Kushal Vangara

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My research focuses on responsible AI, machine learning, computer vision, biometrics, computational psychology, and cybersecurity. I specialize in leveraging multimodal data to model human behavior and personality traits, with a strong emphasis on improving machine learning models' robustness, fairness, and interpretability. My work has advanced face recognition systems by addressing demographic biases and enhancing accuracy across diverse populations. In the past, I have contributed to research on person re-identification, long-distance recognition, and deepfake detection, addressing key challenges in identity verification. Passionate about advancing science and ethical AI to drive innovation and impact.

EDUCATION

Ph.D. in Computer Science (May 2024)
Florida Institute of Technology, Florida, USA
Dissertation: Indirect Personality Prediction through Non-Verbal Cues Analysis in Videos
Advisor: Dr. Michael C. King

M.S. in Information Assurance & Cybersecurity May 2018
Florida Institute of Technology, Florida, USA
Thesis: Transfer Learning with Convolutional Neural Networks (CNNs) Applied to Periocular Biometrics
Advisor: Dr. Michael C. King

B.Tech. in Electronics and Communications Engineering July 2014
Jawaharlal Nehru Technological University, Hyderabad, India
Projects: Developed IoT automation and prototyping solutions using Arduino and Raspberry Pi

PROFESSIONAL EXPERIENCE

Graduate Research Assistant
Florida Institute of Technology, FL, USA May 2018 – present
Researched face recognition, trained CNNs, supervised dataset curation, data processing, and analysis.

Volunteer Research Assistant
Florida Institute of Technology, FL, USA Jan 2016 – Dec 2017
Designed and developed portable biometric systems using Raspberry Pi and Kinect, explored security vulnerabilities and benchmarked CPU architectures.

Internship
TalentSprint, Hyderabad, India Jan 2015 - July 2015
Built an E-Billing web application leveraging Java, Spring Framework, and SQL database with an MVC-based scalable design.

Embedded Systems Intern
Potential Labs, Hyderabad, India July 2014 - Dec 2014
Designed and tested electronic circuits, PCB, and IoT solutions.

TEACHING EXPERIENCE

Graduate Teaching Assistant
Florida Institute of Technology, FL Fall 2024
Developed and taught graduate-level biometrics course, including creating materials, assignments, and exams, while conducting assessments and evaluating student performance.

Tutor
Florida Institute of Technology, FL Spring 2024
CSE5800 Advanced Topics in CS - Cyber Identity

SKILLS AND TOOLS

Machine Learning, Deep Learning, Computer Vision, Biometrics, TensorFlow, PyTorch, OpenCV, Scikit-learn, Pandas, NumPy, SQL, Python, R, MATLAB, AWS, Docker, Data Visualization (Matplotlib, Seaborn, Plotly), Explainability Tools (SHAP, LIME), Hugging Face, GitHub, Raspberry Pi, LaTeX

PUBLICATIONS

- **Kushal Vangara**, Gabriella Pangelinan, Xavier Merino, Gary Burns, and Michael King "Beyond the Smile: Predicting Personality from Facial Movements Using AI". in: *Society for Industrial and Organizational Psychology Annual Conference*. (Accepted). Apr. 2025
- **Kushal Vangara**, Gabriella Pangelinan, Xavier Merino, Gary Burns, and Michael King "Indirect Assessment of Personality from Facial Expressions". In: *Society for Personality and Social Psychology Annual Convention*. (Accepted). 2025
- Cody E Harrell, Gary N Burns, Michael C King, William B Ridgway, **Kushal Vangara**, Zachary B Hesson, Vanessa A Edkins, and Charles A Morgan "Investigating the overlapping concepts of the Dark Core and the General Factor of Personality". In: *Personality and Individual Differences* 225 (2024), p. 112650. ISSN: 0191-8869
- Gabriella Pangelinan, KS Krishnapriya, Vitor Albiero, Grace Bezold, Kai Zhang, **Kushal Vangara**, Michael C King, and Kevin W Bowyer "Exploring Causes of Demographic Variations In Face Recognition Accuracy". In: *Computer Vision: Challenges, Trends, and Opportunities* (2024), p. 61
- Gabriella Pangelinan, Xavier Merino, Samuel Langborgh, **Kushal Vangara**, Joyce Annan, Audison Beaubrun, Troy Weekes, and Michael C King "The CHROMA-FIT Dataset: Characterizing Human Ranges of Melanin for Increased Tone-Awareness". In: *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) Workshops*. Jan. 2024, pp. 1170–1178
- Kevin W Bowyer, Michael C King, Walter J Scheirer, and **Kushal Vangara** "The "Criminality From Face" Illusion". In: *IEEE Transactions on Technology and Society* 1.4 (2020), pp. 175–183
- Vitor Albiero, KS Krishnapriya, Kushal Vangara, Kai Zhang, Michael C King, and Kevin W Bowyer "Analysis of gender inequality in face recognition accuracy". In: *Proceedings of the IEEE Winter Conference on Applications of Computer Vision Workshops*. 2020, pp. 81–89
- KS Krishnapriya, Vitor Albiero, **Kushal Vangara**, Michael C King, and Kevin W Bowyer "Issues related to face recognition accuracy varying based on race and skin tone". In: *IEEE Transactions on Technology and Society* 1.1 (2020), pp. 8–20
- Vitor Albiero, Kevin Bowyer, **Kushal Vangara**, and Michael King "Does face recognition accuracy get better with age? Deep face matchers say no". In: *The IEEE Winter Conference on Applications of Computer Vision*. 2020, pp. 261–269
- KS Krishnapriya, **Kushal Vangara**, Michael C King, Vitor Albiero, and Kevin Bowyer "Characterizing the variability in face recognition accuracy relative to race". In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*. 2019, pp. 0–0
- Tiziano Bernard, Andrea Gonzalez, Vincenzo Miale, **Kushal Vangara**, Lucas Stephane, and Winston E Scott "Haptic feedback astronaut suit for mitigating extra-vehicular activity spatial disorientation". In: *AIAA SPACE and Astronautics Forum and Exposition*. 2017, p. 5113

