Chaity **Banerjee Mukherjee**

Assistant Professor

Department of Computer Science, University of Alabama in Huntsville

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Education

- Ph.D (Computer Science), Florida State University (December 2017)
  Advisers: Dr. Xiuwen Liu (Department of Computer Science), Dr. Kenneth Taylor (Department of Biology and Molecular Biophysics), Florida State University
- M.S (Computer Science), Florida State University
- MS (Computer Applications), West Bengal University of Technology
- B.Sc (Honors in Statistics), Department of Statistics, University of Kalyani, West Bengal, India (Minor in Mathematics and Physics)

Research Interests

- Applications of Deep Learning and AI for Communication and Navigation
- Deep Learning and AI for segmentation in large scale 3D volumetric data
- Deep Learning and AI for segmentation and classification of satellite imagery
- Deep unsupervised Learning for image segmentation and understanding
- Unsupervised learning for tomographic data analysis for identifying macromolecular assemblies
- Activation function design for targeted deep learning applications

Professional Memberships

- Professional Member Association for Computing Machinery (ACM)
- Professional Member Society for Industrial and Applied Mathematics (SIAM)
- Member Golden Key International Honor Society (By invitation)

Work Experience

1. Assistant Professor ,Department of Computer Science, University of Alabama in Huntsville, August 2022 - Present
2. Post Doctoral Fellow (Sponsored by Air Force Research Labs, Munitions Directorate @ University of Central Florida, (January 2018 - Present) (3 years, 9 months))
3. Research Scientist Sponsored by Air Force Research Labs, Munitions Directorate @ Intelligent Robotics Inc., Tallahassee, FL (Nov 2017 - January 2018)
4. Teaching Assistant, Department of Computer Science, Florida State University
5. Research Assistant, Department of Molecular Biophysics & Biology, Florida State University
6. Assistant Professor @ Department of Computer Applications, Bengal Institute of Technology, Kolkata, India (2006 - 2009)
7. Lecturer @ Department of Computer Science, Asutosh College (An autonomous degree granting university), Kolkata, India (2004-2006)
8. Lecturer @ Department of Physics & Computer Science, New Alipore College, Kolkata, India
9. Research Intern with Prof. C.A Murthy @ Machine Intelligence Unit, Indian Statistical Institute, Kolkata, India

Peer Reviewed Publications (Oldest First)

