

The Tape Escape

E-Prop Documentation

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General Connection Notes

Power

ALL PROPS ARE POWERED BY A 5 VOLT SUPPLY.

This comes in two forms: via Mini USB, for Eliza, the Puzzle, and the Phone, and via a 5v 2A adapter for the Maquette and Radio. 2.1mm barrel jacks have been soldered onto the props that require them. Please be careful of short circuits and over/undervolting the props as Bad Things can happen.



MP3 Player

The VS1053 MP3 Player is used in the Phone, Maquette, and Radio. The wiring is standard, and documented here. The MP3 Player plays sounds from an SD card. I recommend a Class 10 card, and it must be formatted Fat32.



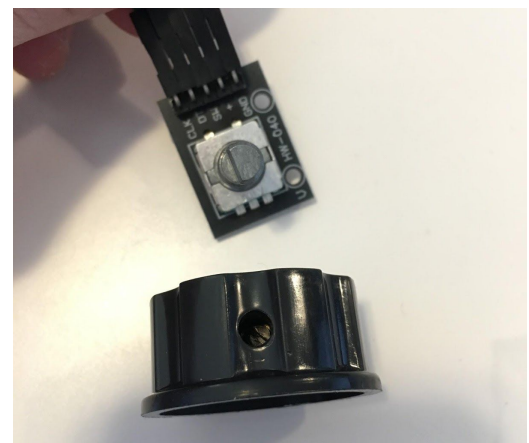
LCD Display

The LCD Display is used in Eliza and the Radio. The contrast can be adjusted with this knob:

