Vishesh Mistry

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Objective: *A highly versatile and motivated individual working in applications of Biometrics and Computer Vision*

Education

○ **MS in Computer Science and Engineering**   **Michigan State University, USA**
Advisor: Prof. Anil K. Jain, GPA: 3.9/4.0   *2019 – 2021*

○ **B.Tech in Computer Science and Engineering**   **IIT Jodhpur, India**
GPA: 8.99/10.0   *2015 – 2019*

Work Experience

○ **Research Scientist**   **Tech5 USA, Michigan**
Research and Development   *Sep 2021 – Present*

- Responsible for managing research activities - participating in biometrics research, helping engineering team with integration, and liasoning with 3rd party research teams
- Leading the research of the flagship product T5 Digital ID - a secure decentralized verifiable credential in the form of a proprietary cryptograph
- Designing an AI-based SDK for facilitating the use of a remote medical injector. Includes detection, tracking, and feedback based on situational awareness
- Developed and deployed core algorithms pertaining to biometrics capture conforming with international standards

○ **Software Engineer**   **ZKTeco USA, Georgia**
Research and Development   *Jun 2021 – Aug 2021*

- Participated in Machine Learning based biometric algorithms research, evaluation, and improvement
- Assisted core R&D team in implementing end-to-end biometric algorithms, including data processing, algorithm training, evaluation, and commercial deployment

○ **Graduate Teaching Assistant**   **CSE Department, MSU**
CSE 801B, CSE 300, CSE 477   *Aug 2020 – May 2021*

- Assisted the course instructors with instructional responsibilities for the courses CSE 801B and CSE 300, covering topics including classification, association, clustering, anomaly detection (CSE 801B), ethics and professional issues in Computer Science (CSE 300), and web application development (CSE 477)
- Responsible for grading assignments and exams, and serving as a liaison between students and the professor

○ **Graduate Research Assistant**   **PRIP Lab, MSU**
Advisor: Prof. Anil K. Jain   *Aug 2019 – Aug 2020*

- Black-box adversarial fingerprints synthesis method to generate adversarial fingerprints capable of evading both model-based and learning-based fingerprint matchers while preserving fingerprint attributes
- Synthesis of 100 million realistic and diverse fingerprint images for large-scale fingerprint search algorithms

○ **Research Intern**   **BISITE Research Lab, Spain**
Advisor: Prof. Juan Manuel Corchado & Dr. Javier Prieto Tejedor   *May 2018 – July 2018*

- Deep transfer learning for the detection of radical groups' iconography in real-world images using a single reference image

○ **Research Intern**   **IIT Mandi, India**
Advisor: Dr. Aditya Nigam   *May 2017 – July 2017*

- Developed an end-to-end neural network based on Single Shot Multibox Detector (SSD) for fingerprint liveness detection
- Designed a hierarchically tuned convolutional neural network for the detection and classification of contact lens

Software Skills

- **Languages**: Python, C++, C, MATLAB, Swift, Java, HTML5, CSS, PHP, MySQL, JavaScript
- **Tools and Technologies**: Tensorflow, PyTorch, Keras, OpenCV, Scikit-learn, Git, jQuery, JSON
- **Environment**: Linux, Mac, Windows

Publications/Patents

- "**System and Method for Credential Verification and Associated Identity Binding using Biometrics in a Decentralised Manner**", US Patent No. 63/457,306 (Pending), Apr 2023
- "**System and Method for asserting document authenticity based on biometric verification of the photo and 2D code as a security feature**", US Patent No. 63/452,057 (Pending), Mar 2023
- Debayan Deb, Vishesh Mistry, and Rahul Parthe, "**AdvBiom: Adversarial Attacks on Biometric Matchers**", ArXiV Preprint, Jan 2023
- "**Contactless Fingerprint Capture using Artificial Intelligence and Image Processing on Integrated Camera Systems**", US Patent No. 11721120, Oct 2022
- Vishesh Mistry, Joshua J. Engelsma, and Anil K. Jain, "**Fingerprint Synthesis: Search with 100 Million Prints**", International Joint Conference on Biometrics (IJCB), Sep 2020
- Shreya Goyal, Vishesh Mistry, Chiranjoy Chattopadhyay, and Gaurav Bhatnagar, "**BRIDGE: Building Plan Repository for Image Description Generation, and Evaluation**", IAPR International Conference on Document Analysis and Recognition (ICDAR), Australia, 2019
- Avantika Singh, Vishesh Mistry, Dhananjay Yadav, and Aditya Nigam, "**GHCLNet: A Generalized Hierarchically tuned Contact Lens detection Network**", International Conference on Identity, Security and Behavior Analysis (ISBA), Singapore, 2018

Achievements

- **Won the LivDet 2023 Noncontact Fingerprint competition** in the Systems category for the most accurate contactless fingerprint PAD application
- Received the **Innovation Award at the NIST mFIT Challenge** for a novel contactless fingerprint capture technology, 2022
- Received **Chairman, Board of Governors Gold Medal** for Best All-Round Performance among all B.Tech Graduates, IIT Jodhpur, India, 2019
- **Received college scholarship** to attend the IEEE International Conference on Identity, Security and Behavioral Analysis (ISBA) 2018 in Singapore for paper presentation
- **Successfully completed Microsoft Hackathon** by building a fully functioning iOS app in 24 hours, IIT Jodhpur, India, 2018
- Secured **3rd position in the Inter-IIT Table-Tennis** Tournament, IIT Kanpur, India, 2016
- **Cleared JEE Advanced** - Top 1 percentile in 1.3 million students, India, 2015
- Received **Letter of Appreciation from the Honorable HRD Minister, Govt. of India**, for exceptional performance in AISSCE, 2015