1. (Conference) **Chaity Banerjee**, Hanspeter Winkler, Moumita Dutta, Xiuwen Liu, Kenneth A. Taylor "An Accurate and Reliable Method for Automatic Picking of HIV/SIV Spikes" *IEEE International Conference on Bioinformatics & Biomedicine 2011*
2. (Conference) Nan Zhao, **Chaity Banerjee**, Xiuwen Liu "Nano-scale context-sensitive semantic segmentation" *In IEEE International Conference on Image Processing (ICIP) 2015*
3. (Journal) **Chaity Banerjee**, Zhongjun Hu, Zhong Huang, James A Warrington, Dianne W Taylor, Kathleen M Trybus, Susan Lowey, Kenneth A. Taylor "The Structure of the Actin-Smooth Muscle Myosin Motor Domain Complex in the Rigor State" *In Journal of Structural Biology 2017*
4. (Journal) **Chaity Banerjee**, Tathagata Mukherjee, Chad Lilian, Daniel Reasor, Xiuwen Liu and Eduardo Pasiliao "A Feature Selection Algorithm Using Neural Networks" *In International Journal of Machine Learning & Computing 2019*
5. (Conference) **Chaity Banerjee**, Tathagata Mukherjee, Eduardo Pasiliao "An Empirical Study on Generalizations of the ReLU Activation Function" *In Proceedings of ACM Southeast Conference 2019*
6. (Journal) **Chaity Banerjee**, Moumita Dutta, Xiuwen Liu, Ken Roux, Kenneth A. Taylor "Segmentation by Classification: A Novel and Reliable Approach for Semi-Automatic Selection of HIV/SIV Envelope Spikes" *In Journal of Structural Biology 2019*
7. (Conference) Vishal Perekadan, Tathagata Mukherjee, **Chaity Banerjee**, Eduardo Pasiliao Jr. "RF-MSiP: Radio Frequency Multi-Source Indoor Positioning with FM & GSM" *In Proceedings of IEEE Big Data Conference 2019*
8. (Journal) **Chaity Banerjee**, Tathagata Mukherjee, Eduardo Pasiliao "Feature Representations using the Reflected ReLU Activation" *In IEEE Journal of Big Data Mining & Analytics, 2020*
9. (Journal) Muthukumaran Ramasubramanian, **Chaity Banerjee**, Debashri Roy, Eduardo Pasiliao Jr., Tathagata Mukherjee "Exploiting Spatio-Temporal Properties of I/Q Signal Data using 3D Convolution for RF Transmitter Identification" *In IEEE Journal of Radio Frequency Identification, 2020*
10. (Conference) Vaidyanath Areyur Shanthakumar, **Chaity Banerjee**, Eduardo Pasiliao Jr., Tathagata Mukherjee, "Uncooperative Direction Finding with Neural Networks using I/Q Information" *Accepted International Conference on Information Systems & Data Mining 2020*
11. (Conference) Nikita Susan Joseph, **Chaity Banerjee**, Eduardo Pasiliao Jr., **Tathagata Mukherjee** "FlightSense: A Spoofer Detection and Aircraft Identification System using Raw ADS-B Data" *In Proceedings of IEEE BigData 2020*
12. (Poster) Nikita Susan Joseph, **Chaity Banerjee**, Eduardo Pasiliao Jr., Tathagata Mukherjee "A Robust Learning Framework For Aircraft Identification Using ADS-B I/Q Information" *POSTER Von Braun Symposium 2020*
13. (Conference) **Chaity Banerjee**, Tathagata Mukherjee, Eduardo Pasiliao "The Multi-phase ReLU Activation Function" *In Proceedings of ACM Southeast (ACMSE) Conference 2020*
14. (Conference) **Chaity Banerjee**, Chad Lilian, Daniel Reasor, Eduardo Pasiliao, Tathagata Mukherjee "An Application of Generative Adversarial Networks for Robust Inference in Computational Fluid Dynamics" *In Proceedings of International Conference on Information Systems & Data Mining 2021 (Published by ACM)*
15. (Journal) **Chaity Banerjee**, Tharun Kumar Doppalapudi, , Eduardo Pasiliao Jr., Tathagata Mukherjee "Camera Identification Using Image Based Deep Feature Signatures" *In IEEE Journal of Big Data Mining & Analytics*
16. (Conference) Nikita Susan Joseph, **Chaity Banerjee**, Daniel Reasor, Eduardo Pasiliao, Tathagata Mukherjee "Mesh Based Neural Networks for Estimating High Fidelity CFD from Low Fidelity Input" *In Proceedings of IEEE SoutheastCon 2022*
17. (Conference) Vishal Perekadan, **Chaity Banerjee**, Tathagata Mukherjee, Eduardo Pasiliao, Hovannes Kulhandjian, Michel Kulhandjian "MOD3NN: A Framework for Automatic Signal Modulation Detection Using 3D CNN" *In Proceedings of 36^{th} FLAIRS Conference 2023*
18. (Conference) Digya Acharya, Hera Siddiqui, Eduardo Pasiliao, **Chaity Banerjee** "Mutually Exclusive Learning for Generators with Multi-Label Classifiers" *In Proceedings of IEEE Big Data 2023*

19. (Conference) Alexander Semenov, **Chaity Banerjee Mukherjee**, Vladimir Boginski, Eduardo Pasiliao, Tathagata Mukherjee "Gradient Upsampling for Enhanced Image Resolution and Classification" *In Proceedings of CSoNet 2024*
20. (Journal) Hera Siddiqui, **Chaity Banerjee**, Erik Blasch, Eduardo Pasiliao, Tathagata Mukherjee "Deep Feature Learning with Concatenated Rectified Pooling Units" *Accepted in IEEE Journal of Big data Mining 2025 & Analytics*
21. (Conference) Srivani Athmakur, Shania Shakri, **Chaity Banerjee** "Segmentation of Impervious Areas from High Altitude Aerial Images using a Regularized UNet Framework" *In IEEE SoutheastCon 2025*
22. (Conference) Benjamin Robinson, **Chaity Banerjee**, Eduardo Pasiliao, Tathagata Mukherjee "A Deep Time Dilation Framework for Predicting Missing Information from Time Series Data" *Published in IEEE AIIoT 2025*
23. (Conference) Elijah Shannon, **Chaity Banerjee** "Localizing AI Image Manipulations by Learning Generative Noise Signatures using Diffusion Based Noise Priors " *Accepted in IEEE Big Data 2025*
24. (Conference) Moath Sulaiman, Timothy McCorry, **Chaity Banerjee**, Eduardo Pasiliao Jr., Tathagata Mukherjee "RePOE: Receiver Position and Orientation Estimation Using Noisy FM Signals and Deep Latent Space Learning" *Accepted in IEEE Vehicular Networking Conference 2026*
25. (Journal) Moath Sulaiman, **Chaity Banerjee**, Timothy McCorry, Erik Blasch, Eduardo Pasiliao, Tathagata Mukherjee "Specialized Learning for Modulation, Transmitter, and Receiver Identification through a Common Feature Learning Framework" *Accepted in Journal of Big Data Mining & Analytics, May 2026*