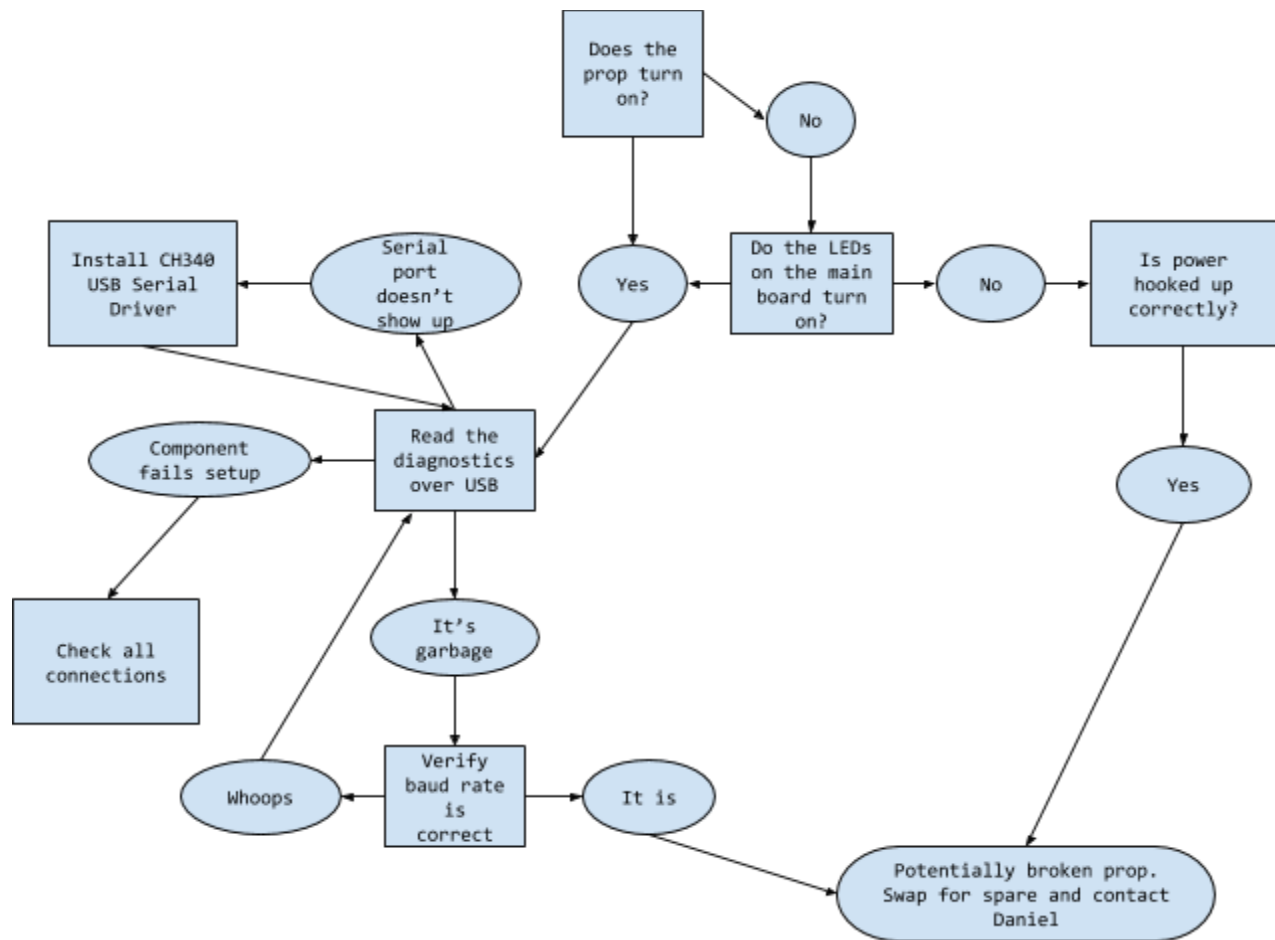


Rotary Encoder

Rotary Encoders are used in Eliza and the Radio. They have a built in button when pressed, and rotate freely in both directions. The knob fits on top, and is attached with the pictured set screw.



Troubleshooting



Eliza

Usage

An LCD screen displays and records responses for 4 T/F questions
The user interacts with the device by picking a Path through an encoder
which loads the proper Truth Table for the device
The user enters their responses to the questions with two buttons,
and receives a message based on their score.

Schematic

```
Encoder
  v
5v USB power -> Arduino -> LCD screen
  ^
  T/F Buttons
```

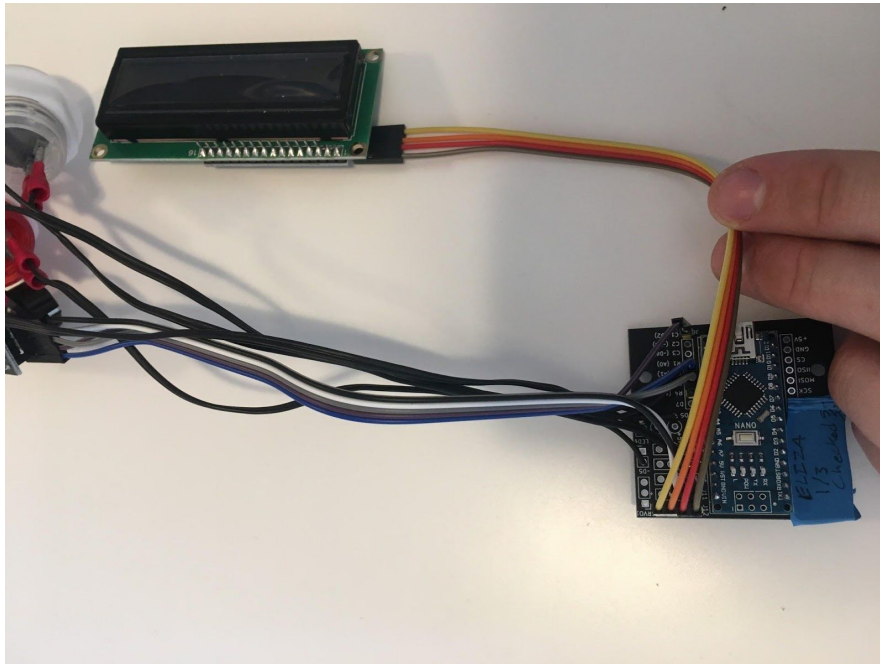
Debug

To debug, open the serial monitor at 115200 baud
The expected output is: LCD Found

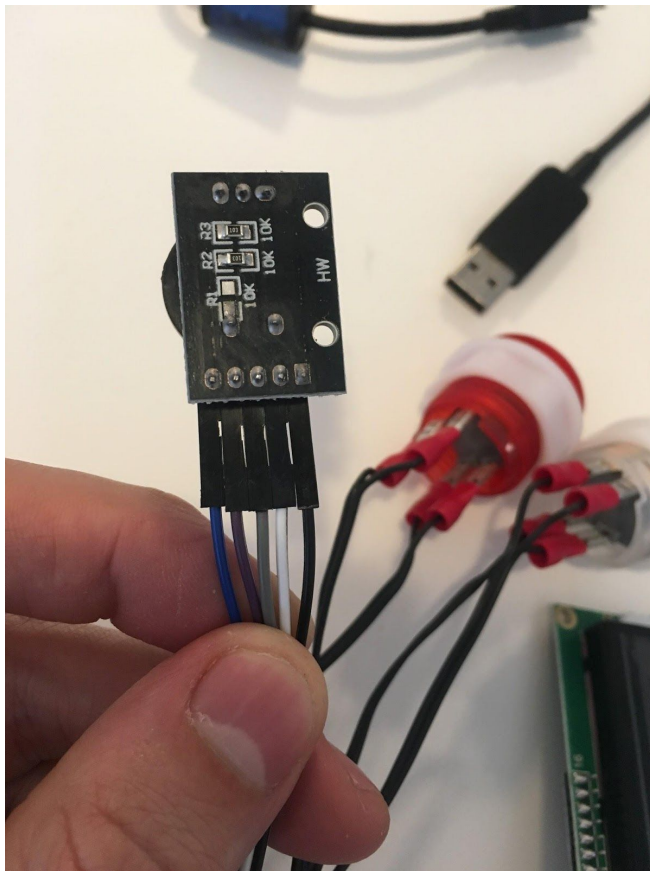
Reminder: All text must fit within a 16x2 matrix
ie:

