BOSTON UNIVERSITY

COLLEGE OF ENGINEERING

Thesis Proposal

3-DIMENSIONAL MODEL-BASED DYNAMIC FEEDBACK CONTROL FOR SOFT ROBOTS
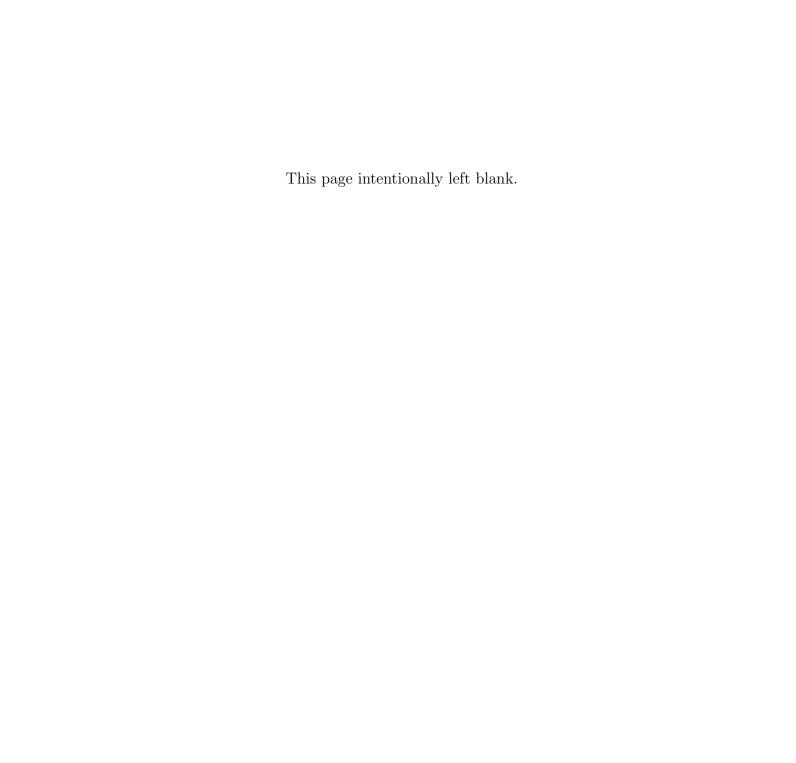
by

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Contents

1 Abstract

The physical characteristics of soft robots inherently promise an ability to perform complex motions, as well as to safely and compliantly interact with sensitive environments. While trajectory tracking and environmental interaction control strategies for planar motion have been developed along with motion plans for it, it has yet to be robustly translated to three dimensions. This thesis thus aims to develop a three-dimensional, model-based, closed loop dynamic controller for continuous soft robots. To develop a robust formulation of this controller, gravitational loads that could potentially violate model assumptions must be dynamically accounted for. Kinematic singularities inherent to the dynamic model used must also be analytically or numerically managed. A suitable dynamic model to underpin the control system must then either be formulated, augmented from an existing one, or selected. Then the model must be validated either analytically or simulatively, before the control system can subsequently be built around it. Then finally, the controller may be validated through hardware implementation.

2 Topic Background

Background

3 Prior Work

4 Research Approach

Research approach

5 Proposed Timeline

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