

Group Trust between Humans and Robots through a Novel Music-Driven Robotic Emotional Prosody Generator



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<https://gtcmt.gatech.edu/robotic-musicianship>

Motivation

- Affective trust in groups of human-robot interaction requires socially believable emotional agents
- Music is the one of richest means to show emotion, avoiding high degrees of freedom and uncanny valley
- Musical prosody can allow robots to communicate and demonstrate emotions and state of mind

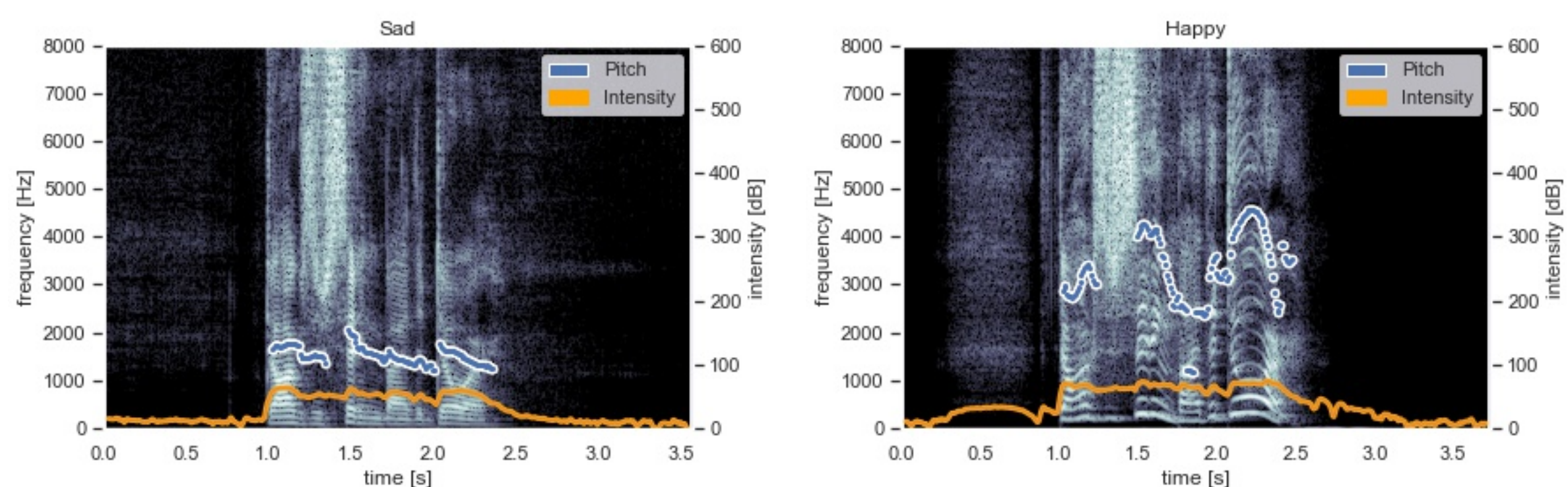


Figure 1: Musical Features of Vocal Prosody. Spectrograms of the same sentence uttered using sad and happy prosodies

Research Questions

- Can music-driven vocal prosody generation convey robotic emotion in a manner that can be validated by human listeners?
- Can vocal prosody convey emotions when applied to non-linguistic phrases?
- Can emotional conveyance through prosody and gestures lead to the creation of trust in human-robot-interaction?
- What are the non-linguistic emotional responses that humans would want robots to use in different emotional contexts?
- How can gestures and prosody be used to convey emotions and lead to human-robot trust with large robotic groups?