#####

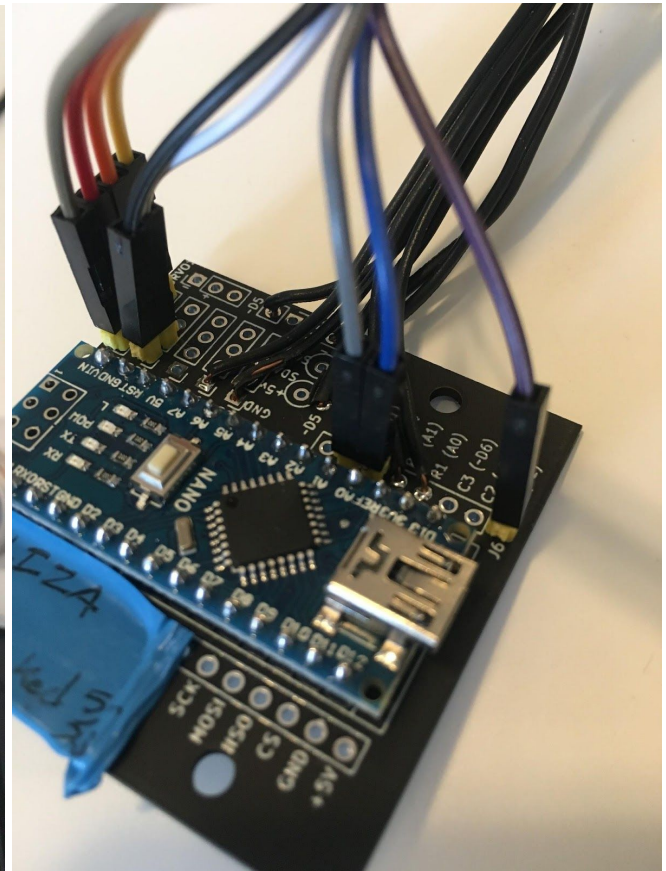
Eliza Wiring



LCD Connection



Encoder Connection



Breakout board connections

Maquette

Usage

Audience members press 4 buttons in order to hear a clue mp3 (SUCCESS.MP3)
They then search for 4 buttons (Play, RWD, FFW, Eject). Each button plays a sound.
Comment out "#define ONE_CHANCE" to allow multiple pushes to play the sound over again
Fast forward also flashes the "Shop LED". Eject opens up a hatch via servo.

Schematic

```

4x tree buttons
      v
5v 2A PSU -> Arduino Nano -> VS1053 MP3 Player -> Audio isolator -> 5v amplifier -> Speakers
      ^           |--> LED
      |           |--> Servo
4x VCR buttons
```

Installation note

The main board is plugged into a daughterboard which connects to the tree buttons and VCR buttons.
The tree buttons are on extension wires which can be plugged into the red crimp terminals upon installation. Once the crimp terminals have been connected, electrical tape them to prevent shorts.

Debug

To debug, open the serial monitor at 9600 baud

Required Files on the SD Card

The MP3 playing functions require the files to be named as such:

ONE.MP3 - Played when tree button 1 is pressed

TWO.MP3 - " " " " 2 " "

THREE.MP3 - Tree button 3

FOUR.MP3 - Tree button 4

SUCCESS.MP3 - Played when the right Tree-quence is pressed

FAILURE.MP3 - Played when the WRONG Tree-quence is pressed

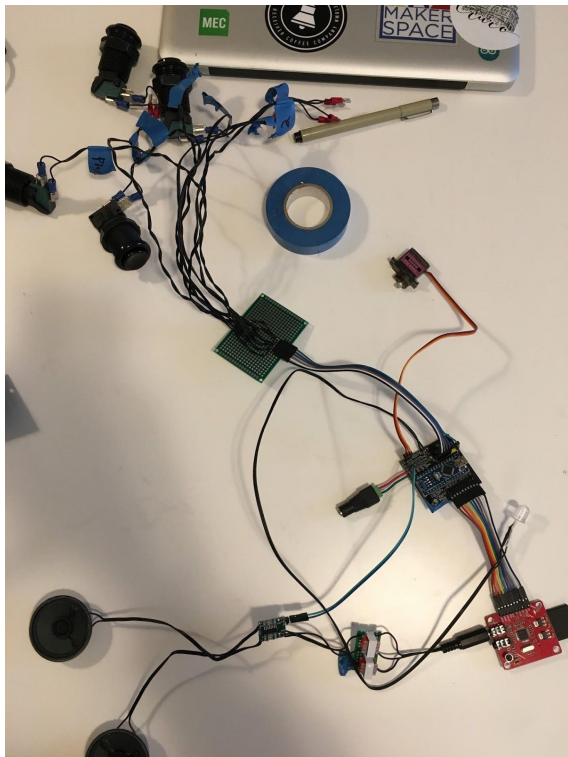
PLAY.MP3 - When the PLAY button is pressed