Manuscripts under review

1. (Journal) Elijah Shannon, Bibek Adhikary, Nikita Susan Joseph, Eduardo Pasiliao Jr., **Chaity Banerjee** "CF-Net: A Channelwise Encoder-Decoder Architecture with Modified Skip Connections and Late-Stage Fusion for Ship Identification in PlanetScope Imagery" *Under review in Taylor & Francis Journal of Geo-spatial Information Science and Remote Sensing*

Manuscripts under preparation

1. (Journal) Hera Siddiqui, Sundar Christopher, **Chaity Banerjee** "A Latent Feature Learning Framework for Identification of Piecewise Linear Artifacts on Earth's Surface from Remote Sensing Data" *Manuscript in preparation for ISPRS Journal of Photogrammetry and Remote Sensing*
2. (Journal) Shania Shakri, Sundar Christopher, **Chaity Banerjee** "Density-Based Spatial Clustering for Unsupervised Semantic Segmentation in High-Dimensional Hyperspectral Data" *Manuscript in preparation for IEEE Transactions on Geoscience and Remote Sensing*
3. (Journal) **Chaity Banerjee**, Elijah Shannon, Shania Shakri, Hera Siddiqui, "Supervised, Unsupervised and Semi-supervised Approaches to Electron Tomographic Segmentation - A Comprehensive Survey" *Manuscript for submission to IEEE/ACM Transactions on Computational Biology and Bioinformatics*

Patents

1. "A Method for Identification of Impervious Surfaces from High Altitude Images Through Image and LiDAR Fusion" *Patent disclosure done and pending filing 2026*
2. "A Method for Finding Navigational Bearing Using Signals of Opportunity" *Patent disclosure done and awaiting filing 2026*
3. "Localizing AI Image Manipulations by Learning Generative Noise Signatures Using Diffusion Based Noise Priors" *Patent disclosure done and awaiting filing 2026*

Grants & Contracts

- **Current**
    1. (PI) "Fundamental Frameworks for Artificial Neural Networks", New Co-operative Agreement with AFRL, Award Amount $ 1,000,000 PoP August 2024 - August 2029

- **Completed**
    1. (PI) “Remote Sensing & AI for Near Earth Object Monitoring”, AFRL Award Amount $ 230,000, PoP January 2023 - December 2025
- **Pending**
    1. (Co-PI) “NRT - HDR: A Living Lab for Training the 21st Century Workforce for Facing Interdisciplinary Earth-Atmosphere System Challenges” Picked up for funding pending changes and budget agreement and negotiations, Amount $ 2,999,978
    2. (PI) “CAREER: A Flexible Hierarchical Learning Framework for Semantic Segmentation and Understanding of Satellite and High Altitude Aerial Imagery” Pending with NSF, Amount $ 498,973

Invited Talks

1. Invited Speaker at Taylor Symposium 2022, Florida State University, Tallahassee, Florida
2. Invited Speaker at International Symposium on Biomedical Engineering and Computational Biology 2022, China
3. Invited speaker at Huntsville Rotary Club, February 2025

Unpublished work

- Automatic segmentation and structure detection of ribosomes (Joint work with data from Joachim Frank Lab @ Columbia University, NY)
- Automatic segmentation of nucleosomes from chromatin packing (Joint work with Elizabeth Stroupe @ MOB FSU)

PHD Student Supervision

- Hera Siddiqui, current PhD candidate (expected graduation Fall 2026)
- Shania Shakri, current PhD student (completed preliminary examination)
- Srivani Atmakur, current PhD student
- Arjama Dutta, Incoming PhD student for Fall 2026

