Developing an LLM and reinforcement learning-based system to summarize patient-reported adverse drug events in cancer treatment.
  - Designing NLP methods to process patient-reported data and generate concise, interpretable summaries for clinical decision-making.
  - Investigating scalable pipelines for continuous model improvement and integration into real-world healthcare settings.
  - **Skills: Natural Language Processing, Large Language Models, Reinforcement Learning, HuggingFace, PyTorch**

Autonomous Systems Laboratory, IIT Madras — May 2025 – July 2025
Undergraduate Project Intern, Department of Engineering Design — *Chennai, Tamil Nadu, India*

- Undergraduate Project Intern under the supervision of *Prof. Bijo Sebastian*, *Prof. Sandipan Bandyopadhyay*, and *Prof. G. Saravana Kumar*.
- **Virtual Simulation of Dynamic Stability of Self-Propelled Boom Sprayer and Optimization of its CG for Different Load/Terrain Conditions**
  - Utilized **Altair MotionSolve** to develop and validate dynamic simulations for a company-sponsored project, analyzing stability under varying loads and terrains.
  - Simplified and optimized a CAD model with 10+ components, reducing computational load while maintaining accurate mass distribution.
  - Simulated cornering and slope tests of a 1.6-ton self-propelled boom sprayer, identifying critical speed (≈41 km/h) and slope angle (≈30°–33°) for stability.
  - Delivered design insights on center of gravity placement and stability margins, informing safer and more reliable off-road agricultural vehicle design.
  - **Skills: CAD Simplification, Dynamic Simulation, Altair MotionSolve, Vehicle Dynamics, Virtual Prototyping**

Mechatronics Lab, IIT Delhi — Feb 2025 – Present
Undergraduate Research Intern, Department of Mechanical Engineering — *Remote*

- Undergraduate Research Intern under the supervision of *Professor Subir K. Saha*.
- **Backend Development of RoboAnalyzer Robotics Analysis and Visualization Software**
  - Utilizing **Visual C#** to develop and enhance the backend of RoboAnalyzer, a robotics analysis and visualization software.
  - Implementing new features to improve simulation accuracy and system performance.
  - Debugging and optimizing existing modules to ensure scalability and reliability.
  - Collaborating with research mentors to align backend improvements with robotics research and use cases.
  - **Skills: Visual C#, Backend Development, Robotics Software, Debugging & Optimization**

CMATER Lab, Jadavpur University, Kolkata — Dec 2025 – Aug 2025
Undergraduate Research Intern, Department of Computer Science and Engineering — *Remote*

- Undergraduate Research Intern under the supervision of *Professor Debotosh Bhattacharjee*.
- **SPAD Value Estimation from Rice Leaf Images**

    - Formulated an ensemble approach combining CNN, DNN, XGBoost, and Random Forest with a linear regression meta-learner to predict chlorophyll (SPAD) values from rice leaf images.
    - Trained and evaluated models on a Kaggle dataset of high-resolution rice leaf images with labeled SPAD values, applying preprocessing steps such as resizing, normalization, and RGB conversion.
    - The ensemble model achieved an R^2 score of 0.7820, outperforming individual models.
    - Published results in a peer-reviewed paper accepted to **COMSYS 2025 (Warsaw, Poland)**, highlighting scalable non-invasive crop health monitoring.
    - **Skills: Ensemble Learning, Deep Learning, Machine Learning, CNN, DNN, XGBoost, Random Forest, OpenCV, TensorFlow/Keras**
- **Cassava Leaf Disease Classifier**
    - Built a multi-backbone ensemble (ViT, ResNet-50, AlexNet, ConvNeXt, Swin-T) to classify 21,367 cassava leaf images across 5 disease categories.
    - Achieved 87.03% validation accuracy and 0.7733 macro F1-score, improving results by 2–8% over individual backbones.
    - Applied extensive data augmentation and ensemble soft voting to handle class imbalance and reduce overfitting.
    - Enabled scalable and automated disease detection to support precision agriculture and improve food security outcomes.
    - **Skills: Deep Learning, Transfer Learning, Vision Transformer, ConvNeXt, ResNet, Ensemble Learning, PyTorch**

Robotics and Automation Laboratory, IIT Patna Dec 2025 – Jan 2025

Undergraduate Research Intern, Department of Mechanical Engineering *Bihta, Bihar, India*

- Undergraduate Research Intern under the supervision of *Professor Karali Patra*, guided by PhD Scholar Surya Prakash Singh.
- **Toolpath Generation for Texturing on Free-Form Surfaces**
    - Developed transformation matrices between two points on free-form surfaces, computing rotation angles and translational vectors for toolpath generation.
    - Implemented algorithms in **MATLAB** and **Python** for STL file rotation, point selection, and meshing-based coordinate extraction.
    - Created codes for selecting points on STL files using meshing and applying computed rotation/translation for accurate orientation.
    - Validated methodology on hemisphere and cube geometries, demonstrating accurate toolpath alignment and applicability to CNC machining.
    - **Skills: Computational Geometry, MATLAB, Python, Rotation and Translation Matrices, Euler Angles, 3D Meshing, CNC Toolpath Simulation**