REWIND.MP3 - When REWIND is pressed

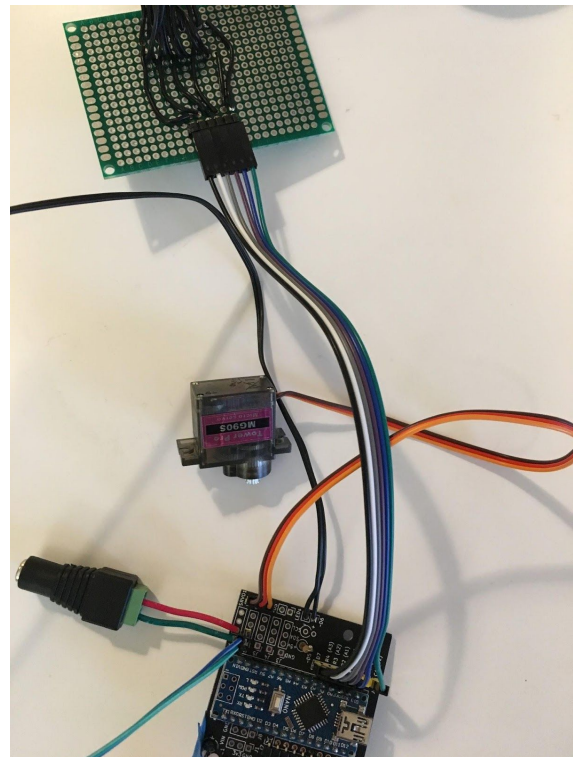
FFWD.MP3 - When FAST FORWARD is pressed

EJECT.MP3 - When EJECT is pressed

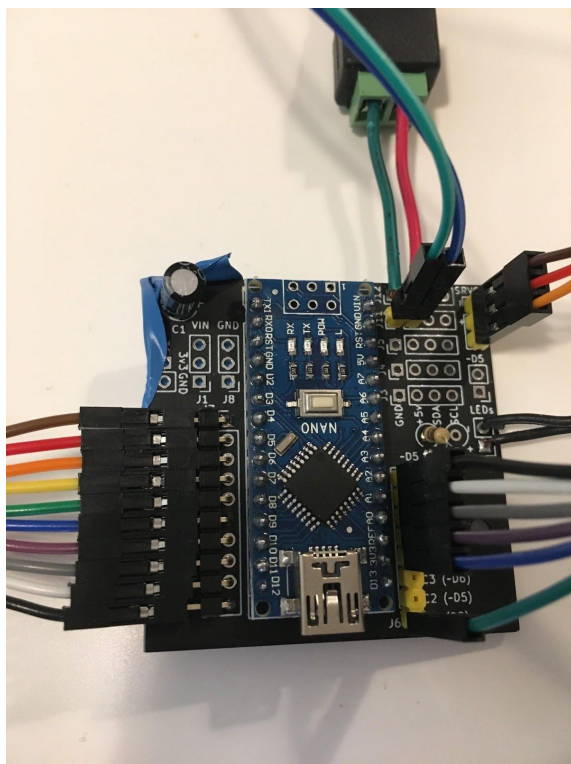
Maquette Wiring



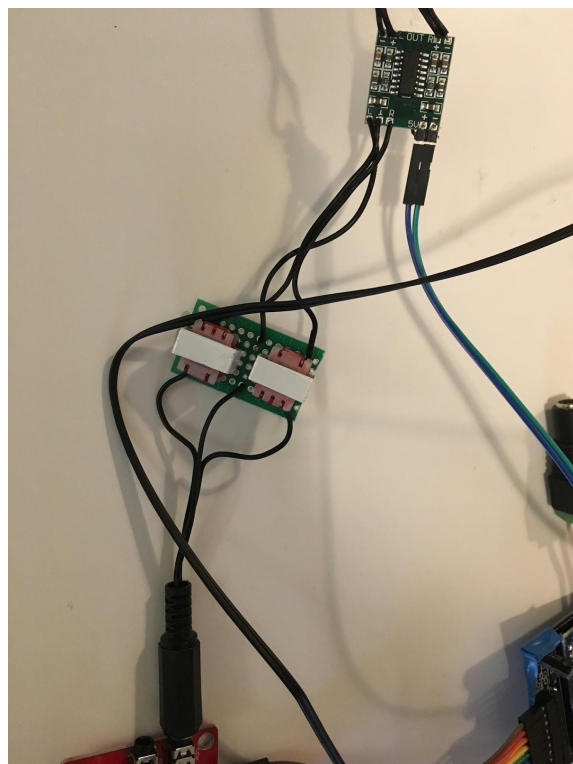
General overview



Button Daughterboard and servo connection



Breakout Board Connection



MP3 -> Speaker connection

Radio

Usage

An LCD displays the frequency the "radio" is tuned to.
An encoder is used to seek a station that the audience member has been told to listen to.
