# Vuong (Dustin) Nguyen

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## Summary

CS Ph.D. candidate with 4-year experience in Computer Vision, Deep Learning (DL), and Graph Neural Network (GNN). My work also encompasses exploring GenerativeAI and Vision-Language models for 3D Generation and Reconstruction.

## Education

**University of Houston** — Houston, TX
*Ph.D. in Computer Science | GPA: 3.802* — *Aug 2022 – Present*

**Hanoi University of Science and Technology** — Hanoi, Vietnam
*B.S. in Applied Mathematics | Talent Honors Program* — *Sep 2017 – Jul 2021*

## Skills

**Programming:** Python, C++, R, MATLAB, SQL, PHP, HTML

**Frameworks & Libraries:** PyTorch, TensorFlow, OpenCV, PyTorch Geometric, PyTorch3D, Scikit-Learn, Matplotlib

**Tools:** Git, Jira, Linux, Blender, Docker, AWS, Spark, Azure, MLFlow, TensorRT, TinyML, CUDA, API, ONNX

## Experience

**University of Houston - Quantitative Imaging Lab** — Houston, TX
*Research Assistant | Advisor: Prof. Shishir Shah* — *Aug 2022 – Present*

- Conduct research on Person Re-Identification, 3D Generation and Reconstruction, and Data Quality Assessment.
- Develop DL and GNN-based models for CV tasks; Explore and implement CLIP, NeRF, GANs, and Diffusion.

**Grooo International** — Hanoi, Vietnam
*Machine Learning Engineer* — *Feb 2021 – Jul 2022*

- Preprocessed and analyzed large-scale datasets; Developed efficient and scalable ML models and pipelines.
- Collaborated with product management and development team to develop product features and deploy models.

## Selected Publications

1. **V. Nguyen**, K. Khaldi, D. Nguyen, P. Mantini, and S. Shah. "Contrastive Viewpoint-aware Shape Learning for Long-term Person Re-Identification". In *WACV*, 2024.

2. **V. Nguyen**, P. Mantini, and S. Shah. "Temporal 3D Shape Modeling for Video-based Cloth-Changing Person Re-Identification". In *WACV - Real-World Surveillance: Applications and Challenges Workshop*, 2024. [*Github*].

3. K. Khaldi, **V. Nguyen**, P. Mantini, and S. Shah. "Unsupervised Person Re-Identification in Aerial Imagery". In *WACV - Real-World Surveillance: Applications and Challenges Workshop*, 2024.

4. **V. Nguyen**, S. Mirza, P. Mantini, and S. Shah. "Attention-based 3D Shape and Gait Representations Learning for Video-based Cloth-Changing Person Re-Identification". In *VISIGRAPP (VISAPP)*, 2024.

5. S. Mirza, **V. Nguyen**, P. Mantini, and S. Shah. "Data Quality Aware Approaches for Addressing Model Drift of Semantic Segmentation Models". In *VISIGRAPP (VISAPP)*, 2024.

6. **V. Nguyen**, A. Ho, A. Vu, A. Nguyen, and T. Tran. "Building Footprint Extraction in Dense Areas using Super Resolution and Frame Field Learning". In *iCAST*, 2023. [*Best paper award*] [*Paper*].

7. **V. Nguyen**, P. Mantini, and S. Shah. "Cross-Modality Spatial-Temporal Collaborative Learning for Video-based Cloth-Changing Person Re-Identification". *Under anonymous review.*

## Projects

**Cloth-Changing Person Re-Identification (CCRe-ID)** | *GitHub* — *Aug 2022 - Present*

- Lead a review paper on CCRe-ID; Develop the open-source baseline code repository for Video-based CCRe-ID.
- Design novel identity-aware 3D human reconstruction models to extract 3D SMPL body shape and gait, gain 3% accuracy improvement for Video-based CCRe-ID in the Wild; Implement in PyTorch.
- Propose 3D cross-attention CNN for Video-based CCRe-ID, outperforming SOTA methods by 14% in accuracy.

- Develop models based on Graph Attention Network (GAT) and Spatial-Temporal GAT to capture 3D pose-based shape and gait, achieving state-of-the-art (SOTA) performance in CCRe-ID; Implement using PyTorch Geometric.
- Construct a large-scale synthetic Video-based CCRe-ID dataset for a CVPR paper using GAN; Generate body segmentation masks, 2D/3D pose, and 3D SMPL human mesh using HRNet, OpenPose, and PyTorch3D.
- Implement a GAN for pose-transfer on aerial images, boosting Unsupervised Drone-based Re-ID accuracy by 2%.

**Texture Generation on 3D Shapes for 3D Games** *Jun 2023 - Present*

- Annotate Objaverse, a large-scale 3D dataset; Select objects based on quality and style for training using Blender.
- Leverage NeRF to generate 3D models of game items from 2D sketches. Modify and implement CLIP and DreamFusion to alter texture on 3D models based on text prompt in PyTorch.

**Tackling Model Drift of Semantic Segmentation Models** *Apr 2023 - Oct 2023*

- Performed Image Quality Assessment using BRISQUE to filter out noisy and distorted data for model refinement.
- Modified an SVM classifier for selecting features for retraining segmentation models; Implemented in TensorFlow.

**Face Recognition at Long Distance (FRaLD)** | *GitHub* *Dec 2022 - Jul 2023*

- Assessed quality of aerial face images using BRISQUE; Preprocessed and analyzed drone-based datasets.
- Designed a pose-guided model based on ArcFace, improving 4% accuracy for FRaLD; Implemented in PyTorch.

**Building Footprint Extraction in Dense Areas** | *Paper* *Sep 2022 - Jun 2023*

- Performed Super Resolution on aerial images by reimplementing and retraining RealESR-GAN in PyTorch.
- Proposed a multitask learning model comprising a U-Net-based segmentation module and a frame field learning module for extracting building contours in dense areas, outperforming Mask-RCNN by 13.9% in F1-score.

**Fetal ECG Extraction using Pix2Pix GAN** | *GitHub* *Oct 2022 - May 2023*

- Filtered, and transformed 1D ECG signals into 2D spectrogram images using SciPy, NumPy, and MATLAB.
- Built an ECG extraction model on Pix2Pix GAN, outperforming AutoEncoder-based models by 5% in accuracy.

**Automated IDs and Business Cards Extractor** *Feb 2021 - Mar 2022*

- Tested OCR methods; Implemented BERT model in PyTorch, achieving 90% accuracy in Korean and Japanese.
- Packaged source code into Docker; Wrote API using FastAPI; Deployed model with TensorFlow using ONNX.

## Honors and Awards

**Cullen Graduate Student Success Fellowship:** Awarded by College of Natural Sciences and Mathematics, UH.

**FPT Young Talents Scholarship:** Awarded by FPT Group for outstanding undergraduate researcher.

## Leadership

**College of Natural Sciences and Mathematics, UH:** CS Graduate Student Representative *Aug 2023 - present*

**Computer Science Graduate Student Association, UH:** Secondary Student Officer *Aug 2022 - present*

## References

Prof. Shishir Shah (Advisor), Chair of Department of Computer Science, UH Email: sshah@central.uh.edu

Dr. Pranav Mantini, Lecturer & Senior Researcher, Department of Computer Science, UH Email: pmantini@cs.uh.edu