Junior Jay Documentation

Lower Beak Actuation:

Cam:

Cam would allow for reduced stress on the servo when an abuse load is applied due to the cam slider taking the force instead of the servo motor. Problem is that it is hard to machine, loud, and is probably more complicated than need be. So we opted for a…

Direct Mount:

AL extrusion mounted directly on the servo.

V1

V2

A 3d model of a machine

Description automatically generated A drawing of a metal object

Description automatically generatedA drawing of a metal object on graph paper

Description automatically generated

Eyebrow Actuation:

A computer screen with a person on it

Description automatically generatedA computer screen with a person in glasses

Description automatically generated

Eyelid Actuation:

Computer Vision:

System Integration:

Feb 2024

This month we made good progress on the development of our three actuation systems. I have been at work making CAD models, printing, and testing each week. We met with the engineering machine shop directors and discussed plans to machine a parts for the cam. After meeting with them, it seems it will be hard to machine that part, so I made a simpler concept for a direct beak-to-servo attachment. I have also progressed the concepts for the eyebrows. The design incorporates two servos stored inside the head, with linkages protruding outside the head but hidden behind the eyebrow (essentially a 3-bar linkage). We ordered some magnets to use for a potential backup concept. Scott has done work on the eyelid mechanism. This month I wrote a python script that tracks eye movement and moves the eyebrow servos accordingly.

Next month, I plan to work closer with the EE team to make sure that the current draw of our servos is acceptable. I met with Bao on Friday, and the eyebrow servos are drawing 300mA, which is apparently quite a lot. We will need to coordinate some housing for the servos and electrical components so the wearer is not shocked. I am also meeting with Josie to bring her up to speed on the computer vision research I have done. I am also trying to target this Friday as our day to install components into the head, so we can accelerate our timeframe and make sure our prototypes can fit in the space constraints.

3/1

Installed the eyebrows and beak servos. The Styrofoam we are using is a bit hard to cut, I want to get some insulation foam or memory foam. Went to Home Depot and get #6 2in fasteners, they are a bit too small to install the servo mounts I have, so I need to change the CAD to have a step-down to the bracket.

Josh installed the eyebrows without fasteners, It works quite well, but it is a bit loose and the screw came loose pretty easily.

Bao tested the current draw for both servos after we installed. We saw peak 500mA for the beak and 650mA for the eyebrows under load.

4/6

In the last month,

Buck converters came in. We soldered the 12V pin, which draws 12V from the battery. Bao created voltage converter to step down to 8V. Current draw of beak servos is ~0.8A peak? May need to adjust resistance of circuit to limit current, we have plenty. Will print custom PCB once design is finalized.

Installed beak. Designed frame after a few iterations using AL extrusions from McMaster.

Set up raspberry Pi. Looking into better facial emotion detection using ML image classifier.