Anurag Chowdhury

Integrated Pattern Recognition and Biometrics (iPRoBe) lab **chowdh51@cse.msu.edu**
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Research Interests

Deep Learning, Speaker Recognition, Speech Processing and Synthesis, Machine Learning, Computer Vision, Biometrics

Programming Skills

Python, PyTorch, MATLAB, Java, SQL

Education

Ph.D. Computer Science **Aug 2016 - May 2021 (Expected)**
Michigan State University (MSU), USA

M.Tech. Computer Science **Aug 2014 - June 2016**
Indraprastha Institute of Information Technology Delhi (IIIT-Delhi), India

B. E. Instrumentation & Control Engineering **August 2008 - May 2012**
Netaji Subhas Institute of Technology Delhi (University of Delhi), India

Professional Experience

Graduate Research Assistant **Aug 2016-Present**
Advisor : Dr. Arun Ross, MSU, USA

- Artificial Speech Synthesis for Conversational News Broadcaster: Worked on design and development of an AI-based Conversational News Broadcaster capable of mimicking the voice and style of a target human personality.
- Speaker Recognition in Degraded Audio Signals:
  - Designed a deep learning based algorithm for speaker identification from degraded audio signals. The work was published in IJCB 2017 conference at Denver, Colorado, USA.
  - Worked on data collection for indoor audio-visual dataset. Developed speaker recognition algorithm for recognizing speakers from their speech audio in surveillance videos and fusing the results with face recognition results for improved overall recognition performance. The work was published in ICPR 2018 conference at Beijing, China.
  - Worked on development of a speaker verification algorithm for improved speaker verification in degraded audio signals. The work was published in IEEE TIFS 2020.
- Securing Opiod Bottles using Biometrics: Worked on design and prototype of a biometric based lock mechanism for securing access to opioid-based medicine bottles to the rightfully prescribed patient. The work has been submitted towards a US Patent.
- Served as a graduate mentor for NSF funded Research Experiences for Teachers (RET) program (Summer, 2018).

Graduate Researcher **Dec 2014-Jul 2016**

Advisors : Dr. Mayank Vatsa and Dr. Richa Singh, IIIT-Delhi, India

- Kinect RGBDI Video Data Collection: Collected video dataset from both versions of the Kinect device for over 100 subjects, shot in unconstrained conditions with respect to distance, pose, expression, illumination. The database encompasses challenges such as cross-sensor, cross-distance, cross-spectral and cross-resolution recognition. The work was published in Information Fusion journal.
- 3D Face Representation Learning from Kinect videos: Proposed a deep learning based 3D face representation learning system from input RGB-D image data for performing RGB-D face recognition. The work was published in BTAS 2016 conference at New York, USA and won the best poster award.

Software Engineer **Aug 2012-Aug 2014**

CenturyLink, Noida, India

- Proposed and developed 'Automatic Ticket Management System' that assigned maintenance tickets to developers based on their past experience data and current expertise in resolving different types of tickets.
- Worked on the product development of Ensemble Billing System, CSM module, using Java, C/C++, SQL, UNIX shell scripting.
- Worked on delivery of five product deployment cycles for Ensemble CSM.

Undergraduate Thesis Project **Nov 2011-May 2012**

Robotic Humanoid Legs Project
Advisor : Associate Professor Piyush Saxena, NSIT, India

- Led a team of four members on the design and development project of Robotic Humanoid Legs as part of undergraduate thesis project.
- Designed the CAD model of the robotic legs in Solidworks and manufactured the same using carbon fibre rods and balsa wood.

Aero-Design Team Lead (Design Deptt.) **Feb 2010-May 2011**

SAE Aero Design East Competition, 2011, Atlanta, USA
Advisor : Dr. Smriti Srivastava, NSIT, India

- Led the design department of a team of four members and represented the University of Delhi at SAE Aero Design East 2011 competition held at Marietta, Georgia (USA).
- Conceptualized and designed a winged unmanned aerial vehicle (UAV) on Solidworks and manufactured it using aluminium, balsa wood and carbon fiber.