When the right station is selected, an MP3 is played.
MP3s should be in the format [3-4 digits]AM.mp3 OR [3-4 digits]FM.mp3. Note that for FM stations, omit the decimal in the frequency.
The "AM/FM" Switch also triggers a servo which rotates a car.

Schematic

```
Encoder + Switch
      ^
5v 2A Wall Wart -> Arduino Nano -> LCD
      ^v
VS1053 MP3 Decoder -> Speaker
```

Debug

To debug, open the serial monitor at 9600 baud

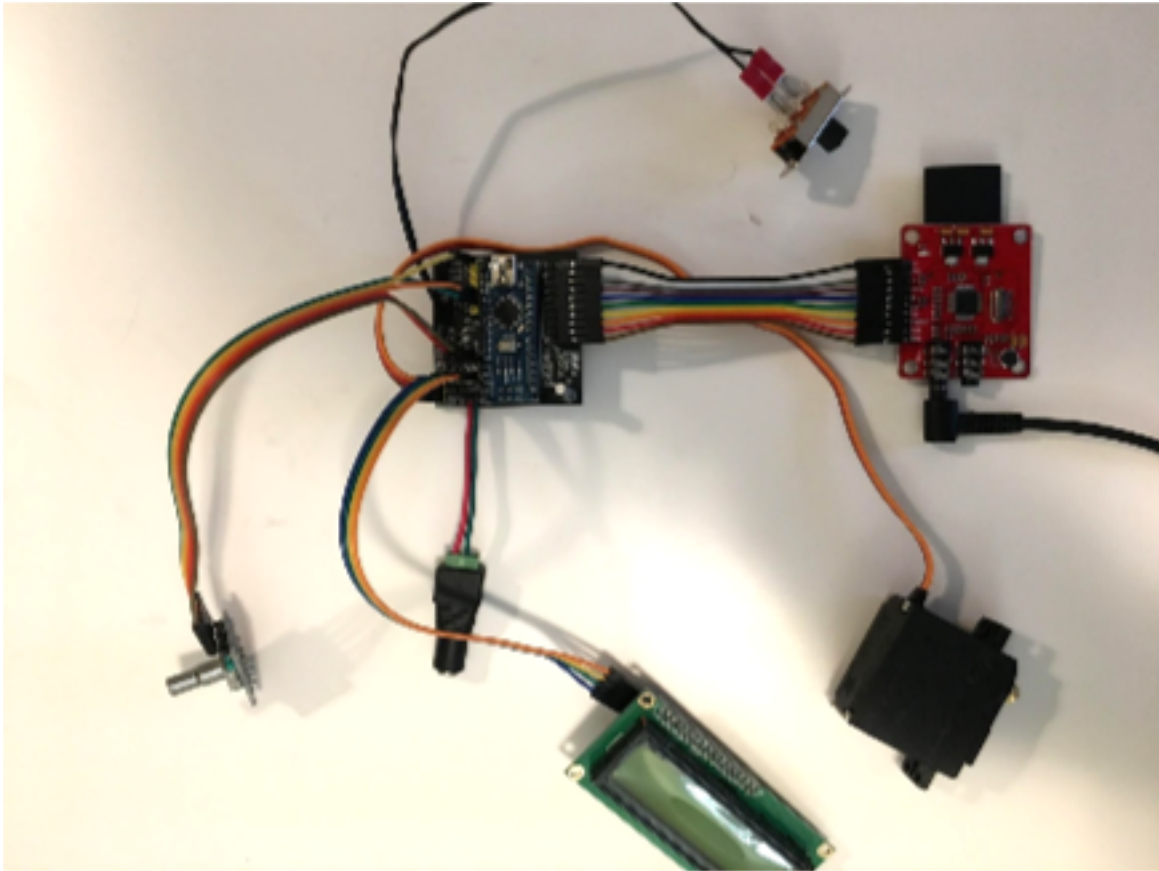
Required Files on the SD Card

The MP3 playing functions require the files to be named as such:

