

Mesfin Leranso Betalo, Ph.D.

Postdoctoral Research Associate

Department of Civil Engineering, Schulich School of Engineering

University of Calgary

Artificial Intelligence | Generative AI | Digital Twins | Multi-Agent Learning
AI for 6G Wireless Systems | UAV Networks | Intelligent Transportation Systems

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Professional Profile

Dr. Mesfin L. Betalo is a Postdoctoral Research Associate in the **Department of Civil Engineering, Schulich School of Engineering, University of Calgary, Canada**. His interdisciplinary research focuses on Artificial Intelligence, Machine Learning, Generative AI, Digital Twins, Multi-Agent Reinforcement Learning, Intelligent Transportation Systems, UAV-assisted wireless networks, and next-generation 6G communication systems. His research develops AI-native intelligent systems integrating predictive analytics, digital intelligence, autonomous decision-making, advanced wireless communications, and trustworthy AI for resilient transportation, cyber-physical systems, and future smart cities.

Technical Skills

- **Programming Languages:** Python, MATLAB, C++, and Java.
- **Artificial Intelligence:** Machine Learning, Deep Learning, Generative AI, Reinforcement Learning, Multi-Agent Reinforcement Learning, and Federated Learning.
- **AI Frameworks & Libraries:** PyTorch, TensorFlow, Scikit-learn, and Keras.
- **Research Expertise:** Digital Twins, Edge AI, Computer Vision, Predictive Analytics, Wireless Sensor Networks, Wireless Communications, 6G Networks, UAV-Assisted Networks, Edge Computing, Internet of Things (IoT), and AI-Driven Optimization.
- **Software & Simulation Tools:** Git, Docker, Linux, L^AT_EX, NS-3, and OMNeT++.

Research Vision

My long-term research vision is to advance **AI-Native Autonomous Intelligence Systems (AIDIAS)** by integrating Generative AI, Predictive Digital Intelligence, Foundation Models, Digital Twins, Multi-Agent Reinforcement Learning, Edge AI, Federated Learning, and 6G communication systems. This research aims to develop trustworthy, explainable, scalable, and resilient intelligent systems for smart cities, intelligent transportation, climate-health resilience, autonomous networking, and sustainable cyber-physical infrastructure.

Research Interests

- **AI-Native Wireless Systems:** 6G/Beyond Networks, Open RAN (O-RAN), Non-Terrestrial Networks (NTNs), Space-Air-Ground Integrated Networks (SAGIN), Semantic Communications, Integrated Sensing and Communications (ISAC).
- **Intelligent Networking:** UAV-Assisted Wireless Sensor Networks (WSNs), Internet of Things (IoT), Edge Intelligence, Mobile Edge Computing (MEC), Cell-Free Massive MIMO, Reconfigurable Intelligent Surfaces (RIS).
- **Artificial Intelligence:** Generative AI, Foundation Models, Machine Learning, Deep Learning, Federated Learning, Multi-Agent Reinforcement Learning (MARL), Autonomous Decision Intelligence.
- **Digital Intelligence:** Digital Twins, Cyber-Physical Systems, Intelligent Transportation Systems (ITS), Smart Cities, Digital Health, Climate Intelligence.
- **Optimization & Applications:** Resource Allocation, Network Optimization, Autonomous Network Orchestration, Green Communications, Sustainable AI.

Education

1. **Ph.D. in Information and Communication Engineering** 2018–2024
University of Electronic Science and Technology of China (UESTC), China
Dissertation: *Data Collection Schemes for UAV-Assisted Wireless Sensor Networks*
2. **M.Sc. in Information Technology** 2014–2016
University of Madras, India
3. **B.Sc. in Computer Science** 2008–2012
Hawassa University, Ethiopia

Professional and Academic Experience

A. Postdoctoral Research Associate

June 2026–Present

University of Calgary, Calgary, Alberta, Canada

- ▶ Conduct independent and collaborative research in artificial intelligence, machine learning, wireless communications, and intelligent transportation systems.
- ▶ Develop, implement, and evaluate advanced algorithms, models, and research prototypes.
- ▶ Design experiments, analyze data, and interpret simulation and experimental results.
- ▶ Publish research findings in peer-reviewed journals and present them at international conferences.
- ▶ Prepare research proposals, technical reports, and grant applications.
- ▶ Collaborate with academic researchers, industry partners, and interdisciplinary teams.
- ▶ Mentor graduate students, research assistants, and junior researchers.
- ▶ Translate research outcomes into practical solutions, prototypes, and innovative technologies.

