

## SenSIP Seminar Series

### Quantum Classification for Synthetic Aperture Radar

Presenter: Salil Naik, NSF IRES Student, SCAI

April 18th, 2024, 2:00 PM / GWC 487 or Zoom: <https://asu.zoom.us/j/81297188448>

**Abstract:** The field of quantum computing, especially quantum machine learning (QML), has been the subject of much research in recent years. The special property to place qubits into a superposition state within a quantum computer allows for an exponential decrease in computation costs. With the promises of increased speed and accuracy in the quantum paradigm, many classical machine learning algorithms have been adapted to run on quantum computers, typically using a quantum-classical hybrid model. This seminar will discuss the applications of quantum-hybrid convolutional neural networks (QCNN's) for classification of Synthetic Aperture Radar (SAR) images. While some work has been done to compare classical and quantum classification algorithms in the Electro-Optical (EO) image domain, the work presented in this seminar will compare the performance of traditional convolutional neural networks (CNN's) and QCNN's on X-band SAR data using the MSTAR dataset. While we see the quantum simulations achieve slightly lower accuracies than their classical counterparts, this is an expected result given the current state of the field. Nevertheless, the results of this work are promising and the true performance benefits of QML will become more apparent as quantum hardware matures

#### Biography:



Salil Naik is currently in his Sophomore year pursuing a Bachelor's in Computer Science from Arizona State University. He is set to graduate in Fall 2026 with both his Bachelor's and a Master's degree in Computer Science with a focus in machine learning. Salil started his work at SenSIP through the NSF International Research Experience for Students (IRES) Cyprus program. Through this program, he had the opportunity to travel to the country of Cyprus and collaborate with the renowned KIOS lab at the University of Cyprus to conduct research in quantum machine learning (QML) for photovoltaic fault detection. More specifically, he researched a novel field of QML called Quantum Positive Unlabeled (QPU) Learning. This experience culminated in a research paper which he presented at the 15th Cyprus Workshop on Signal Processing and Informatics (CWSPI). Salil is currently continuing his work as an undergraduate researcher at SenSIP. He will be presenting his paper on Quantum Classification for Synthetic Aperture Radar at the 2024 SPIE Defense + Commercial Sensing conference in late April 2024.

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