DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

Jazz Hands

UNIVERSITY OF MARYLAND 1856 — A. JAMES CLARK SCHOOL OF ENGINEERING

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Project Description

Our goal was to construct a wearable device that allows the user to generate and control musical tones using hand gestures. By combining flex sensors and motion detection with a synthesizer engine, we created a glove that maps human gestures into expressive musical input.

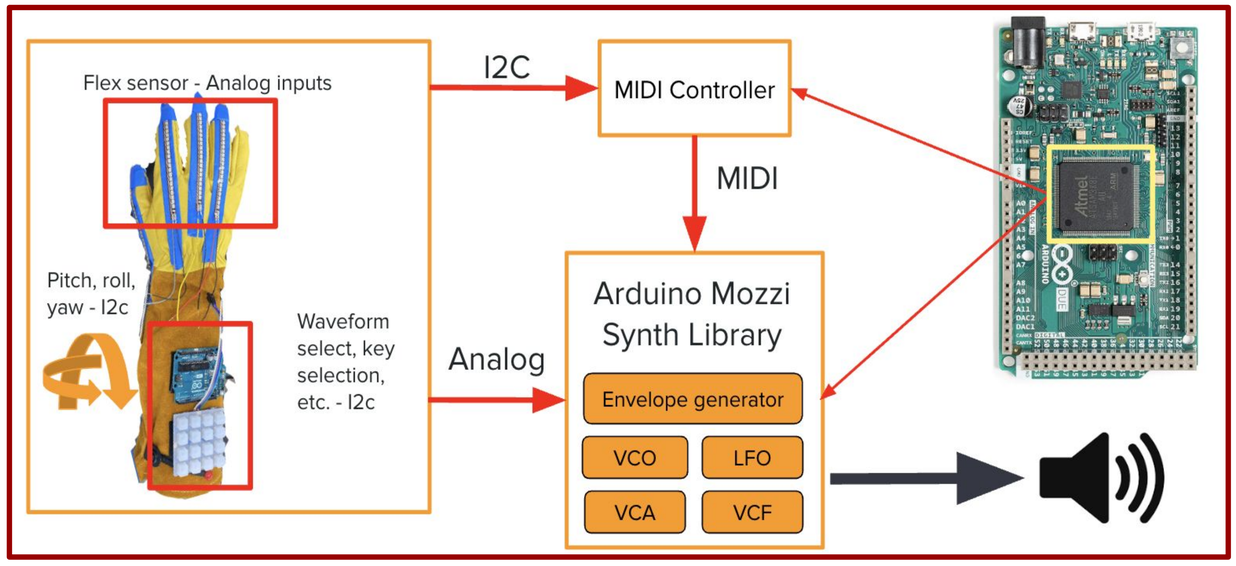

Figure 1: Initial block diagram of musical glove

Prototype & Test Results

Initial Prototype:

- Functional sensor mapping
- Real-time audio response

Insights from Testing:

- Flex sensors provided consistent analog output
- Wrist rotation integration achieved smooth modulation
- Keypad input reliable for quick chord switching

Analog Flex Sensor Values on Glove

Finger	Straight (ADC)	Flexed (ADC)
Thumb	685	420
Pointer	700	490
Middle	640	325
Ring	700	450

Motivation & Objectives

- Inspired by the 1989 Nintendo Power Glove
- Modify a glove to generate sounds based on:
  - Finger flexion
  - Wrist rotation
- Design a custom synthesizer engine

Final Design

Key Features:

- Keypad: 9 buttons mapped to 9 major chords; 3 buttons mapped to effects (delay, FM synth, phaser); 3 buttons mapped to different oscillator types (sine, sawtooth, triangle wave); 1 button for changing octave
- 3 fingers mapped to 3 different notes of a major chord
  - Flexion bends pitch of note down
- Thumb flexion changes volume
- Wrist rotation enables filter effects

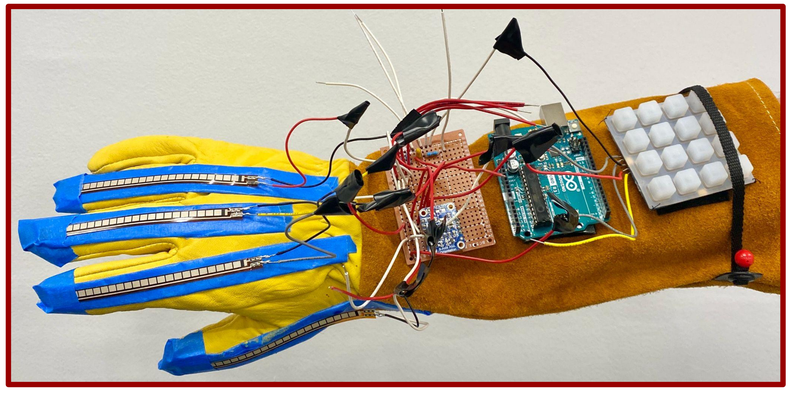

Figure 2: Final product

Component	Description
Flex Sensors (x4)	Measure finger bending
9-DOF Sensor	Tracks wrist orientation/rotation
4x4 Keypad	Button inputs for chord/oscillator/effects
Arduino Uno	Microcontroller for processing