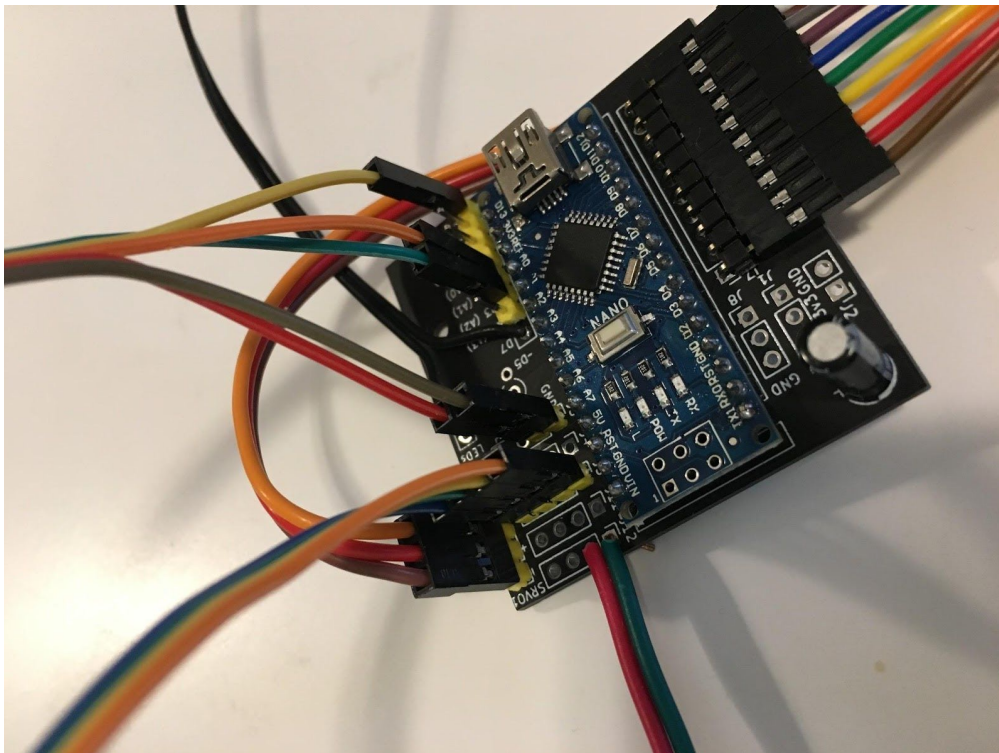
SILENCE.MP3 - 30 seconds of silence, to prevent an infinite loop
FUZZ[0-9]AM.MP3 - 10 MP3s of static to be played when a file isn't found on AM
FUZZ[1,3,5,7,9]FM.mp3 - 5 MP3s of static to be played when a file isn't found on FM
[#]###[AM/FM].MP3 - The "radio stations" are formatted this way.
FM stations count by .2 from 88.1 to 107.9. FM stations are always ODD
FM stations are listed WITHOUT the decimal.
Example: 89.1fm becomes 891FM.MP3, 107.1FM becomes 1071FM.MP3

