

Project Title: Thermal Management of Biosensor Networks

A biosensor is a device whose sensing elements are biological materials like enzymes. They can be implanted into the human body to monitor organs and detect physiological changes. They generate heat as a result of their operation and need for recharge. The generated heat can damage the tissues surrounding the biosensors. Therefore, there is a need for effective thermal management techniques for biosensors.

In this project, the frameworks of Markov Chains (MCs) and Markov Decision Processes (MDPs) are used as the main tools for modeling and analyzing biosensor networks. One possible flow is to first use MDPs to obtain the optimal policy for operating a biosensor network. Then, after characterizing the optimal policy, MCs are used to evaluate its performance.

MDPs models can be solved using dynamic programming and linear programming. Both techniques will be used. Due to the exponential nature of the MDP-based model, state reduction techniques need to be investigated.

This project can be divided into several tasks. Some of these tasks can be carried out as course projects.

Students interested in pursuing this project as their primary thesis topic are welcome.