Actuator Placement for Distributed Chemical Engineering Processes

Many industrially important processes in chemical engineering exhibit significant spatial variation due to intimate coupling between chemical reactions and fluid flow and thermal and mass transport. These processes are commonly plagued by actuator failure, after some time, due to their misplacement and the hostile process environment. The present project focuses on quantitatively addressing this issue of actuator placement for such chemical processes through the formulation and solution of optimization problems. This is a three-phase project; the latter two phases can be pursued in parallel.

Phase 1: Literature review of optimal placement approaches spanning chemical, mechanical and civil engineering. Laying the mathematical foundations for the project and defining individual objectives.

Phase 2: Laying the computational foundations for the project. A working knowledge of programming in Matlab will be a partial objective of this phase. A working knowledge of optimization will be the second objective of phase 2.

Phase 3: Solution of the optimal actuator placement problem and analysis of the results.