Button Hero

Jeremy Yew, Kristina Shia

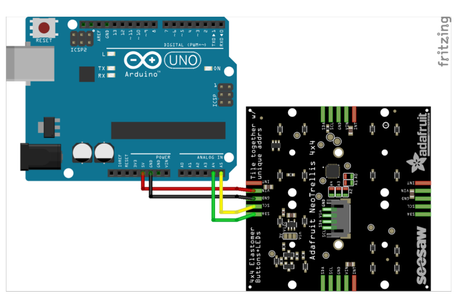
Pseudocode

```
setup serial communication
load song file and button prompts
start music

for duration of song:
    calculate current beat based on time elapsed and
beats/second
    if moving onto new beat:
        light up buttons that should be pressed for current
beat
        light up buttons to hint for next beat
        turn off all other button lights
        read serial input to process incoming button presses
        change button color based on correct/incorrect
button press, and record score

calculate and display final score
```

Representation of button prompt sequence:

```
// Every prompt lasts one beat, and prompts can be
inserted at any beat.
prompts = {
    // beat : button numbers
    0: [0, 4],
    2: [1, 2], // On beat 2, prompt buttons 1 and 2.
    8: [0]
    10: [1, 2, 3, 5]
    …
}
```

Circuit Schematic



Arduino Uno to Adafruit NeoTrellis

Goals and Implementation

Goal: build a simple music rhythm game in which a sequence of buttons must be pressed in time to the music being played.

Similar to Tap Tap Revenge/Guitar Hero/Dance Dance Revolution, but with a LED-lit button keypad, to combine visual and audio feedback with physical buttons.

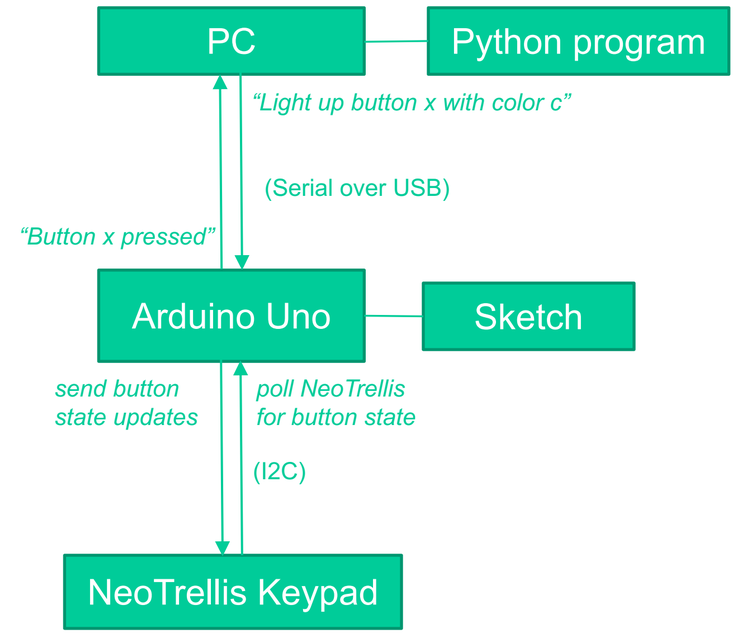
Basic requirements:

- Play music track
- Light up sequence of buttons in time to music
- Change light color and record score if button is pressed at correct time

Implementation:

1. Set up I2C communication between Arduino and NeoTrellis keypad
2. Poll button state/light up buttons with **Trellis** library
3. Set up serial communication between Arduino and PC, using **Serial.write() on Arduino and pyserial for PC**
4. Define single-byte serial messages (button press, light up button)

Components



Challenges and Limitations

- Initially intended to play notes or loops via MIDI (Musical Instrument Digital Interface) messages as audio feedback.
- However, MIDI API is limited.
- Furthermore, complicated to play specific notes in sync with music.
- So we decided to go with visual feedback only.
- Playing music from Arduino requires extra storage for sound files. So we decided to run game and play music from PC.