AM stations count by 10s, from 540 to 1700.
Example 680AM.MP3, 1690AM.MP3

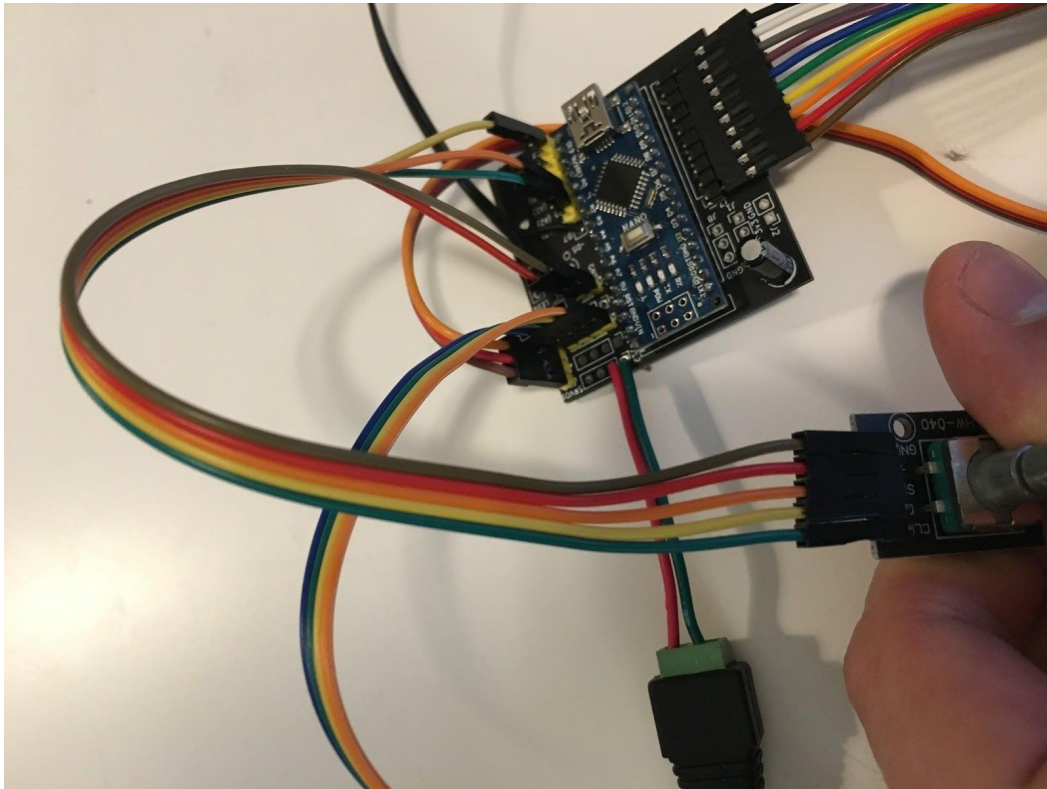
Radio Wiring



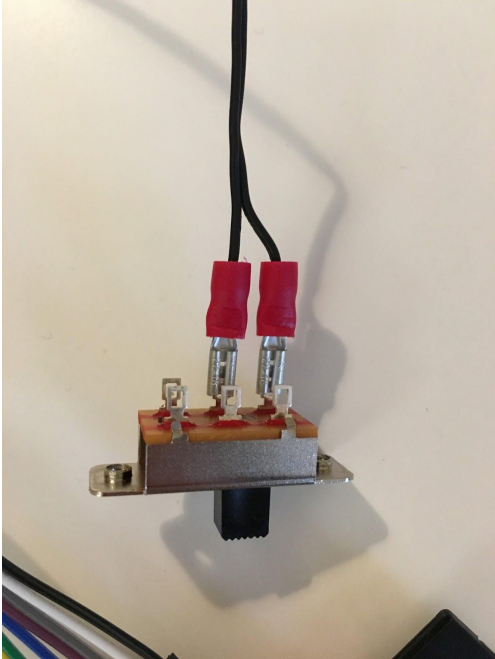
General Overview



Breakout Board



Encoder + Power wiring



AM/FM Switch



Servo + Horn

Phone

Usage

A keypad is used to dial a number that the audience member finds

A corresponding MP3 is played.

The MP3s are loaded from the SD card in the form "PHONENUMBER.MP3"

NOTE: Phone numbers must be 8 digits or shorter.

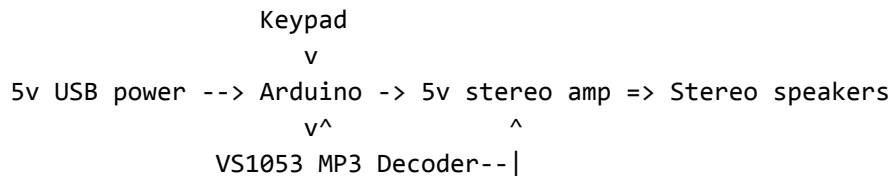
Every time a key is pressed, the number is loaded to the stack.

When # is pressed, the number is "Dialed" ie, searched for on the SD card

If found the mp3 is played, if not, play a busy signal.

The key is to pick up or hang up. This also clears the stack.

Schematic



Debug

When booting, the device plays 2 tones to indicate the speakers and SD card are working.

To debug, open the serial monitor at 115200 baud.

The expected output is: VS1053 found, SD OK!

Followed by: a printout of the files on the SD card

Every time a key is pressed, the stack is printed.

As well, every time a number is dialed, the search results are displayed.

Required Files on the SD Card

The MP3 playing functions require the files to be named as such:

