Faculty: Amy Pickering, Assistant Professor, School of Engineering

Project Locations: 2 weeks in Medford, 6 weeks in Vellore, India

Dates: flexible between May 21, 2018 – September 1, 2018

Project Title: Development of a Novel Environmental Monitoring System for Detecting Antimicrobial Resistance Genes

Project Details: The spread of antibiotic resistance is a critical threat to human health. Antimicrobial resistant infections are more prone to treatment failure, which in turn increases mortality rates, treatment time, and health care costs (WHO 2014). Environmental reservoirs of antimicrobial resistance (AMR) are not well understood, in part because there has been limited standardized monitoring (Berendonk et al. 2015). Standardized environmental monitoring methods are needed to better target control strategies to protect the most vulnerable populations. High-throughput sequencing is a promising tool for building improved AMR monitoring systems. The MinIon is a new pocket-sized, portable sequencing device that costs only $1000 and generates long sequence reads by passing DNA/RNA through nanopores (Jain et al. 2016). Sample preparation can be done in as little as 20-40 minutes and the output analyzed with a laptop in real-time. This technology has the potential to make environmental monitoring of AMR globally accessible. This project aims to optimize and standardize use of the MinIon for the detection of AMR in environmental samples, and field test the protocol on environmental samples from Boston and India. Wastewater and environmental water samples have been collected from the Boston area and will be sequenced with the MinIon between Jan-May.

We are seeking a research assistant to participate in the sample collection, processing, and analysis in our India field site during the summer. The student will spend a short amount of time learning the protocol in the PI's lab at the Tufts Medford campus (up to 2 weeks), then will travel to India with the postdoctoral fellow working on this project. In collaboration with our partner, Christian Medical College, the student will assist with field, lab, and data analysis work for 6 weeks.

Tasks and Responsibilities of Research Assistant: The student will be responsible for assisting with sample collection in India, pre-processing of the samples (e.g. filtration), DNA extraction, and sequencing the samples with the MinIon. The student will also participate in data analysis of the sequencing data to identify antimicrobial resistance genes. If the student is interested, she/he will also be able to use the sequencing data to explore additional hypotheses, such as diversity of pathogens in the environmental samples from India compared to Boston.

Qualifications:

Required:

- Experience working in a lab
- Interest in global health
- Programming experience or willingness to learn programming relevant for bioinformatics analysis

Preferred:

- Experience traveling internationally
- Experience with molecular techniques

Housing in India: Students will stay on the campus of Christian Medical College in Vellore, India.