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# SenSIP Seminar Series

## Signal Analysis, Synthesis and Compression using Quantum Fourier Transform

Presenter: Aradhita Sharma, MS Candidate in ECEE

February 9, 2023, 3:00 PM / GWC 487 and Zoom: https://asu.zoom.us/j/84151985290

## Abstract

The field of quantum computing has gained attention due to its ability to outperform classical techniques and achieve faster computation. One crucial aspect of quantum computing is the Quantum Fourier Transform (QFT), which plays a central role in many quantum algorithms and has been shown to provide exponential speedup compared to classical methods. The similarity between QFT and the Discrete Fourier Transform (DFT) opens up the possibility of exploring its applications in signal processing.

In this presentation, the utilization of Quantum Fourier Transforms (QFT) in signal processing will be explored. An overview of the fundamental concepts of quantum computing, including quantum mechanics, quantum gates, and the QFT circuit will be provided. Encoding a signal into quantum states will be explained, and the signal analysis synthesis and signal compression using QFTs will be discussed.
A QFT simulation tool based on JDSP will be introduced for hands-on learning and its application for signal analysis and synthesis will be explained. Furthermore, similar to this process for 1D signal, 2D images can be encoded as quantum states.

The ongoing research is to use DCTs in the quantum domain to implement image compression, and to implement linear prediction using quantum computing for speech compression

**Biography:**

Aradhita Sharma earned her undergraduate degree in Electronics and Communication Engineering from the National Institute of Technology (NIT) in Hamirpur, India in 2021. She is currently pursuing a master's degree in the School of Electrical, Computer, and Energy Engineering at Arizona State University in Tempe, AZ.

She interned with Analog Devices in the summer 2022 where she worked on a project involving speech-based proximity detection using machine learning techniques. Her research focus is on quantum computing in signal processing, and applications of machine learning in signal processing, with a specific interest in speech and audio applications.

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