BUSY.MP3

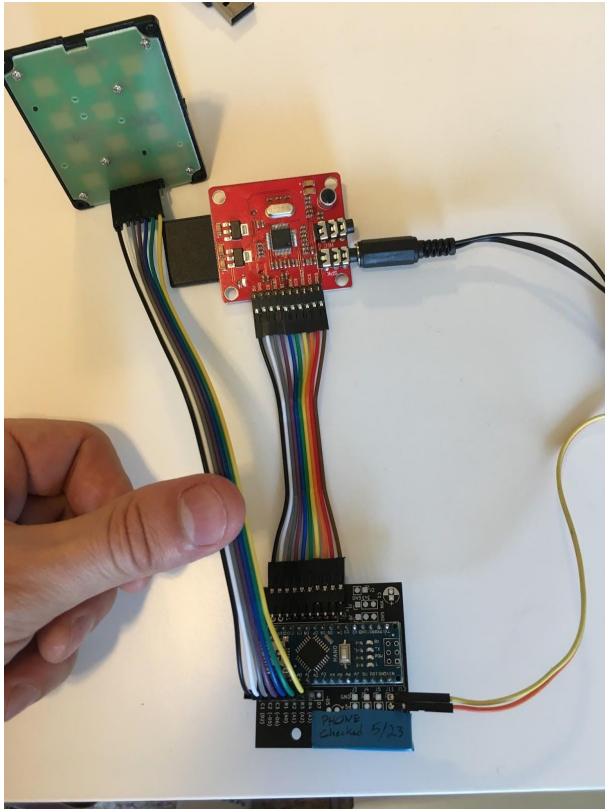
DIALTONE.MP3

dtmf-[0-9].MP3 - The tones for each key

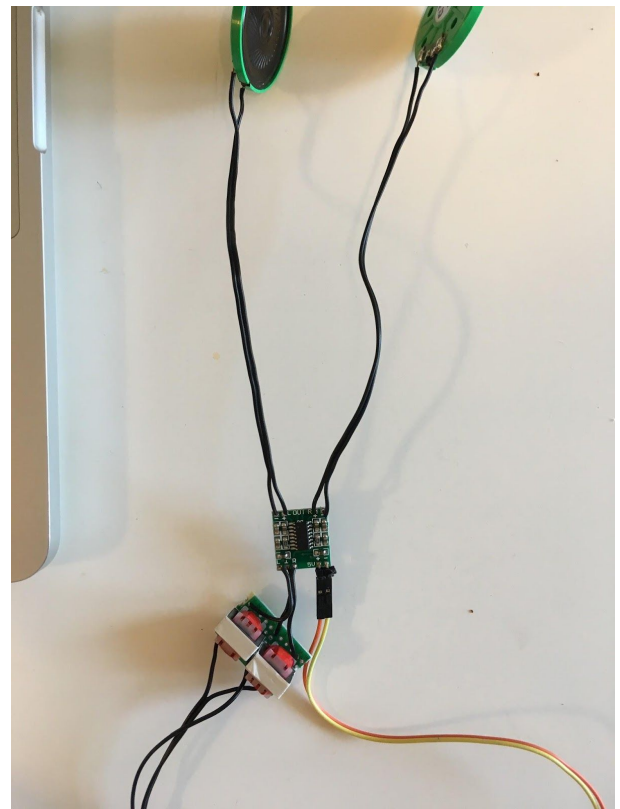
dtmf-[str/hsh] - These tones are never played but are included for completeness

[#####].MP3 - Any dialled phone numbers. The maximum length of a number is 8 characters.

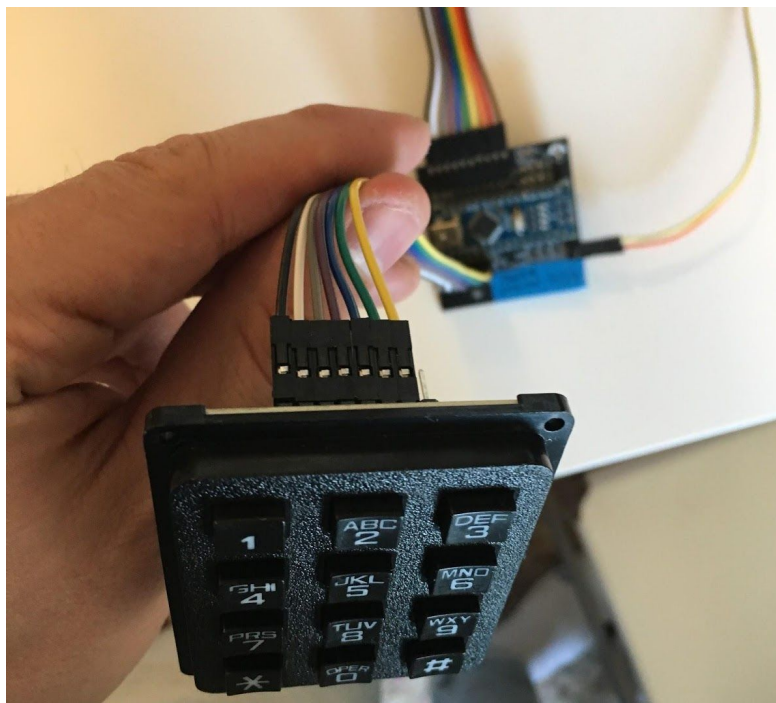
Phone Wiring



Breakout + MP3 + Keypad



Speakers



Keypad (Note that the last pin is left open)

Puzzle

Usage

The Arduino reads 5 digital inputs every 50ms (adjustable) and prints the output to the serial port at 9600 baud. The switches are activated by the presence of a magnet. The form of the output is [0/1][0/1][0/1][0/1][0/1]. EOM (end of message) character is ASCII 10 (Line feed). This is important for the Isadora session that receives the message. The order of switches is White, Red, Yellow, Green, Blue.

Schematic

```

                    |-----SW1-|
                    | |-----SW2-|
5v USB Power -> Arduino --SW3-|
                    | |-----SW4-|
                    |-----SW5-|
                        |
                        GND
```



Reed Switches