University of Liège - Faculty of engineering

Master thesis

Simulation of complex actuators

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Abstract

Lorem ipsum dolor...

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Introduction

1.1 Introduction

This is the introduction

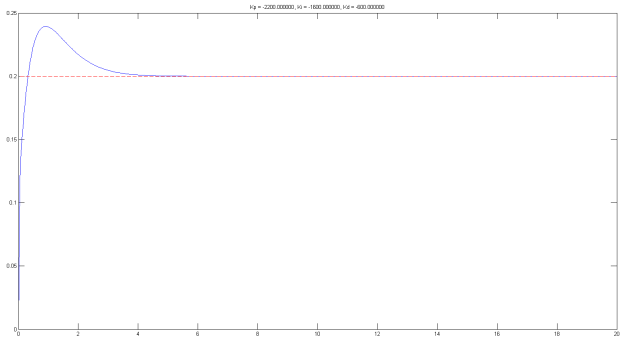

Figure 1.1: best pid

Chapter 2

Simulator

2.1 Simulation of rigid body dynamics

2.2 Existing simulators

[1] The list of physics simulating engines is quite long, but the most popular ones are, in no particular order

1. Bullet
2. ODE
3. DART
4. Simbody
5. PhysX
6. Havok

Bullet was chosen because while it does not distinguish itself when it comes to pure physical simulation [2], a 3D modelling application called Blender is built atop of it, providing excellent tools for fast and easy robot modelisation. Blender also provides access to Bullet through a well document Python API.

Table 2.1: Features comparison

Engine	**License**	**Coordinates**	**Origin**	**Editor**	**Solver type**
Bullet	Free	Maximal	Games	Blender	Iterative
ODE	Free	Maximal	Simplified robot dynamics, games		Iterative
DART	Free	Generalized	Computer graphics, robot control		
Simbody	Free	Generalized	Biomechamics		
PhysX	Proprietary	Maximal	Games		
Havok	Proprietary	Maximal	Games		

2.3 Choice

Chapter 3

Modelling tools

This chapter covers the tools used in order to create a model of the robot, from the placement of the servos and joints to the incorporation of accelerometers.

3.1 Blender

The modelling of the robot starts in Blender, where the servos and the joints will be positioned. The justification is that it is faster to do it in Blender than in V-Rep, because of its better interface.

For the import operation into V-REP, the model is exported to the COLLADA format.

3.2 V-REP

V-Rep can import COLLADA files. This is where

3.2.1 Servos

3.2.2 Joints

3.2.3 Sensors (accel, cog)

3.2.4 Springs

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4.1 Interface (api)

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Bibliography

[1] Herman Bruyninckx. Blender for robotics and robotics for blender. *Dept. of Mechanical Engineering, KU Leuven, Belgium*, 2004.

[2] Tom Erez, Yuval Tassa, and Emanuel Todorov. Simulation tools for model-based robotics: Comparison of bullet, havok, mujoco, ode and physx.