Umar Khalid

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EDUCATION

- **University of Central Florida (UCF)** — Orlando, FL
  PhD in Computer Engineering — *2020 - 2024*
  - **Computer Vision**: Deep Learning, Generative AI, Diffusion Models, AI Security, 3D Computer Vision.

- **Shanghai Jiao Tong University (SJTU)** — Shanghai, China
  MS in Electrical Engineering — *Aug 2016 - Dec 2018*

- **University of Central Florida (UCF)** — Orlando, FL
  MS in Computer Engineering — *2020 - 2023*

- **National University of Sciences and Technology** — Islamabad, Pakistan
  BS in Electrical Engineering — *Sep 2010 - June 2014*

RECENT RESEARCH PROJECTS (1ST AUTHOR)

- **3DEgo: 3D Editing on the Go!(ECCV 2024 accepted)**: We introduce **3DEgo** to address a novel problem of directly synthesizing photorealistic 3D scenes from monocular videos guided by textual prompts. [Project Link]

- **LatentEditor (ECCV2024 accepted)**: Groundbreaking approach for editing neural fields using denoising diffusion models, introducing a novel delta score method for precise, local editing in 3D scenes. Tested on multiple 3D datasets, bridging the gap between textual instructions and high-quality 3D editing. [Project Link]

- **Free Editor (ECCV 2024 accepted)** : A novel training-free 3D scene editing technique, addressing multi-view style inconsistency in T2I diffusion models. Utilizes an Edit Transformer for intra-view consistency and inter-view style transfer, enhancing editing speed and efficiency. [Project Link]

- **Medical Diffusion Models**: Development of advanced diffusion models for medical applications. [GitHub Link]

- **Federated Learning for Video Understanding**: Efficient algorithms for federated learning in video understanding, contributing to industrial human-robot interaction. [GitHub Link]

- **Continual Learning with Noisy Labels**: Innovative approaches for continual learning in environments with noisy labels, enhancing robustness in machine learning. [GitHub Link]

- **Out of Distribution Detection**: Advanced research in out-of-distribution detection, focused on enhancing model robustness. [GitHub Link]

- **Text Guided Video Editing using Stable Diffusion**: Cutting-edge development in text-guided video editing using stable diffusion techniques. [Project Link]

EXPERIENCE

- **Meta Inc., Menlo Park, CA, USA** — May. 2024 - Present
  Machine Learning Intern
  - **Genrative AI Applications**: Developed and implemented techniques to improve LLM performance on multimodal tasks, such as visual question answering, and image captioning. Fine-Tuned LLMs for smart reply recommendations in Facebook reels and stories.

- **Samsung Research, USA** — Sept. 2023 - May 2024
  Generative AI Researcher
  - **3D AR/VR Applications**: Developed advanced 3D AR/VR algorithms and systems.
  - **3D Scene**: Evaluated and optimized ML models for 3D applications like NeRF and Gaussian Splatting on next-generation Galaxy devices.
  - **Gen AI**: Developed efficient video generation and editing algorithms leveraging diffusion models. .
  - **Research**: Actively contributed to innovation by developing prototypes, research papers, and patents.

- **Microsoft Inc., USA** — Summer, 2023
  Machine Learning Research Intern
  - **Efficient Multi-Modal Applications**: Development of efficient multi-modal machine learning models.

- **CHEP Inc., USA** — Jan 2023 - May 2023
  Machine Learning Intern

- **Industrial Applications**: Designed deep learning-based crack detection technology in industrial pallets with 95% accuracy. Developed a privacy-preserving worker time tracking system with a performance deviation of only 1-2 minutes per day compared to ground truth.

- **MengBaby Inc., Shanghai, China**   Jan 2019 - Mar 2020
  Software Engineer-Computer Vision
  - **Counterfeiting Detection and Healthcare Solutions**: Led the development of a deep learning-based Counterfeiting app with 98-99% client-reported accuracy. Planned market expansion for major clients like Castrol and Kohler. Developed healthcare solutions using deep learning, contributing to a successful $20 million funding round in 2019.

- **Florida Polytechnic University, Lakeland, USA**   2021 - 2022
  Adjunct Professor
  - **Instructor**: OOP & Python programming language

- **CRCV Lab, University of Central Florida, Orlando, FL, USA**   Aug 2022 - Present
  Graduate Student
  - **3D Computer Vision Research**: Developing algorithms to detect and mitigate image artifacts and degradation. Pioneered the first study on Federated Learning Video Understanding, proposing a highly efficient algorithm. Proposed an out-of-distribution detection framework, achieving state-of-the-art performance. Developed the RF1024 dataset for RF communication research.

SKILLS

- **Technologies**: Scikit-learn, PyTorch, Vision Transformers, GANs, Deepfakes, Pandas, NumPy, SciPy
- **Programming Languages**: Python, MATLAB, Java, C++, Shell scripting
- **Tools**: Git, LINUX terminal, Windows bash programming, AWS Cloud, Google Cloud
- **Machine Learning**: Deep Learning, Computer Vision, GANs, Diffusion Models, Action Recognition, NLP, Vision Transformers, Privacy Preservation, Federated Learning

SELECTED PUBLICATIONS   HTTPS://SCHOLAR.GOOGLE.COM/CITATIONS?USER=HGJD_XUAAAAJ&HL=EN

[1] **Khalid, Umar**, Hasan Iqbal, Nazmul Karim, Jing Hua, and Chen Chen. LatentEditor: Text Driven Local Editing of 3D Scenes. *ECCV*, 2024.

[2] **Khalid, Umar**, Hasan Iqbal, Nazmul Karim, Jing Hua, and Chen Chen. 3DEgo: 3D Editing on the Go! *ECCV*, 2024.

[3] **Khalid, Umar**, Nazmul Karim, Hasan Iqbal, Jing Hua, and Chen Chen. Free-Editor: Zero-shot Text-driven 3D Scene Editing. *ECCV*, 2024.

[4] **Khalid, Umar**, Hasan Iqbal, Saeed Vahidian, Jing Hua, and Chen Chen. CEFHRI: A Communication Efficient Federated Learning Framework for Recognizing Industrial Human-Robot Interaction. In *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 10141–10148. IEEE, 2023.

[5] Nazmul Karim, Abdullah Al Arafat, **Umar Khalid**, Zhishan Guo, and Nazanin Rahnavard. Augmented Neural Fine-Tuning for Efficient Backdoor Purification. *ECCV*, 2024.

[6] **Khalid, Umar**, Hasan Iqbal, Chen Chen, and Jing Hua. Unsupervised anomaly detection in medical images using masked diffusion model. In *International Workshop on Machine Learning in Medical Imaging*, pages 372–381. Springer Nature Switzerland Cham, 2023.

[7] **Khalid, Umar**, Nazmul Karim, Mohsen Joneidi, Chen Chen, and Nazanin Rahnavard. SAVE: Spectral-Shift-Aware Adaptation of Image Diffusion Models for Text-guided Video Editing. *arXiv preprint arXiv:2305.18670*, 2023.

[8] Nazmul Karim, **Khalid, Umar**, Ashkan Esmaeili, and Nazanin Rahnavard. CNLL: A Semi-supervised Approach For Continual Noisy Label Learning. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 3878–3888, 2022.

[9] **Khalid, Umar**, Ashkan Esmaeili, Nazmul Karim, and Nazanin Rahnavard. Rodd: A self-supervised approach for robust out-of-distribution detection. In *2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, pages 163–170. IEEE, 2022.