Project Overview

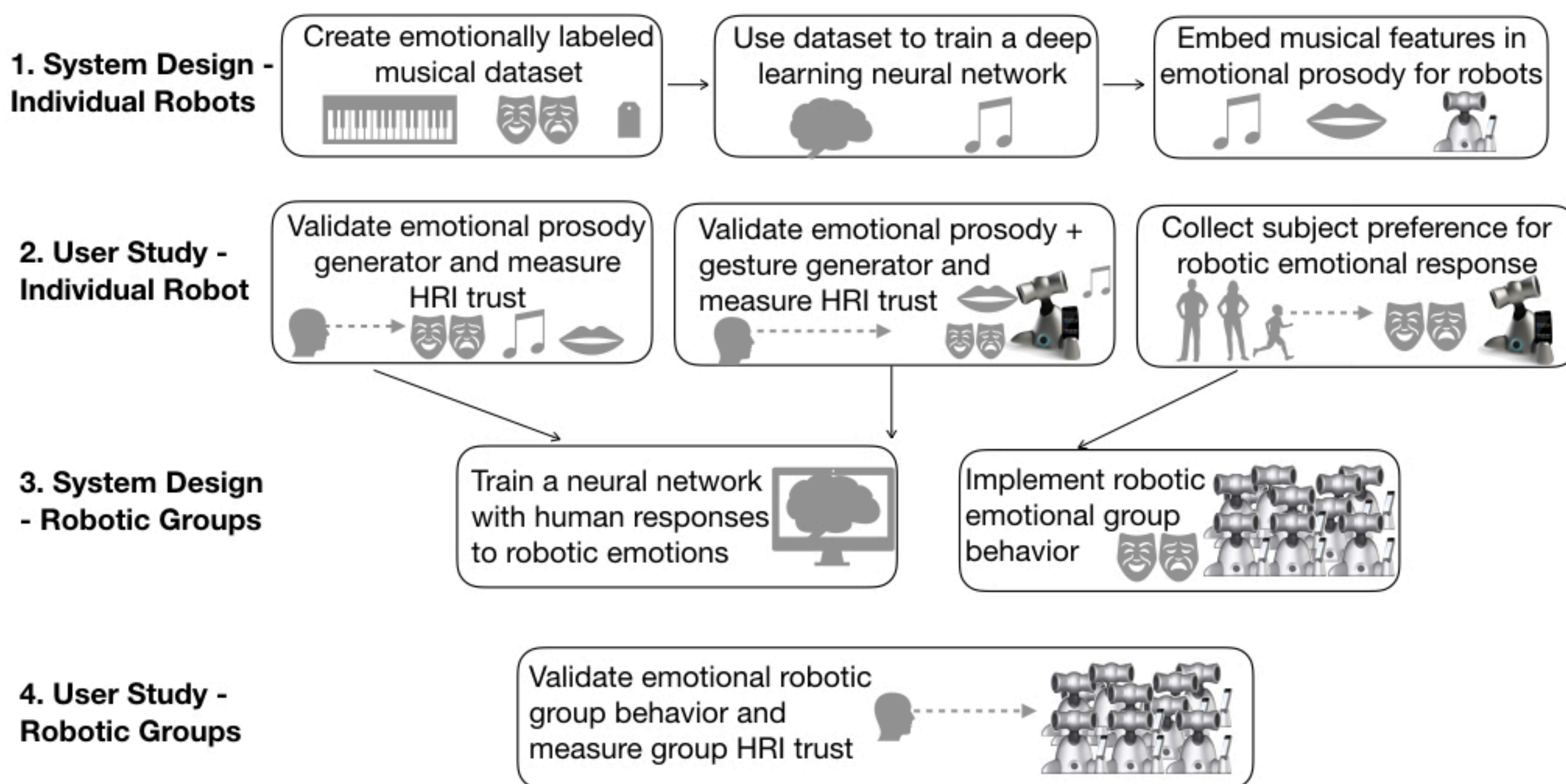


Figure 2: Project Overview

Current Progress:

Dataset Creation

- Collected emotionally labeled musical improvisation from 10 musicians in a pilot study
- Automated pipeline for music transcription, feature extraction and analysis

Music Driven Vocal Prosody Generation

- Developed a prototype for machine learning generation using a Disentangled Variational Autoencoder

Robot Development

- Designed a larger scale robot based on Shimon Robot to allow for large scale interactions and unique performance opportunities

Robotic Emotion Studies

- Completed development of a prototype robot, rapidly created for experiments
- Protocol completed and ready for first group emotion study, schedule for March 1st – 4th