Positions of Responsibility

- **Research Lead - T5 Digital ID**, TECH5, Troy, MI, USA, 2022
- **Research Lead - Remote Medical Injector, PreciHealth**, TECH5, Troy, MI, USA, 2022
- **Affiliate - CITeR**, TECH5, Troy, MI, USA, 2022
- **Research Lead - T5 AirSnap Face**, TECH5, Troy, MI, USA, 2021
- **Overall Student Coordinator**, Microsoft Code.Fun.Do Hackathon, IIT Jodhpur, India, 2017
- **Assistant Coordinator**, Programming Club, IIT Jodhpur, India, 2017
- **Assistant Head**, Technical Events, IGNUS 2017, IIT Jodhpur, India, 2017
- **Overall Coordinator**, Table-Tennis Events, Varchas 2017, IIT Jodhpur, India, 2017
- **Student Guide**, Counselling Service, IIT Jodhpur, India, 2016

Selected Projects

AI SDK for Remote Medical Injector - PreciHealth, TECH5 **May 2022 - Present**
- Developing a comprehensive AI SDK for the use of a remote medical injector through any device with an integrated camera system
- Led research activities involving data collection, network selection, model training/testing, and deployment
- The SDK includes real-time device detection and tracking, along with live feedback based on the physical state of the device

T5 Digital ID - Decentralized Verifiable Credential, TECH5 **Apr 2022 - Present**
- Leading the research behind the T5 Digital ID, a secure decentralized offline verifiable credential in the form of a proprietary cryptograph
- Optimized the T5 Face SDK to facilitate the use of 136 bytes lightweight face templates for real-time verification on smartphones
- Managing the research team responsible for the AI SDK - detection and processing of the cryptograph before decoding
- Playing an important role in the integration of this technology into the T5 Idencode platform for digital ID issuance and verification

T5 AirSnap Face - Contactless Capture for Face, TECH5 **Sep 2021 - Present**
- Extended T5 AirSnapFace, contactless face capture technology using smartphones and browsers, by developing and implementing algorithms for ICAO compliance and international standards conformance
- Improved the then implementation by making the capture faster, fluid, and robust across multiple devices
- Played an integral role in deploying the technology in the Digital Passenger Declaration (DPD) platform of Australia's Department of Home Affairs

Adversarial Fingerprints Synthesis, PRIP Lab, MSU **Apr 2020 - Dec 2020**
- Developed a black-box adversarial fingerprints synthesis method that automatically generates adversarial fingerprints capable of evading model-based and learning-based fingerprint matchers while preserving fingerprint attributes
- The proposed method dropped the TAR of three fingerprint matchers on three datasets from 94.15% to as low as 5.52% (using Innovatrics SDK on FVC 2004 DB1-A at 0.01% FAR), outperforming other white-box state-of-the-art adversarial attack methods
- The proposed method outperforms other white-box state-of-the-art adversarial attack methods while preserving fingerprint attributes

Towards 100 Million Synthetic Fingerprints, PRIP Lab, MSU **Sep 2019 - Mar 2020**
- Implemented an identity loss while training the I-WGAN which guides the generator to synthesize a diverse set of rolled and plain synthetic fingerprints corresponding to distinct identities
- Synthesized fingerprints are closer to real fingerprints in terms of (i) fingerprint quality and (ii) fingerprint uniqueness

Synthesis of Realistic Weather Specific Images, IIT Jodhpur, India **Feb 2018 - Apr 2019**
- Constructed a pipeline to convert images taken in summer season to images of winter season taking into consideration fine level features like clothing, etc
- Employed scene transfer using GANs, followed by person identification and segmentation, clothes transfer, and finally warping back the person onto the image

Detection of Radical Groups' Iconography, BISITE Lab, Spain **May 2018 - Dec 2018**
- Trained several deep CNNs such as SSD, YOLO, DeepRanking, etc. to detect the presence of radical groups' logos in real-life images. Compared their performance to that of traditional feature descriptors such as SIFT, SURF, rSIFT, AKAZE, ORB, etc
- Created an artificial dataset from a single radical group logo using various transformations and observed how each degree of transformation affected the performance of the entire network

Spoofing and Liveness Detection in Fingerprints, IIT Mandi, India **Sep 2017 - Dec 2017**
- Developed an end-to-end network for spoofing detection using Keras and PyTorch
- Used Single Shot Multibox Detector (SSD) network as a backbone for patch extraction from fingerprints followed by a multi-input convolutional network for classification

Contact Lens Detection and Classification, IIT Mandi, India **Jun 2017 - Jul 2017**
- Used Keras to develop a hierarchically tuned two-model deep convolutional neural network for detection and classification of contact lens from iris images, outperforming the then existing state-of-the-art techniques