National Institute of Technology Durgapur Jan 2025 – Present

Undergraduate Research Intern *Durgapur, West Bengal, India*

- Undergraduate Research Intern under the supervision of multiple professors across the Department of Mechanical Engineering and the Department of Electrical Engineering.
- **Biped Robot Jumping Mechanism (with Professor Nirmal Baran Hui, Department of Mechanical Engineering)**
    - Designed walking and jumping control strategies for a biped robot using **MATLAB and Simulink**.
    - Developed simulation models for dynamic balance and ground reaction forces in collaboration with Mr. Debanuj Roy.
    - **Skills: MATLAB, Simulink, Biped Robotics, Dynamic Simulation**
- **Unmanned Aerial Vehicle Tracking Controller Design (with Professor Aritro Dey, Department of Electrical Engineering)**
    - Developing and implementing a tracking sliding mode controller for unmanned aerial vehicle dynamics using **MATLAB and Simulink**.
    - Simulating unmanned aerial vehicle trajectory tracking performance with robustness against external disturbances, in collaboration with Mr. Siddhartha Kundu.
    - **Skills: MATLAB, Simulink, Unmanned Aerial Vehicles, Nonlinear Control, Sliding Mode Control**
- **Eye Disease Classification with Deep and Transfer Learning (with Professor Soumya Chatterjee, Department of Electrical Engineering)**
    - Applied deep learning and transfer learning models (**DenseNet169, MaxViT-Tiny, EfficientNet-B0, ResNeXt-101, etc.**) for eye disease classification using **PyTorch**.
    - Achieved highest performance with DenseNet169, reaching **93.7% validation accuracy, 92.5% test accuracy, and 0.925 macro F1-score**, outperforming other models by 2–10%.
    - Benchmarked 13 state-of-the-art models on accuracy, precision, recall, and F1-score, highlighting DenseNet and ResNeXt as top-performing architectures.
    - **Skills: Deep Learning, Transfer Learning, DenseNet, EfficientNet, ResNeXt, PyTorch, Computer Vision, Medical Imaging**

Skills

Soft Skills: Communication, Community Outreach, Content Writing and Business Marketing.
Programming Languages: MATLAB, Python, C, Visual C#, SQL (mySQL), LaTeX.
Hardware: Arduino, ESP32
Mathematics: Linear Algebra, Statistics, and Calculus.
Frameworks: PyTorch, Tensorflow, Scikit-Learn, Mediapipe.
Developer Tools: VS Code, Visual Studio.
Libraries: Pandas, NumPy, Matplotlib, Seaborn, OpenCV, OpenTK, HelixToolkit3D, Streamlit
Languages: English (Fluent), Bengali (Native), Hindi (Fluent), German (Beginner).
Simulation Softwares: Ansys WorkBench, Simulink, Altair MotionSolve, Altair HyperMesh, Altair HyperGraph.
CAD tools: SolidWorks, Autodesk Fusion360, CATIA V5R19.

Achievements

- Paper accepted for presentation at **COMSYS 2025 (Warsaw, Poland)** on SPAD estimation using ensemble learning under the supervision of Prof. Debotosh Bhattacharjee, CMATER Lab, Jadavpur University.
- Semi-Finalist in **Flipkart GRiD 6.0 - Robotics Track.**
- Ranked 7th among all the teams that participated in **Prodylitics 2024** organised by IIM Indore.

Extra - Curricular

Society of Automotive Engineers Collegiate Club May 2025 - Present
Senior Coordinator *On-site*

- Domain - Robotics, Machine Learning and Automobiles.
- Introduced the weekly F1 Magazine - **Through the Formula Lens** as a part of SAE.
- Organized the Aarohan as a member of **Team Aavishkar**.

Mechanical Engineers' Student Association, NIT Durgapur March 2025 - Present
Senior Coordinator *On-site*

- Organised the **CADathon** - a hackathon aimed at promoting CAD designing through the institute.

Innovation and Incubation Cell, NIT Durgapur Feb 2025 - Present
Student Volunteer *On-site*

- Actively involved in producing curated content for the website of IIC NIT Durgapur.
- Member of the official **Content Wing of IIC NIT Durgapur**.
- Team Member of **AI2Summit** Team and the **IIC Chronicles**.

Team NDORS, NIT Durgapur Jun 2025 - Present
Senior Member *On-site*

- Member of the **BAJA SAE NIT Durgapur Team NDORS**.
- Involved in the **Computer Aided Engineering and Steering System team of Team NDORS**.

Aerial Robotics Research Group, NIT Durgapur Jun 2025 - Present
Senior Member *On-site*

- Involved in the team **AI/ML, Microcontroller and CAD Design tracks**.

NayePankh Foundation Aug 2024
Fundraising Intern *Remote*

- Raised INR 5001 for the cause of providing sustainable education to the underpriviledged children.

Rendezvous, IIT Delhi Aug 2024 - Septermber 2024
Campus Ambassador *Remote*

- Promoted the fest and their sponsors within the institute.

Earth5R Aug 2024 - Dec 2024
Content Writer *Remote*

- Wrote multiple articles promoting environmental awareness.

Interests

Artificial Intelligence : Machine Learning, Deep Learning, Natural Language Processing, Large Language Models, Reinforcement Learning and Computer Vision and their applications in the Biomedical Domain.
Robotics : Medical Robotics and Industrial Robotics.