B. Postdoctoral Fellow

September 2024–June 2026

Shenzhen University, Shenzhen, China

- ▶ Conducted research on Generative AI, multi-agent reinforcement learning, digital twins, UAV-assisted wireless sensor networks, and 6G intelligent communication systems.
- ▶ Developed AI-driven frameworks for task scheduling, resource allocation, trajectory optimization, and intelligent decision-making in next-generation wireless networks.
- ▶ Published multiple high-impact papers in leading IEEE journals, including IEEE Internet of Things Journal, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Network and Service Management, and IEEE Transactions on Vehicular Technology.
- ▶ Contributed to nationally funded research projects and international collaborations.
- ▶ Supervised graduate students and contributed to algorithm development, scientific publications, and project implementation.

C. Assistant Professor

April, 2020–December, 2022

Department of Information Technology, School of Engineering

Wachemo University, Hossana, Ethiopia

- ▶ Delivered undergraduate and postgraduate courses in Artificial Intelligence, Computer Networks, Wireless Communications, Machine Learning, Programming, Information Systems, and Research Methods.
- ▶ Supervised undergraduate and postgraduate research projects involving computer networks, intelligent systems, wireless communications, software technologies, and data-driven applications.
- ▶ Mentored students in research-problem formulation, methodological design, software implementation, data analysis, academic writing, and presentation of research findings.
- ▶ Conducted and disseminated research in wireless communications, networking, artificial intelligence, and intelligent computing systems.
- ▶ Developed and revised curricula, course outlines, laboratory activities, and assessment methods to support contemporary computing and engineering education.
- ▶ Served as a Postgraduate Program Committee Member and contributed to postgraduate admissions, proposal evaluations, research-progress reviews, and program-level academic decisions.
- ▶ Participated in departmental planning, academic quality assurance, examination moderation, faculty meetings, and continuous program improvement.
- ▶ Supported junior instructors and contributed to collaborative teaching, student mentorship, research development, and departmental service.

D. Senior Lecturer

March, 2018–April, 2020

Department of Information Technology, School of Engineering

Wachemo University, Hossana, Ethiopia

- ▶ Delivered undergraduate courses in Artificial Intelligence, Computer Networks, Data Structures and Algorithms, Database Systems, Software Engineering, Operating Systems, Information Systems, Programming, and Research Methods.
- ▶ Designed lectures, laboratory exercises, programming assignments, examinations, and project-based learning activities.
- ▶ Supervised undergraduate research projects in computer science, networking, software systems, and emerging information technologies.
- ▶ Advised students on academic progression, research methods, project development, and career preparation.
- ▶ Participated in curriculum review and course-content revision to reflect developments in computing technologies and industry requirements.
- ▶ Contributed to departmental academic activities, student assessment, examination moderation, and academic quality assurance.
- ▶ Conducted research in wireless communications, computer networking, intelligent computing, and related information technologies.

E. Network Administrator

2013–2018

Wolaita Sodo University, Wolaita Sodo, Ethiopia

- ▶ Administered and maintained campus network infrastructure, ensuring secure and reliable network operations.
- ▶ Configured, monitored, and troubleshooted routers, switches, wireless access points, firewalls, and network servers.
- ▶ Managed TCP/IP, DNS, DHCP, VPN, network security, and user access control.
- ▶ Installed, configured, and maintained Windows and Linux servers for academic and administrative services.
- ▶ Provided technical support and training to faculty, staff, and students.

F. ICT Instructor

2012–2013

Boditi Industrial and Construction College, Boditi, Ethiopia

- ▶ Delivered Computer Science, Information Technology, Programming, Computer Networks, Database Systems, and Information Systems courses.
- ▶ Developed course materials, laboratory exercises, practical assignments, and assessments.
- ▶ Provided hands-on training in programming, computer applications, networking, and system administration.
- ▶ Mentored students on academic performance, practical projects, and career development.

Research Grants and Funded Projects

Research Team Participant / Collaborator

- ▶ National Natural Science Foundation of China (NSFC), Grant Nos. 62373255 and 62171104.
- ▶ National Key R&D Program of China, Grant No. 2018YFE0117500.
- ▶ Shenzhen Natural Science Fund, Grant No. 20220809175803001.
- ▶ Guangdong Natural Science Foundation, Grant No. 2024A1515011204.
- ▶ Open Fund of National Engineering Laboratory for Big Data System Computing Technology, Grant No. SZU-BDSC-OF2024-15.

