# ACHINTHA WIJESINGHE

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## SUMMARY

Ph.D. candidate in Electrical and Computer Engineering at UC Davis with extensive experience in **Generative AI**, **Diffusion Models**, **Federated Learning**, **Image Compression** and **Semantic Communications**. Adept at designing innovative frameworks for goal-oriented tasks, generative learning, and communication systems, with a proven track record of high-impact research and publications in top-tier journals and conferences.

## EDUCATION

**University of California, Davis**, *Davis, CA* Sep. 2021 - Sec. 2025 (Expected)

*Ph.D. candidate in Electrical and Computer Engineering*, **GPA:** 4.0/4.0

- Research Topics: federated learning, generative learning, semantic communications

*M.S. in Electrical and Computer Engineering*, **GPA:** 4.0/4.0 Sep. 2021 - Aug. 2023

**University of Moratuwa**, *Sri Lanka* Dec. 2015 - Jan. 2020

*BSc. Engineering (Hons) specialized in Electronic and Telecommunication Engineering*, GPA: 3.91/4.20

## WORKING EXPERIENCES

**Graduate Student Researcher** — University of California, Davis, *Davis, CA* 2022 - Present

- Research topics: Federated Learning; Diffusion Model; Generative Adversarial Networks; Semantic Communications. Group leader and management of Lab Computation Resources: GPU servers.

**Teaching Assistant** — University of California, Davis, *Davis, CA* 2022 - Present

- Introduction to Signals & Systems (EEC 150); Random Signals & Noise (EEC 260)

**Lecturer on Contract** — University of Moratuwa, *Sri Lanka* 2020-2021

- Introduction to Image Processing and Computer Vision, Introduction to Telecommunication, Digital Electronics, and Analog Electronics

**Research Intern** — Data 61 CSIRO *Sydney Australia* July— December, 2018

- Investigation of different sampling and sketching methods, like Flow Sampling and Sketching.

## RESEARCH PROJECTS

**Machine Learning for Health** Jan. 2025 - Present

- Machine learning and deep learning models for infant mortality and birth weight prediction.

**Generative AI for Image Generation** Aug. 2023 - Present

— *Mentor: Dr. Zhi Ding* at UC Davis

— **Diffusion Models; VQ-VAEs; PyTorch; High Performance Computing**

- Developed and implemented conditional diffusion models and codebook-based noise learning techniques to enhance image compression and generation for semantic communications, culminating in three peer-reviewed publications. [**C1, J1, J2**].

**Federated Learning with Communication Efficiency and Privacy Preservation** Sep. 2022 - Present

— *Mentor: Dr. Zhi Ding* at UC Davis & *Dr. Songyang Zhang* at University of Louisiana at Lafayette

— **GANs; PyTorch; High Performance Computing**

- Developed a federated learning framework with generative adversarial networks to address non-IID data and enable efficient, privacy-preserving model sharing, resulting in three peer-reviewed publications. [**C2, J3, J4**].

**Physics-inspired Generative Learning for Spectrum Coverage Cartography** Sep. 2022 - Present

— *Mentor: Dr. Zhi Ding* at UC Davis & *Dr. Songyang Zhang* at UL Lafayette

— **GANs; PyTorch; High Performance Computing**

- Developed novel frameworks of radiomap estimation based on generative adversarial networks, which integrated the generative AI models with radio propagation models.

**Three-Dimensional (3D) Point Cloud Processing** Jan. 2021 - Sep. 2021.

— *Mentor: Dr. Kanchana Thilakarathna* at University of Sydney

— **Auto-Encoders; PyTorch**

- Developed point cloud releasing mechanism using privacy aware loss function utilizing Auto-Encoders.

