Abstract

Masters of Engineering Degree (Mechanical)

Project Title:

Controller Design for a Steerable Self Stabilizing Bicycle

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Abstract:
The goal of this project is to create a controller for a bicycle that self-stabilizes. This controller should receive a reference steering angle and then make the bicycle follow this reference while staying upright.

The approach undertaken to create the controller is as follows. The model for the bicycle chosen is based on a simplified version of the linearized equations of motion. Two controllers were then created using this model: one for bicycle stability, and another for bicycle stability and steering reference tracking. These controllers were then implemented in simulation and they were shown to meet the specifications.

In the future it is desired to implement the controller on a real bicycle, which will be able to self-stabilize and navigate using position data. This controller will also be used to create a steer-by-wire bicycle in which the rider turns a handlebar that is essentially a joystick. The microcontroller implementing the controller will then turn the steering wheel as needed, thus causing the bicycle to turn stably. Such a bicycle will be able to be ridden by people who do not know how to ride a bicycle or who cannot stabilize it themselves.

Report Approved By:

Project Advisor:_____ Date:_____

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