

# Vishesh Mistry

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## Education

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- **MS in Computer Science** **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 (Gold Medalist)* 2015 – 2019

## Work Experience

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- **Senior AI Scientist** **Tech5 USA, Michigan**  
*Research and Development* Mar 2024 – Present
  - Research for contactless biometrics capture technologies, biometrics-powered digital identity solutions, and privacy-preserving biometrics under the CTO
  - Collaborating on end-to-end AI projects from ideation to deployment; coordinating between cross-functional teams, managing resources, and ensuring timely project execution
  - Providing technical consult to governments, law enforcement agencies, and other independent bodies for their access control and privacy needs
- **Research Scientist** **Tech5 USA, Michigan**  
*Research and Development* Sep 2021 – Feb 2024
  - Responsible for various research activities - participating in biometrics research, helping engineering team with integration, and liaoning with 3rd party research teams
  - Designed and developed solutions pertaining to decentralised verifiable credentials, biometrics capture conforming with international standards, and remote medical injector
- **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

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- **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

## Selected Publications/Patents

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- Debayan Deb, Vishesh Mistry, and Rahul Parthe, "**AdvBiom: Adversarial Attacks on Biometric Matchers**", Springer Face Recognition Across the Imaging Spectrum (FRAIS) 2024, May 2024
- "**System and Method for Decentralized Digital Identity Verification**", US Patent No. 18/658,621 (Pending), May 2024
- "**System and Method for AI-based Digital Identity Verification Field of Disclosure**", US Patent No. 18/595,756 (Pending), Mar 2024
- "**Contactless Fingerprint Capture using Artificial Intelligence and Image Processing on Integrated Camera Systems**", US Patent No. 17/967,563, Oct 2022
- Vishesh Mistry, Joshua J. Engelsma, and Anil K. Jain, "**Fingerprint Synthesis: Search with 100 Million Prints**", IEEE 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**", IEEE 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

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- **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 oral 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 0.5 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

## Selected Projects

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- **T5 BTP - Privacy Preserving Biometric Template Protection, TECH5** **May 2024 - Present**
  - Designing and developing an AI-powered privacy-preserving biometric template protection scheme in compliance with ISO 30136
  - Implementing a novel multi-layer solution that projects biometric templates to a protected space while practically reducing false accepts to zero
- **T5 Digital ID - Decentralized Verifiable Credential, TECH5** **Apr 2022 - Present**
  - Leading the design and research behind the T5 Digital ID, a secure decentralized offline verifiable credential in the form of a proprietary two-dimensional high-density cryptograph
  - Optimized the T5 Face SDK to facilitate the use of 136 bytes lightweight face templates for real-time verification on smartphones
  - The solution is deployed in Columbia's military to facilitate biometrics-powered gun ownership, and in DRC for their student and foreigner ID cards

- **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 and ISO 39794-5 compliance
  - Improved the then implementation by making capture faster, fluid, and robust across multiple devices and operating systems
  - Played an integral role in deploying the technology in the national digital ID of Kenya (>30M identities), Digital Passenger Declaration (DPD) platform of Australia, and MTN (Africa's largest mobile network operator)
- **Remote Medical Blood Collector and Injector - PreciHealth, TECH5** **May 2022 - Mar 2024**
  - Developed a robust set of AI tools to facilitate users for using a remote medical blood collector and injector through any device with an integrated camera system
  - Led research activities involving data collection, architecture analysis, model training/testing, and deployment for different modules in the pipeline
  - The end-to-end solution provides real-time detection and tracking of the custom devices along with live feedback
- **T5 AirSnap Finger - Contactless Capture for Finger, TECH5** **Sep 2021 - Feb 2024**
  - Led the research behind contactless finger capture technology using smartphones for capturing accurate ridge lines and finger resolution
  - Developed and deployed a proprietary contactless finger presentation attack detection solution conforming to ISO 30107-3; won the 2023 LivDet Noncontact Fingerprint competition
  - The solutions were successfully deployed in the national digital ID of Kenya (>30M identities) and MTN (Africa's largest mobile network operator)
- **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
- **Fingerprint Spoofing and Liveness Detection in Fingerprints, IIT Mandi, India** **Sep 2017 - Dec 2017**
  - Developed an end-to-end network for detecting a complex variety of fingerprint spoofs using 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
  - The novel implementation performed better or at par with existing state-of-the-art techniques on intra-sensor, inter-sensor, and multi-sensor iris datasets