With the increase in the number of wireless devices, spectrum has become increasingly expensive over the last few years. This increase in the cost of spectrum has made it essential for regulatory authorities to detect and/or localize illegal transmitters. Such patrolling of spectrum needs to be done with low-cost sensors and using minimal amount of energy to keep its overhead low. We propose using cheap, crowdsourced sensors to perform low-cost spectrum patrolling. To realize the goal, we must overcome challenges such as noisy outputs from low cost devices and high data and energy cost of running the sensors.

In the first part of this talk, I will explain how multiple low-cost sensors can outperform expensive sensors. Our approach is a data-driven technique to model individual sensors and their hardware imperfections. We then adapt a sensor fusion algorithm to combine the results from the individual sensors to improve the accuracy of individual sensors. We validate both our data-driven technique and sensor fusion algorithm on actual sensor data.

In the second part of this talk, I will discuss how to improve the energy-efficiency of a crowdsourced spectrum system by selecting the most relevant sensors. Selecting the optimal subset is known to be NP-Hard and thus, intractable for a large number of sensors. We, therefore, propose an approximation algorithm that guarantees a constant performance bound with the optimal subset. We prove that our algorithm outperforms some baseline techniques in practical environments, while scaling across thousands of sensors.

- A part of this work was presented at IEEE Infocom 2018.

**Speaker Bio:** Arani Bhattacharya is a Ph.D. candidate working with Professor Samir R. Das at Stony Brook University. He works on improving the reliability and scalability of systems using algorithms and machine learning. Arani was a Ph.D. student at SUNY Korea working on edge computing before he relocated to Stony Brook University as part of the Ph.D. program at SUNY Korea.