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**Towards Large-scale Humanoid Demonstration Data  
Using VR Headsets**

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**Towards Large-scale Humanoid Demonstration Data  
Using VR Headsets**

by

**Steve Han**

**THESIS**

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# **Towards Large-scale Humanoid Demonstration Data Using VR Headsets**

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In our modern world that is designed by humans and for humans, the morphology of humanoid robots makes them the perfect platform for a wide range of applications. However, due to the complexity of humanoid robots and the shortage of demonstration data, research in robot learning for humanoids is scarce. In this thesis, I present a VR interface for collecting human demonstrations for humanoid robots in both simulation and reality. I propose that by embedding this data collection mechanism in VR video games, we can amass a large scale dataset of high quality human demonstrations that can drive the development of a future generation of autonomous humanoids. To illustrate the feasibility of this idea, I collect a small dataset on toy tasks in simulation and real robot using the interface. I then show that an imitation learning policy trained on the demonstrations can be deployed with a reasonable success rate.

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# Chapter 1

## Introduction

### 1.1 Background

In 1991 the `utdiss` package was written by Young U. Ryu in order to be used in the preamble of L<sup>A</sup>T<sub>E</sub>X doctoral dissertation files at the University of Texas at Austin. Since then some changes have occurred, the most important one being the introduction of a new version of L<sup>A</sup>T<sub>E</sub>X called L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>.

In order to partially adapt the `utdiss` package to this new version of L<sup>A</sup>T<sub>E</sub>X, Miguel Lerma introduced a few modifications in it, and his document, *How to Write a Doctoral Dissertation with L<sup>A</sup>T<sub>E</sub>X*, served as a test for it. His new package was called `utdiss1`.

With the significant changes in style introduced by the Graduate School in the Spring of 2001, as well as my need to write a dissertation myself, I extended Miguel Lerma's package to meet these new requirements. As in Miguel Lerma's case, this document serves as a test for it, but it is, in addition, intended as a template for others to use in writing their own dissertations. The new package is called `utdiss2`.



## 1.2 Revised Philosophy for This Package

Since the source file of this document is intended to be used by students writing their own dissertations, this document does not display all of the comments regarding usage of previous versions. It has, instead, transferred these comments to their respective places in the source file so someone editing their own copy of the source file to produce their own dissertation will see the comments where they are needed. It may be helpful to print out a copy of the source file along with the PostScript version of the document so the two can be studied side-by-side.

**Note:** In spite of the effort to accommodate the package to the requirements of the University, it is not possible to guarantee that it will always work, and the author of the dissertation remains responsible for checking that such requirements are actually fulfilled by his/her final work.

The standard caveat applies:

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In case of any problem with the use of `utdiss2`, send me email at `mccluskey@mail.utexas.edu`.

## Appendices

## Appendix A

### Lerma's Appendix

The source  $\text{\LaTeX}$  file for this document is no longer quoted in its entirety in the output document. A  $\text{\LaTeX}$  file can include its own source by using the command `\verbatiminput{\jobname}`.

# Appendix B

## My Appendix #2

### **B.1 The First Section**

This is the first section. This is the second appendix.

### **B.2 The Second Section**

This is the second section of the second appendix.

#### **B.2.1 The First Subsection of the Second Section**

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#### **B.2.2 The Second Subsection of the Second Section**

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##### **B.2.2.1 The First Subsubsection of the Second Subsection of the Second Section**

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## Appendix C

### My Appendix #3

#### C.1 The First Section

This is the first section. This is the third appendix.

#### C.2 The Second Section

This is the second section of the third appendix.

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