

Introduction

As the role of robots shifts from tool to peer, effective human – robot interaction has become increasingly important.

Furthermore, many have shown that humans interact most easily with humanoid robots [1].

This research focuses on the development of a low cost humanoid robot platform to study human robot interaction.



Fig 1. Kismet [2], Repliee, and Evilee [1].

Background

Previous humanoid human – robot interaction platforms are traditionally very expensive multi year projects [2].

Because of this, HRI with humanoid robots is a relatively unexplored robotics sub-discipline.

Existing Platform

The platform began as a Sharper Image “Alive” Chimpanzee [3].

- Toy: robot was designed for entertainment – not research.
- Seven degrees of freedom.
- Diverse sensor set: Touch, sound, primitive vision.
- Inexpensive: It was mass produced for ~\$100.



Fig 2. Partially disassembled Monkey bust.

- Standalone system, cannot be interfaced with other systems.
- Not reprogrammable.
- Not easily repurposed.
- Complete controllability and observability not possible.

Modified Platform

Custom hardware developed to interface the robot and the computer backend.

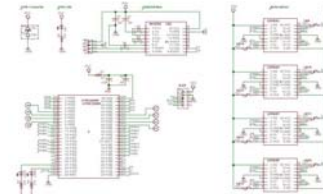


Fig 3. Schematic in Eagle CAD [4].

- Eight fused motor drivers.
- Eight analog inputs for position potentiometers.
- Inputs for microphones and touch sensors
- Serial port and In Circuit Serial Programmability.

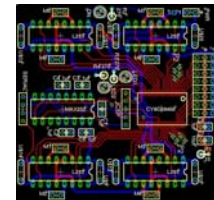


Fig 4. Board artwork .

Summary

- Hardware was characterized and its functionality was determined.
- System specification drafted.
- System designed to meet specification.
- Learned how to implement many PWM channels in a small microcontroller.

Future Work

- Reimplement original functionality.
- Complete computer interface.
- Robotic “chat-bot”, secretary or concierge.
- Production cost estimation.

References

- [1] Breazeal, How to Build robots that make friends and influence people.
- [2] Ishiguro, Development of androids for studying on human-robot interaction.
- [3] The Sharper Image Part # WW258.
- [4] Eagle CAD, www.cadsoft.de.