Bastian Lang

From MAS-Students_ss15

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Topic: Real World Optimization of Energy Efficient Vehicle Control
Author: Bastian Lang
Advisors: Prof. Dr. Alexander Asteroth
Date: 22-10-2015
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Contents

Abstract

Introduction

Problem Formulation

What is this project about?

- Creating an energy efficient vehicle control for a real-world e-bike
- Transferring and evaluating the controller on the real device
- Applying ways to cross the reality gap
- Improving the vehicle model

Why is it relevant?

- Energy-efficiency is important in transportation as even small improvements result in huge savings of energy
- There is still much room for improvements as even simple driver-training programs have yielded impressive results

What have other people done in this field?

- Use of optimal control theory
- Use of graph search algorithms
- Use of heuristics to prune search space
- Use of inverted system equations to avoid discretization
- Applying noise to the EA to make solutions robust
- Use of transferability measure to estimate real world performance
- Application of evolutionary algorithms to evolve a controller in simulation

Why is that not sufficient?

- Complexity and computation speed is not good enough for real time application
- Not all system equations can be inverted and it is non-trivial
- Vehicle control only developed in simulation without preparations for transfer to real world

- Transfer algorithms do not have many real world applications so far, only proof of concepts

What is the deficit addressed in this project?

- The controller so far has only been developed in simulation and not on the real device

State of the Art

Reading Reports

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Abstract: todo

Keywords: todo

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References

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Appendix

A. Online literature search

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B. Sources

'''B.1 List of searched journals

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'''B.2 List of searched conference proceedings

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'''B.3 List of searched magazines

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'''B.4 Other searched publications

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C. List of top research labs/researchers

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