شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

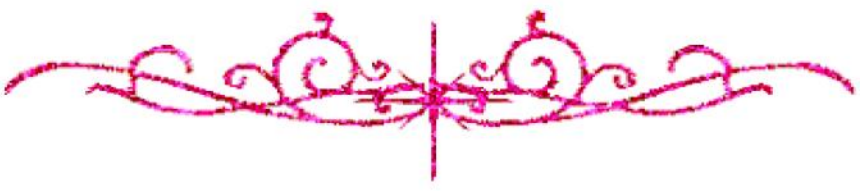
نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

شبكة المعلومات الجامعية

بعض الوثائق الأصلية تالفة



بالرسالة صفحات
لم ترد بالأصل

APPLICATION OF L1 ADAPTIVE CONTROL TO A TWO-WHEEL SELF-BALANCING SYSTEM

By

Abdelrahman Osama Ahmed Mahgoub Ali

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCEINCE
in
Electrical Power and Machines Engineering

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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Application of L1 Adaptive Control to a Two-wheel Self-balancing System

Key Words:

Robust adaptive control – Discrete-time adaptive control – Intelligent control – Balancing robot – Simscape multibody

Summary:

In this thesis, a wheeled self-balancing robot is introduced as a benchmark mechanism to examine the performance of an L1 adaptive controller compared to a linear-quadratic regulator. The thesis focuses on the improvement of the reliability of the obtained results based on the benchmark system by introducing an ad-hoc technique to accurately simulate the wheeled mechanism. The aim of the thesis is to reduce the level of approximation that inevitably exist in the analytical models. The deployed technique is verified via matching the developed linearized model and the analytical model. The grasped results show great proximity between the model of the proposed technique and the conventional mathematical models introduced in the literature. The overall benchmark mechanism accommodates the unmodeled dynamics, limitations, and uncertainties of the system without mathematical hardships.

Table of Contents

List of Tables