Role: Contributed to AI algorithm development, machine learning model design, experimental validation, technical publications, and collaborative research in nationally funded projects.

Research Publications

1. **M. L. Betalo**, A. Mohamed, A. Sharafian, Z. Wu, J. Li, and X. Bai, “Meta-Learning-Enhanced Task Assignment and Resource Scheduling for UAV-Assisted Wireless Sensor Networks in 6G-Enabled Intelligent Transportation Systems,” *IEEE Transactions on Mobile Computing*, 2026. DOI: [10.1109/TMC.2026.3696005](https://doi.org/10.1109/TMC.2026.3696005)
2. **M. L. Betalo**, I. Ullah, F. B. Tesema, Z. Wu, J. Li, and X. Bai, “Generative AI-Driven Multi-Agent Deep Reinforcement Learning for Task Allocation in UAV-Assisted EMPD within 6G-Enabled SAGIN Networks,” *IEEE Internet of Things Journal*, 2025. DOI: [10.1109/JIOT.2025.3579780](https://doi.org/10.1109/JIOT.2025.3579780)
3. **M. L. Betalo**, Z. Wu, J. Li, X. Bai, W. Zhang, and S. S. Ge, “RIS-Assisted UAV-Based Dynamic Coverage Control for 6G-Enabled Internet of Everything Using Multi-Agent Deep Reinforcement Learning,” *IEEE Transactions on Automation Science and Engineering*, 2025. DOI: [10.1109/TASE.2025.3638763](https://doi.org/10.1109/TASE.2025.3638763)
4. **M. L. Betalo**, S. Leng, A. M. Seid, H. N. Abishu, and X. Bai, “Dynamic Charging and Path Planning for UAV-Powered Rechargeable Wireless Sensor Networks Using Multi-Agent Deep Reinforcement Learning,” *IEEE Transactions on Automation Science and Engineering*, 2025. DOI: [10.1109/TASE.2025.3558945](https://doi.org/10.1109/TASE.2025.3558945)
5. **M. L. Betalo**, A. M. Seid, H. N. Abishu, S. Leng, M. Fakirah, A. Erbad, and M. Guizani, “Multi-Agent Deep Reinforcement Learning-Based Energy Harvesting for Freshness of Data in UAV-Assisted Wireless Sensor Networks,” *IEEE Transactions on Network and Service Management*, 2024. DOI: [10.1109/TNSM.2024.3454217](https://doi.org/10.1109/TNSM.2024.3454217)
6. **M. L. Betalo**, S. Leng, H. N. Abishu, F. A. Dharejo, A. M. Seid, A. Erbad, R. A. Naqvi, and M. Guizani, “Multi-Agent Deep Reinforcement Learning-Based Task Scheduling and Resource Sharing for O-RAN-Empowered Multi-UAV-Assisted Wireless Sensor Networks,” *IEEE Transactions on Vehicular Technology*, 2024. DOI: [10.1109/TVT.2023.3330661](https://doi.org/10.1109/TVT.2023.3330661)
7. I. Ullah, H. Bilal, A. Sharafian, **M. L. Betalo**, S. A. Samy, and X. Bai, “The Internet of Nature Things: A New Frontier in Environmental Monitoring and Sustainable Ecosystem Management,” *IEEE Internet of Things Journal*, 2026. DOI: [10.1109/JIOT.2025.3642935](https://doi.org/10.1109/JIOT.2025.3642935)
8. F. Wayesa, **M. L. Betalo**, G. Asefa, and A. Kedir, “Pattern-Based Hybrid Book Recommendation System Using Semantic Relationships,” *Scientific Reports*, 2023. DOI: [10.1038/s41598-023-30987-0](https://doi.org/10.1038/s41598-023-30987-0)
9. E. Bekele, T. Beshah, and **M. L. Betalo**, “Bidirectional English to Wolaytta Machine Translation Using Hybrid Approach,” *International Journal of Soft Computing and Engineering*, 2025. DOI: [10.35940/ijscce.B1028.15020525](https://doi.org/10.35940/ijscce.B1028.15020525)
10. **M. L. Betalo**, S. Leng, L. Zhou, and M. Fakirah, “Multi-UAV Data Collection and Trajectory Planning in Wireless Sensor Networks,” in *Proc. IEEE International Conference on Computer Communication and Artificial Intelligence (CCAI)*, Beijing, China, May 2022. DOI: [10.1109/CCAI55564.2022.9807699](https://doi.org/10.1109/CCAI55564.2022.9807699)
11. **M. L. Betalo**, S. Leng, X. Chen, and L. Zhou, “Joint Optimization for Cluster Head Selection in UAV-Assisted Wireless Sensor Networks,” in *Proc. International Conference on UK-China Emerging Technologies (UCET)*,

