

Cool Glove

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1 Project Overview

Our project (Cool Glove) has 3 main components - the glove (drives flex sensors which vary resistance going to our oscillator), independent relaxation oscillators (generate square waves at a frequency determined by RC values), and a summing amplifier (takes all 3 frequencies and sends the output to a speaker).

1.1 The Glove

There is one flex sensor attached to each of three fingers - the thumb, pointer, and middle. Each flex sensor has a resting resistance of 25K ohms and has a range up to 125k ohms when fully flexed (90 degrees). Each sensor is in series with another resistor (1M, 500k, 200k) to produce various frequencies for each finger.



Figure 1: A photo of the finished glove.

1.2 Relaxation Oscillators

Relaxation oscillators use a double feedback mechanism to generate square waves. We sourced new OpAmps (TLV41101P) to drive the speakers because the ones used in class did not generate enough output current. The positive feedback was a voltage divider with 2 10k resistors. Our negative feedback was the flex sensor in series with another resistor (see above) and a 1000pF capacitor.

1.3 Summing Amplifier

We used a simple summing amplifier with a potentiometer as our feedback resistor so that the output amplitude of waves going to our speaker could be regulated - volume control.

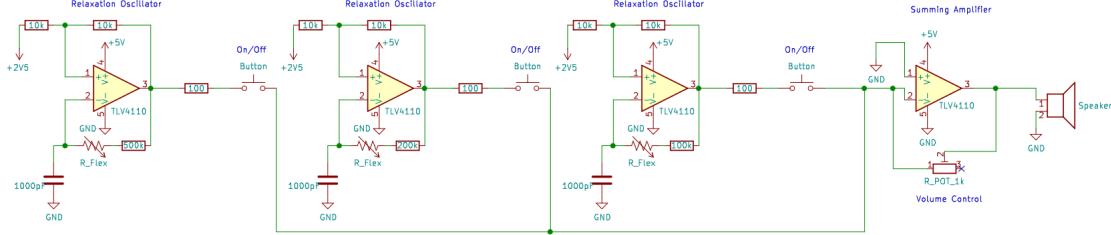


Figure 2: A schematic diagram of our finished circuit.

2 Preliminary Testing

After building our first oscillator, we measured the output square waves and their corresponding capacitor charging rates with the Analog Discovery. As we bent the sensor, we saw an increase in time between periods for the square waves.

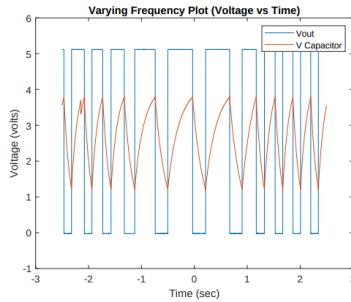


Figure 3: A trace of our varying output frequency.

3 Final Product

Our final deliverable:

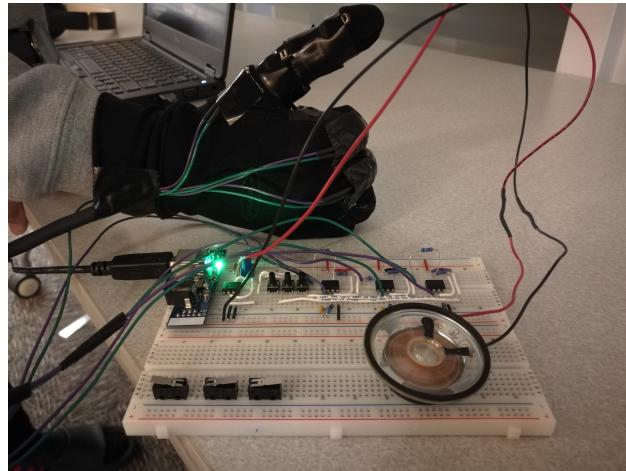


Figure 4: Final product!