Platforms

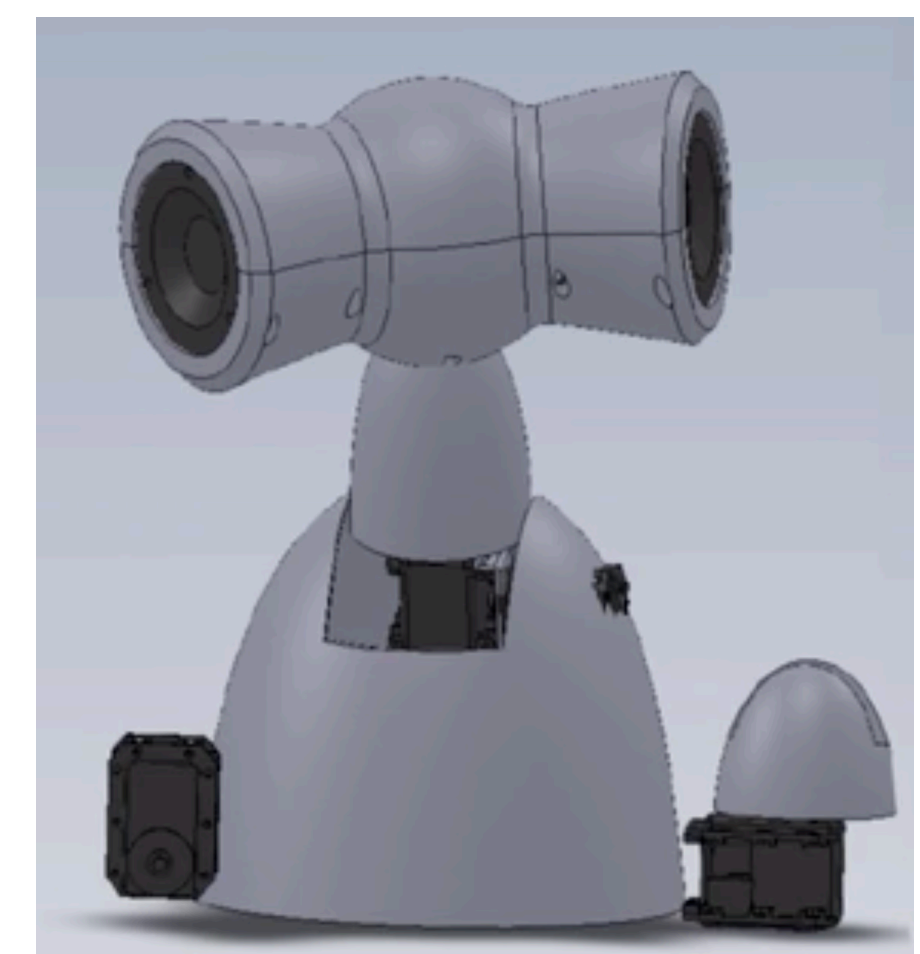


Figure 3: Originally proposed platform for the project – Shimi Robot

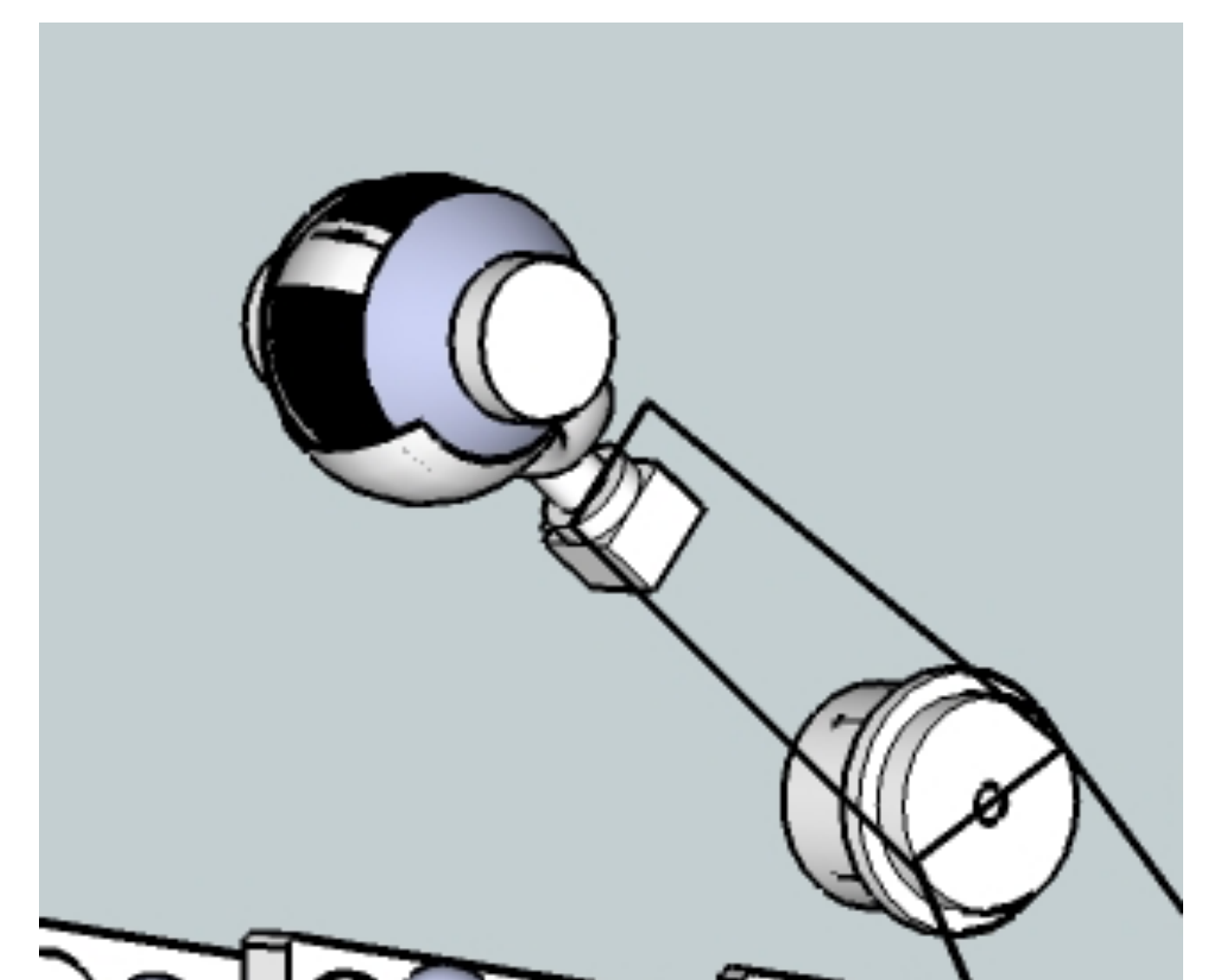


Figure 4: Updated platform designed for large scale HRI experiments – Shimon Robot