

Abstract Title: Dynamic Reconfiguration in Modular Robots using Graph Partitioning

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In this presentation, we will describe the research on the ongoing NASA EPSCoR funded ModRED project. We will present our approach to solving the problem of dynamic self-reconfiguration by a modular self-reconfigurable robot (MSR) called ModRED. We have modeled the self-reconfiguration problem as a constrained optimization problem that attempts to minimize the reconfiguration cost while achieving a desirable configuration. We have represented the set of all robot modules as a fully-connected graph and used a graph partitioning technique to cluster the vertices (robot modules) together. We have verified our technique experimentally for different settings on a model of ModRED within the Webots simulator. Our results show that the graph clustering-based self-reconfiguration algorithm performs comparably with two other existing algorithms for clustering robot modules.