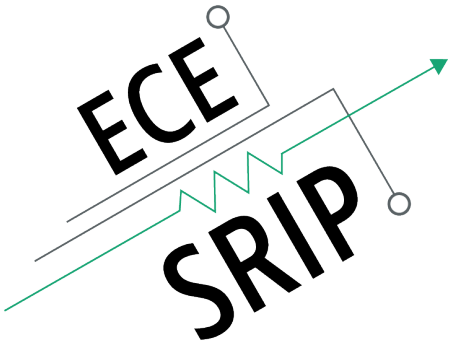


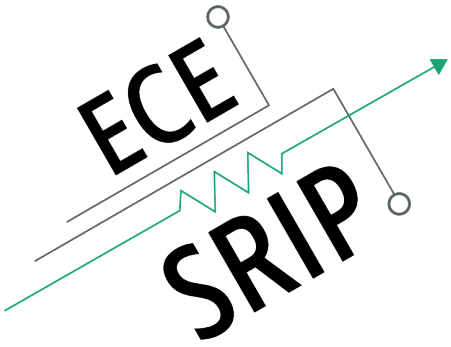
FACULTY MENTOR
Gerstoft, Peter

PROJECT TITLE
Sparse modeling and machine learning in geoscience

PROJECT DESCRIPTION
Sparse modeling and machine learning methods have recently shown great promise in the analysis of Earth acoustic and seismic data. Sparse models approximate signals of interest using few vectors, called atoms, from a potentially large dictionary of atoms. Dictionary atoms can be generic functions, e.g. wavelets or sinusoids, or can be learned directly from the data via dictionary learning, a form of unsupervised machine learning. Sparse models with learned dictionaries have achieved widespread use and success in many tasks including image restoration and medical imaging. In this project you will have the opportunity to work with seismic and ocean acoustic data, including temperature measurements and waveform recordings from sensor arrays, to apply sparse modeling and machine learning concepts to their analysis, and potentially obtain improved models of the solid earth or dynamic oceans.

INTERNS NEEDED
1 MS

PREREQUISITES
Strong programming skills with some statistics background



FACULTY MENTOR
Gerstoft, Peter

PROJECT TITLE
MIMO Array Processing for Atmospheric Duct Detection

PROJECT DESCRIPTION
Remote electromagnetic sensing is progressing towards multiple input multiple output (MIMO) systems due to several theoretical advantages over their single element counterparts. One example of the emergence of MIMO systems is the proposed 5th generation (5G) wireless cell network. This project will enlist one student to assist the setup, data collection, and signal processing chain of a 24x4 MIMO radar for the purpose of monitoring costal atmospheric conditions. The goal is to develop a mapping between atmospheric refractivity (which is known to facilitate abnormally long range wireless communication) and the received angular power spectrum of the MIMO system.

INTERNS NEEDED
2 MS

PREREQUISITES
Strong programming skills with some statistics background