Animatronics
Eye Mechanism Document

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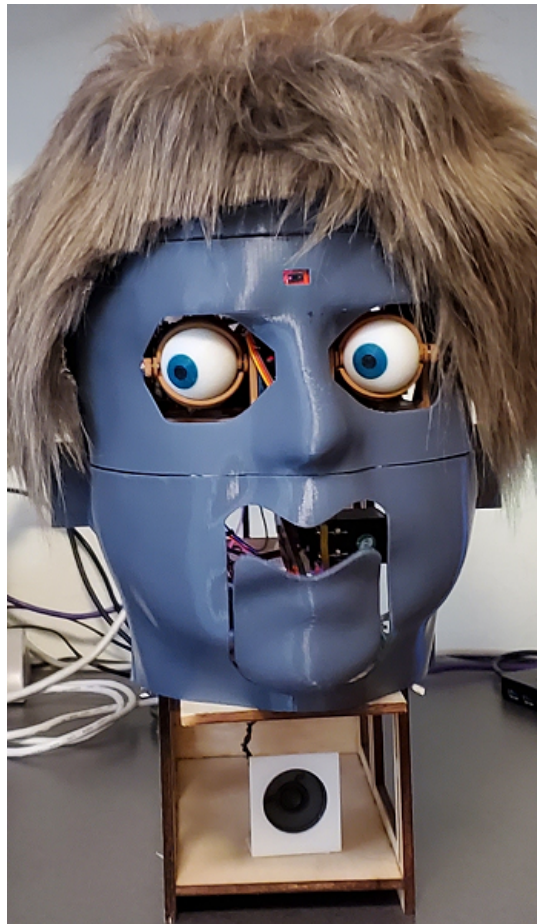
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DOCUMENT OVERVIEW

This document will review at a high level the eye component of the animatronic head.

Eyes mechanism

The eyes mechanism is taken directly from the popular and talented Will Cogley who works as Niehelm Megatronics. Will has

- A Patreon page: https://www.patreon.com/c/Will_Cogley/posts
- A YouTube channel: https://www.youtube.com/@WillCogley

Your best place to start is this Instructable of the eye mechanism we used. https://www.instructables.com/Simplified-3D-Printed-Animatronic-Dual-Eye-Mechani/ It gives a step-by-step for making the eyes.

Note that in the years since we chose this mechanism Will has released newer versions that are even more clever in their assembly. All of his mechanisms should work with our software.

The original mechanism was a bit too big to fit closely into the animatronic head. As a result we modified the base of the mechanism slightly. You can find our modified STL files in the repository.

Basic Eyes Movements

The eyes have five different motions.

1. Up and Down. The eyes are coupled and move together.
2. Left and Right. Also coupled together and move at the same time.
3. Four eyelids, one upper and one lower on each eye. The eyelids move independently.

Eye calibration

Every servo can react slightly differently to the same positioning command. In addition, the linkage from the servo to the mechanism can be mounted on the servo horn at a slightly different angle. For these reasons, calibration is required.

The repository contains a calibration program. When loaded into the Particle chip it will move the eyes and eyelids to what it expects to be the two extents of movement. For example it will move the eyes fully up and then fully down. Each time it will print out the servo command value it is using to the serial port.

Your job is to adjust the mechanism, the mounting of the linkage to the servo horn, or the values being used by the calibration firmware. You want to find values that will command each servo to push the mechanism to its extent, but not beyond. You don't want the servos to stall.

The calibration program will print out a series of steps to follow. For instance it might say, "Opening the left upper eye brow". Your job is to slowly turn the potentiometer until the left upper eye brow is fully open. Then press the button to move on to the next calibration step.

After you have a completed calibration, the calibration program will print out a code block of constants that you can copy and paste into the actual animatronic code. The code block goes in the file `eyeservosettings.h`

If you have several mechanisms, you may want to alter the animatronic code to use #defines to indicate which of your mechanisms you are compiling for. In our experience each mechanism will be significantly different.