PROJECTS

Automated Face Recognition Best Practices (AFRBP) 2018-2020

- Bias in Face Recognition: Investigated root causes of performance variations in automated face recognition algorithms and evaluated methods to mitigate biases in operational scenarios.
- Exposure and Data Diversity: Researched the impact of image exposure and training data diversity on false match rates across demographics using facial brightness measures and DCNN models.
- Reducing Disparities: Examined adaptive margins in ResNet-50 DCNN with ArcFace loss to minimize demographic gaps in face recognition performance.

Person Re-identification 2019

- Visual Attribute Classification: Studied soft identifying features to uniquely identify individuals in congested environments using video media.

Cyber Identity and Behaviour Analytics Research Consortium (CIBAR) 2020-2021

- Synthetic Content Detection: Researched GAN models for generating and detecting adversarial content in online environments.

Visual Dossiers for Recognizing and Identifying Humans at Altitude and Range (VIDORA) 2022-2023

- Algorithm Development for Long-Range Biometric Identification: Contributed to modules addressing atmospheric, motion, and resolution challenges for real-time whole-body biometric identification at

long ranges.

- Data Collection and Curation for Research: Curated a diverse indoor/outdoor dataset with skin tone and contextual attributes to enhance biometric research.

Computational Psychology - Towards Indirect Personality Trait Inference 2021-2024

- Corpora Development: Designed and implemented protocols to create rich, naturalistic datasets, capturing personality traits through individual differences in speech, body gestures, and physical movements.
- Spatio-Temporal Visual Analysis: Researched and developed spatio-temporal machine learning models and computer vision methods to detect and analyze visual cues like body motion, facial micro-expressions, and hand gestures for passive personality assessment.

RESEARCH PRESENTATIONS

Invited Presentation **Sep 2023**
Center for Advanced Manufacturing and Innovative Design (CAMID) Melbourne, FL
Presented a poster at the *C3E-Computational Cybersecurity in Compromised Environments* workshop, titled: *"Deep Learning-Based Personality Trait Analysis from Facial Expressions."*

Invited Presentation **Feb 2020**
University of North Carolina Wilmington Wilmington, NC
Invited to present the *Cyber Identity and Behavior Analytics Research Consortium (CIBAR)* meeting, titled: *"Facing Off with Deep Fakes."*

MAJOR COLLABORATORS

- Dr. Kevin Bowyer from University of Notre Dame
- Dr. Charles A Morgan III from University of New Haven
- Dr. Mark Liberman from Linguistic Data Consortium, University of Pennsylvania
- Dr. Vanessa A Edkins, Emeritus Faculty, Florida Institute of Technology *(Currently at Gartner)*

REVIEWS

- IEEE Winter Conference on Applications of Computer Vision (WACV)
- Workshop on Demographic Variations in Performance of Biometrics And Related Technology
- ACM Transactions on Privacy and Security

PROFESSIONAL AFFILIATIONS

- IEEE
- ACM
- SPSP
- ARRL *(Call Sign: KQ4YAG)*