## SELECTED PUBLICATIONS

I have authored or co-authored 7 journal manuscripts and 7 conference manuscripts. 🎓 Google Scholar

**Journal Papers**

- (**J1**) **A. Wijesinghe**,et al., "LaMi-GO: Latent Mixup for a High-Speed Goal-Oriented Communications". (Submitted to *IEEE Transactions on Neural Networks and Learning Systems*).
- (**J2**) **A. Wijesinghe**, et al., "Diff-GO+: An Efficient Diffusion Goal-Oriented Communication System with Local Feedback".(Accepted by IEEE Transactions on Wireless Communications)
- (**J3**) **A. Wijesinghe**, et al., "Pfl-gan: when client heterogeneity meets generative models in personalized federated learning,". (Submitted to *IEEE Transactions on Machine Learning in Communications and Networking*).
- (**J4**) **A. Wijesinghe**, et al., "PS-FedGAN: An Efficient Federated Learning Framework Based on Partially Shared Generative Adversarial Networks For Data Privacy" IEEE Internet of Things Journal (2024).
- (**J5**) S. Zhang, **A. Wijesinghe**, and Z. Ding "RME-GAN: A Learning Framework for Radio Map Estimation based on Conditional Generative Adversarial Network", in IEEE Internet of Things, [**co-first author**].
- (**J6**) Y. Zhou, **A. Wijesinghe**, Y. Ma, S. Zhang and Z. Ding, "TiRE-GAN: Task-Incentivized Generative Learning for Radiomap Estimation", arXiv:2405.02567, 2024. Accepted by *IEEE Wireless Communications Letters*.
- (**J7**) C. M. M. Kattadige, K. N. Choi, **A. Wijesinghe**, K. Thilakarathna, S. Seneviratne, and G. Jourjon,"SETA++: Real-Time Scalable Encrypted Traffic Analytics in Multi-Gbps Networks," in IEEE Transactions on Network and Service Management, vol. 18, no. 3, pp. 3244-3259, Sept. 2021

**Conference Papers**

- (**C1**) **A. Wijesinghe**, et al., "TACO: Rethinking Semantic Communications with Task Adaptation and Context Embedding". Accepted by IEEE Global Communications Conference, 2025.
- (**C2**) **A. Wijesinghe**, et al., "Diff-GO: Diffusion Goal-Oriented Communications to Achieve Ultra-High Spectrum Efficiency". In 2024 IEEE International Conference on Communications Workshops.
- (**C3**) **A. Wijesinghe**, et al., "UFed-GAN: A Secure Federated Learning Framework with Constrained Computation and Unlabeled Data" In 2024 IEEE International Conference on Communications Workshops.
- (**C4**) Y. Chao, Y. Chen, **A. Wijesinghe**, S. Wanninayaka, S. Zhang, and Z. Ding, "Task-Driven Semantic Quantization and Imitation Learning for Goal-Oriented Communications", Accepted by *2025 IEEE ICC*.
- (**C5**) S. Wanninayaka, **A. Wijesinghe**, W. Wang, Y. Chao, S. Zhang, and Z. Ding, "Diff-GO$^n$: Enhancing Diffusion Models for Goal-Oriented Communications with Noise Banks", Accepted by *2025 IEEE ICC*.
- (**C6**) N. Karunanayake, **A. Wijesinghe**, C. Wijethunga, C. Kumaradasa, P. Jayasekara, and R. Rodrigo, "Towards a Smart Opponent for Board Games: Learning beyond Simulations", in IEEE International Conference on Systems, Man, and Cybernetics, Toronto, CA, 2020. (**co-first author**, H index - 62)
- (**C67**) K. N. Choi, **A. Wijesinghe**, C. M. M. Kattadige, K. Thilakarathna, S. Seneviratne, and G. Jourjon, "SETA: Scalable Encrypted Traffic Analytics in Multi-Gbps Networks", in IEEE International Conference on Local Computer Networks, Sydney, AUS, 2020. (CORE A)
- (**C8**) G. Jourjon, **A. Wijesinghe**, K. Thilakarathna, and S. Seneviratne, "Towards Flow Sampling for Deep Content Analysis", in Cyber Defence Next Generation Technology & Science Conference, Brisbane, AUS, 2020.

## SKILLS

- **Programming:** Python, MATLAB, C, C++, Java, GO
- **Frameworks:** PyTorch, TensorFlow, Keras, OpenCV
- **Tools and Cloud Platforms:** Scikit-learn, Pandas, SciPy, GCP, AWS

## OTHER AWARDS & HONORS

- Dr. Khadar B. Shaik Memorial Award - UC Davis, CA, USA — Fall 2025
- Dissertation Fellowship - UC Davis, CA, USA — Winter 2025
- Summer Graduate Fellowship - UC Davis, CA, USA — Summer 2024
- Prof. K.K.Y.W. Perera award for the best GPA - University of Moratuwa — 2019