Master’s Student Supervision

- Digya Acharya, **Graduated** with MS Thesis in CS, Fall 2022)
- Srivani Atmakur, **Graduated** with MS Thesis in CS, Spring 2024)
- Pavani Suresh, **Graduated** with MS Thesis in CS, Spring 2025)

Undergraduate Student Supervision

- Elijah Shannon, undergraduate honors project (joining Texas A&M College Station as PHD Student in Fall 2026)
- Kennedy Kuria, undergraduate honors project
- Tristan Kennedy, undergraduate honors project

Teaching

- Spring 2026 CS 637 Deep Learning
- Spring 2026 CS 317 Introduction to Design and Analysis of Algorithms
- Fall 2025 CS 430/CS 530 Artificial Intelligence & Machine Learning
- Spring 2025 CS 637 Deep Learning

- Fall 2024 CS 488/588 Intro to Big Data Computing
- Fall 2024 CS 317 Design and Analysis of Algorithms
- Spring 2024 CS 430/CS 530 Survey of Artificial Intelligence
- Spring 2024 CS 637 Graduate Deep Learning
- Fall 2023 CS 430/CS 530 Survey of Artificial Intelligence
- Spring 2023 CS 430/CS 530 Survey of Artificial Intelligence
- Fall 2022 CS 317 Design and Analysis of Algorithms
- I was the lead Teaching Assistant designing, managing and teaching the Computer Literacy course at the Department of Computer Science @ FSU for several years.
- I have taught courses on Discrete Mathematics, Theory of Computation, Numerical Analysis & Statistics at the graduate level @ Bengal Institute of Technology, India
- I have taught Database systems, Introduction to Discrete Mathematics, Database & Introduction to Digital Electronics at Undergraduate level @ Asutosh College and New Alipore College, Kolkata

Scientific Software

- Plug-ins for Protomo & I3 software packages for Electron Tomographic Segmentation (Available on request)
- Plugin for Relion software package for Bayesian analysis of single particle electron micrographs. This package analyzes the metadata and uses it for Helical reconstruction (Available on request)
- Software package for interoperability of I3 and Relion for electron tomographic analysis (Available on request)

Awards

- Best Teaching Assistant Award from Department of Computer Science, Florida State University

Professional Service

- Reviewer for Journal of Energy Systems 2018
- Reviewer for Journal of Energy Systems 2019
- Technical Program Committee ACM Southeast 2021
- Technical Program Committee ACM Southeast 2022
- Session Chair for International Symposium on Biomedical Engineering and Computational Biology 2022, China
- Technical Program Committee ACM Southeast 2023
- Reviewer IEEE Transactions on Geo-science and Remote Sensing 2023
- Technical Program Committee ACM Southeast 2024
- Technical Program Committee IARIA Mobility 2024
- Reviewer IEEE Transactions on Geo-science and Remote Sensing 2024
- Reviewer IARIA JOURNALS 2024
- Technical Program Committee ACM Southeast 2025
- Technical Program Committee ACM Southeast 2026
- Reviewer for Journal of Geo-spatial Information Science (Taylor & Francis) in 2026

UAH Service

- Organizer of CS Expo for 2024, 2025 and 2026

- Faculty adviser for ACM-W in the Department of Computer Science, UAH, (Fall 2022 - present)
- CS Ph.D. progress committee for the Department of Computer Science at UAH, (2024 - present)
- CS theory preparation committee for the Department of Computer Science at UAH, (2022 - present)
- Committee for the Computational Biology Certificate program at UAH, (2022 - present)
- Committee for the Women in Science Distinguished Speaker Series at UAH, (2023 - present)
- Member of COS Graduate Curriculum committee at UAH, (2023 - present)
- ABET Committee for CS Department (2023 - 24)

Technical Skills

- **Operating Systems**: Windows Linux & OSX (Mac)
- **Programming Languages**: MATLAB, Python, Shell Scripting

References

- Prof. Xiuwen Liu, Department of Computer Science, 166 Love Building, Florida State University, Tallahassee, FL 32306-4530; Phone: (850) 644-0050; Email: liux@cs.fsu.edu
- Prof. Kenneth Taylor, Institute of Molecular Biophysics, KLB202, Florida State University, Tallahassee, FL 32306-4380; Phone: (850) 644-3357; Email: taylor@rebel.sb.fsu.edu