Chen Peng

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Research interests

Underwater acoustic communication, network scheduling, cognitive radio, decision making under uncertainty

Education

2020 – Present　**University of Southern California** – Los Angeles, CA
PhD in Electrical Engineering
Advisor: Professor Urbashi Mitra. *GPA: 3.92.*

Selected coursework
Random Processes, Estimation Theory, Convex Optimization, Data Networks, Wireless Communication, Information Theory

2016 – 2020　**Shanghai Jiao Tong University** – Shanghai, China
BS in Electrical and Computer Engineering, Minor in Data Science
GPA: 3.72.

2019　**North Carolina State University** – Raleigh, NC
Undergraduate Exchange Program
GPA: 4.0.

Publications

2022　**Decentralized Scheduling of a Cognitive Multihop Underwater Acoustic Network with Interference Constraint**
Chen Peng, Urbashi Mitra.
Accepted by The 16th International Conference on Underwater Networks & Systems.

2022　**Interference-Constrained Scheduling of a Cognitive Multihop Underwater Acoustic Network**
Chen Peng, Urbashi Mitra.
Submitted to IEEE Journal of Oceanic Engineering.

Research experience

Jan 2021 – Aug 2022

Cognitive Scheduling for Multihop Underwater Acoustic Networks

Advisor: Professor Urbashi Mitra (USC).

The major goal of this project is to investigate optimal scheduling for a cognitive multihop underwater acoustic network with a primary user interference constraint. The network consists of primary and secondary users, with multihop transmission adopted for both user types to provide reliable communications. Key characteristics of underwater acoustic channels, including large propagation delay, distance-and-frequency dependent attenuation, half-duplex modem and inter-hop interference are taken into account in the design and analysis. In particular, time-slot allocation is found to be more effective than frequency slot allocation due to the underwater channel model. The goal of the network scheduling problem is to maximize the end-to-end throughput of the overall system, while limiting the throughput loss of primary users. Both centralized and decentralized approaches are considered. The framework of Partially Observable Markov Decision Processes (POMDP) is applied to formulate the optimization problem and an optimal dynamic programming algorithm is derived. However, the optimal dynamic programming solution is computationally intractable. Key properties are shown for the objective function, enabling the design of approximate schemes with significant complexity reduction. Numerical results show the proposed schemes significantly increase system throughput and while maintaining the primary throughput loss constraint. Under certain traffic conditions, the throughput gain over frequency-slot allocation schemes can be as high as 55%.

Aug 2022 – Present

Multiuser Spatial Division Scheduling in Underwater Acoustic Networks with Fairness

Advisor: Professor Urbashi Mitra (USC).

In this project, we consider a multiple-input single-output underwater acoustic OFDM communication system. The POMDP framework is combined with spatial division multiple access and beamforming ideas to explore scheduling opportunities in the spatial domain. We explore the multi-user scenario where user mobility is taken into consideration. As the scheduling problem faces the issue of high computation complexity due to the exponentially large state space, we will explore simplification ideas to reduce dimensionality reasonably. Moreover, we also introduce a fairness measure into the scheduling problem to ensure that users with different traffic statistics are served fairly.