Activity and Achievements

- **Winner of 2019 Innovation Challenge**, hosted and funded by NAB for development of an AI-driven conversational news broadcaster.
- Academic Reviewer of top Computer Vision and Biometrics conferences and journals like: BMVC, WACV, ICIP, ICB, BTAS, ACM Computing Surveys, Information Fusion, IEEE Transactions on Multimedia, and Pattern Recognition Letters
- Presented my work on "Fusing MFCC and LPC Features using 1D Triplet CNN for Speaker Recognition in Severely Degraded Audio Signals" (Published in IEEE TIFS 2020) at the First MSU/Notre Dame Workshop, held at the University of Notre Dame, in Sep 2019.

- Received **Special Mentions award** for poster presentation at **MSU Graduate Research Symposium** in the consecutive years of 2017 and 2018, from Graduate Director of Deptt. of Computer Science Engineering at M.S.U
- Received **Best Master's Thesis award** for my master's thesis project, titled 'RGB-D face recognition in surveillance videos', at the annual convocation ceremony at IIIT Delhi in the year of 2016.
- Won **Best Poster award** at **IEEE BTAS 2016** held at **Buffalo, New York** for the paper 'RGB-D Face Recognition via Learning-based Reconstruction '
- Served as a Teaching Assistant for the courses on Advanced Programming, GPU Computing, and Image Analysis at IIIT Delhi, India and as a Course Assitant for the Courses on Biometrics and Pattern Recognition at MSU, USA. Received **Best TA award** for the course of GPU computing from Dr. Pankaj Jalote, Director, IIIT Delhi.
- Ranked 11th out of 45 participating teams in SAE Aero Design East 2011 competition, organized by **NASA and Lockheed Martin**, held in Georgia, USA.

Publications

Journals

- A. Ross, S. Banerjee, and **A. Chowdhury**, Security in Smart Cities: A Brief Review of Digital Forensic Schemes for Biometric Data, Pattern Recognition Letters, 2020
- **A. Chowdhury** and A. Ross, Fusing MFCC and LPC Features using 1D Triplet CNN for Speaker Recognition in Severely Degraded Audio Signals, IEEE Transactions on Information Forensics and Security, 2020
- P. Chhokra, **A. Chowdhury**, G. Goswami, M. Vatsa, and R. Singh, KaspAROV: Unconstrained Kinect Video Face Database, Information Fusion 2017.

Conferences

- **A. Chowdhury**, A. Cozzo, and Arun Ross, JukeBox: A Multilingual Singer Recognition Dataset, INTERSPEECH, 2020
- **A. Chowdhury**, S. Kirchgasser, A. Uhl, and Arun Ross, Can a CNN Automatically Learn the Significance of Minutiae Points for the Task of Fingerprint Recognition?, IEEE WACV, 2020
- A. Ross, S. Banerjee, C. Chen, **A. Chowdhury**, V. Mirjalili, R. Sharma, T. Swearingen, and S. Yadav, Some Research Problems in Biometrics: The Future Beckons, ICB 2019
- **A. Chowdhury**, Y. Atoum, L. Tran, X. Liu, and A. Ross, MSU-AVIS dataset: Fusing Face and Voice Biometrics for Biometric Recognition in Indoor Surveillance Videos, IEEE ICPR, 2018
- **A. Chowdhury** and A. Ross, Extracting Sub-glottal and Supra-glottal Features from MFCC using Convolutional Neural Networks for Speaker Identification in Degraded Audio Signals, IEEE IJCB, 2017.
- **A. Chowdhury**, S. Ghosh, M. Vatsa, and R. Singh, RGB-D Face Recognition via Learning-based Reconstruction, IEEE BTAS, 2016.

Patents

- Bahar Aliakbarian, Muhammad Rabnawaz, Susan E Selke, Krystal Cheng, Arun Ross, Austin Cozzo, **Anurag Chowdhury**, Ali Tamayol, Carina Russell, and Prem Chahal, Medication Bottle with Anti-tampering features, US Patent App. 16/569,747, 2020