RUI CHEN

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EDUCATION

Massachusetts Institute of Technology (MIT)   Cambridge, MA
Woods Hole Oceanographic Institution (WHOI)   Woods Hole, MA
Ph.D. Candidate, MIT-WHOI Joint Program   Expected June 2021
Applied Ocean Science and Engineering   GPA: 4.9/5
Relevant Coursework: Array processing, Discrete-time signal processing, Environmental ocean acoustics, Applied machine learning, Unmanned marine vehicle autonomy, sensing & communications, Stochastic systems

Northwestern University   Evanston, IL
B.A. with Honors, *Magna Cum Laude*   June 2016
Majors in Integrated Science, Physics, Earth Science   GPA: 3.88/4
Outstanding Student in Physics (2014, 2015)
Inductee, Phi Beta Kappa Society

RESEARCH EXPERIENCE

Arctic Ocean Underwater Ambient Noise   July 2016 - Present
Graduate Research Assistant, MIT-WHOI   Cambridge, MA

· Investigate environmentally-induced changes to Arctic underwater ambient noise using signal processing techniques including time-frequency analysis, beamforming, and transient event detection & estimation using Matlab and Python
· Model and correlate underwater acoustic propagation to environmental variability using raytracing (Bellhop), wavenumber integration (OASES), and normal modes (Kraken)
· Develop a convolutional neural network approach using Tensorflow and Keras to estimate range of surface noise sources that exhibit more robustness to environmental mismatch compared to conventional matched field method
· Implement image processing and hierarchical clustering with Python and OpenCV to automatically detect and group transient noise features in data spectrograms; allows for easier categorization of transients compared to amplitude-based approach

Arctic Ice Cover Cryo-seismic Monitoring   December 2018 - Present
Graduate Research Assistant, MIT-WHOI   Woods Hole, MA

· Collaborate with WHOI scientist to monitor Arctic ice cover activity near the coast of northern Alaska with a deployed planar geophone array to better understand ambient noise generation
· Design and implement an event detection and localization algorithm that combines match filtering followed by time-difference-of-arrival estimate using Matlab; able to locate events within array perimeter with $< 10\%$ error

Cold, Diffuse Interstellar Clouds   September 2014 - June 2016
Undergraduate Research Assistant, Northwestern University   Evanston, IL

· Extracted and analyzed star UV spectrum data from telescope databases to determine cloud distance and density using the image reduction and analysis facility program (IRAF) to better understand star formation within these clouds

Tsunami Danger Threshold Modeling   Summer 2015
Student Research Project, Pacific Tsunami Warning Center   Honolulu, HI

· Formulated a current velocity threshold for tsunami warning issuance by employing a 1-D shallow water model in Matlab to simulate tsunami events and quantifying the human and economic impacts of the waves

TECHNICAL PROJECTS

AUV Mission for Temperature Front Estimation   MIT Marine Vehicle Autonomy Course

· Leveraged autonomy software (MOOS-IvP) and C++ to plan an adaptive underwater vehicles behavior for autonomous sampling of a temperature front in the Charles River
· In simulation, the resultant mission enabled collaboration between two independent vehicles with acoustic message passing; reduced the required mission time compared to standard lawn-mower path planning

Web Application for Logging Board Game Results   Personal Interest

· Utilized JavaScript and HTML to build a NodeJS application that allows for easy documentation of board game results and calculates player performance statistics; the logged data are automatically stored in a MongoDB and displayed through a web interface

RESEARCH EXPEDITIONS

U.S. Navy Ice Exercise 2020 (ICEX2020) — March 2020
Arctic Ocean

· Collaborated with labmates to facilitate the deployment of a Bluefin-21 autonomous underwater vehicle with a towed line array for noise data collection below the Arctic ice cover

Sea Ice Dynamics Experiment (SIDEx) — December 2018
Barrow, AK

· Assisted in the deployment and calibration of a planar geophone array on the ice cover near Elson Lagoon to monitor cryo-seismic activities

PUBLICATIONS

R. Chen, A. Poulsen, and H. Schmidt, "Spectral, spatial, and temporal characteristics of underwater ambient noise in the Beaufort Sea in 1994 and 2016," J. Acoust. Soc. Am. **145**, 605–614 (2019), doi.org/10.1121/1.5088601.

R. Chen and H. Schmidt, "Temporal and spatial characteristics of the Beaufort Sea ambient noise environment," J. Acoust. Soc. Am. **148**, 3928-3941 (2020), doi.org/10.1121/10.0002955.

R. Chen and H. Schmidt, "Model-based convolutional neural network approach to underwater source-range estimation," J. Acoust. Soc. Am. **149**, 405-420 (2021), doi.org/10.1121/10.0003329.

TEACHING & ADVISING

Graduate Peer Career Advisor — MIT Career Advising & Professional Development, September 2019 - Present

· Conducted >50 individual career advising appointments with undergraduate and graduate students to review resumes/cover letters and offer career counseling; 100% of students rated sessions as extremely helpful

Course Facilitator — MIT edX, November 2019 - May 2020

· Prepared and facilitated weekly online lessons for ∼20 students (industry professionals) on machine learning topics as part of MIT edX's MicroMasters program on Statistics and Data Science

Teaching Assistant — MIT Environmental Ocean Acoustics Course, Fall 2018 & 2020

· Led weekly recitations and advised students on coding projects in underwater acoustics modeling; guided novel programmers to produce functional raytracing, normal modes, and wavenumber integration codes

LEADERSHIP

Webmaster, Tour Coordinator, President (since September 2020) — MIT Concert Band, May 2019 - Present

· Actively maintain the concert band website and advertise band events; organize weekly music programs such as listening sessions and master classes to keep members engaged virtually
· Spearheaded the planning of the band's 2019 performance tour in Washington D.C.; communicated with MIT administrators and various vendors to finalize travel logistics for ∼40 band members and band equipment

President — MIT-WHOI Joint Program Student Representatives, October 2019 - October 2020

· Lead monthly representatives meeting and help manage the group's budget
· Collaborate with other representatives to organize program events such as student orientation, academic talks, social engagements, and diversity & inclusion efforts

SKILLS

Computer: Proficient in Matlab, Python, C++, OASES, Bellhop, Kraken. Familiar with HTML, JavaScript, NodeJS, React.
Language: Native fluency in English, Mandarin Chinese.