2021.  DOI: [10.1109/UCET54125.2021.9674955](https://doi.org/10.1109/UCET54125.2021.9674955)
12. M. Fakirah, S. Leng, M. A. Mohammad, and **M. L. Betalo**, “Improving User Data Rate Performance for Hybrid RF/VLC Outdoor Vehicular Communications,” in *2022 IEEE 22nd International Conference on Communication Technology (ICCT)*, 2022.  DOI: [10.1109/ICCT56141.2022.10073397](https://doi.org/10.1109/ICCT56141.2022.10073397)
13. M. Fakirah, S. Leng, M. A. Mohammad, and **M. L. Betalo**, “Hybrid VLC/RF Misalignment System for Autonomous Vehicles at Roundabouts in *Proc. IEEE International Conference on Electronics Technology (ICET)*, 2023.  DOI: [10.1109/ICET58434.2023.10211918](https://doi.org/10.1109/ICET58434.2023.10211918)

Teaching Experience

- ▶ Artificial Intelligence
- ▶ Machine Learning and Data Science
- ▶ Cybersecurity Fundamentals
- ▶ Network and Systems Security
- ▶ Information Security Management
- ▶ Internet of Things Security
- ▶ Cloud and Edge Computing Security
- ▶ Programming Languages using Python, Java, and C++
- ▶ Computer Networks
- ▶ Database Systems
- ▶ Data Structures and Algorithms
- ▶ Operating Systems
- ▶ Software Engineering
- ▶ Computer Architecture
- ▶ Web Programming and Web Security
- ▶ Information Systems
- ▶ Wireless Communications
- ▶ Distributed Systems
- ▶ Linux and Network Administration
- ▶ Research Methods

Student Supervision and Mentorship

- ▶ Supervised undergraduate and postgraduate research projects in computer science, networking, wireless communications, and intelligent computing.
- ▶ Mentored students in research design, literature review, experimentation, manuscript preparation, and technical presentation.
- ▶ Supported graduate students in AI, wireless networking, UAV-assisted systems, and optimization-based research.

Professional Service and Reviewer Roles

- ▶ Completed more than 100 peer reviews for journals, conferences, and funding-related academic evaluations.

Research Impact

- ▶ Published numerous peer-reviewed papers in IEEE Transactions and other leading international journals.
- ▶ Developed AI frameworks integrating Generative AI, Digital Twins, Federated Learning, and Multi-Agent Reinforcement Learning.
- ▶ Contributed to nationally funded AI, UAV, wireless communication, and intelligent networking research projects.
- ▶ Collaborated with international research teams across Canada, China, Ethiopia, and other global research networks.

Awards and Honors

- ▶ Best Session Speaker – National Research Conference.
- ▶ Best ICT Supervisor – Ethiopian National Election Board.
- ▶ Best Sports Award – University of Electronic Science and Technology of China.

Training and Certifications

- ▶ UAV Flight Control.
- ▶ Wireless Network Administration.
- ▶ Computer Maintenance.

Languages

- ▶ English – Fluent.

- Amharic – Native.
- Wolaita – Native.

Academic References

1. **Dr. Merkebe G. Demissie** (Associate Professor, University of Calgary, Alberta, Canada)
Current Research Supervisor, Email: merkebe.demissie@ucalgary.ca
2. **Prof. Xiaoshan Bai (Research Professor, Shenzhen University, China)**
Former Research Supervisor, Email: baixiaoshan@szu.edu.cn
3. **Prof. Supeng Leng** (Professor, of Electronic Science and Technology of China (UESTC), China)
Ph.D. Supervisor, Email: spleng@uestc.edu.cn
4. **Dr. Ahmad Ali** (Assistant Professor, Department of Computer Science and Technology, Hainan Bielefeld University of Applied Sciences)
Former Staff member, Email: ahmad.ali@hibiuh.edu.cn
5. **Dr. Yishak Gecho** (Associate Professor, Wolaita Sodo University, Ethiopia)
Former Staff member, Email: yishakgecho@gmail.com
6. **Dr. Fiseha Berhanu Tesema** (Assistant Professor, University of Nottingham Ningbo China)
Former Staff member, Email: Fiseha-Berhanu.Tesema@nottingham.edu.cn