ELECTRICAL & COMPUTER ENGINEERING + IEEE + CAPS JOINT SEMINAR ANNOUNCEMENT

Distributed Machine Learning over Wireless Networks: From Classical to Quantum Approaches

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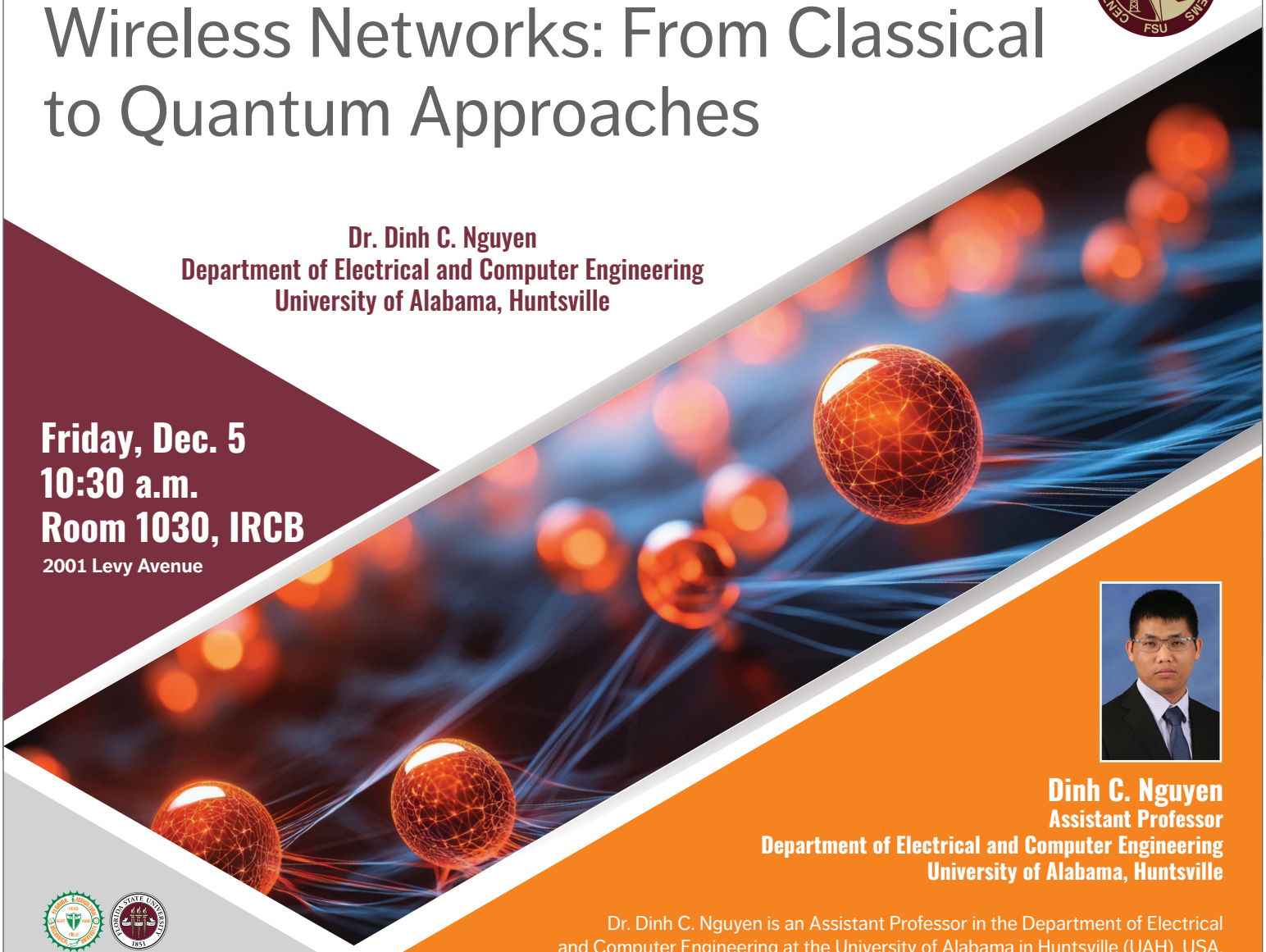
Friday, Dec. 5
10:30 a.m.
Room 1030, IRCB
2001 Levy Avenue



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Dr. Dinh C. Nguyen is an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Alabama in Huntsville (UAH), USA. He is leading the Networking, Intelligence, and Security (NIS) group at UAH, focusing on federated learning, quantum machine learning and their applications in wireless Internet of Things and smart grids. He has authored over 70 publications in leading IEEE/ACM journals and conferences, including the IEEE Journal on Selected Areas in Communications, IEEE Transactions on Mobile Computing, and IEEE Conference on Quantum Computing and Engineering (QCE). He serves as an Associate Editor for the IEEE Transactions on Network Science and Engineering and the IEEE Internet of Things Journal. His research is currently supported by the National Science Foundation (NSF).

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The emergence of distributed machine learning has transformed how intelligent systems are designed and deployed across wireless networks. This talk will explore the progression of Federated Learning (FL) and its quantum counterpart toward developing scalable, secure, and efficient distributed intelligence in wireless systems. The talk will consist of two main parts. The first part focuses on FL over wireless networks, emphasizing key design aspects such as communication resource allocation and security mechanisms to ensure reliable machine learning model training under realistic network constraints. The second part expands the discussion to Quantum Federated Learning (QFL), addressing the challenges posed by limited qubit counts in near-term quantum devices through innovative qubit reuse strategies and enhanced model explainability to improve transparency and trust in quantum-driven learning systems. Real-world applications of FL and QFL will be showcased in Internet of Things (IoT) applications including smart grid. Finally, we will outline open challenges and promising research directions toward achieving trustworthy, high-performance, and quantum-driven distributed learning over wireless networks.