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# Wonder Factory-2B

## Midpoint Presentation

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Abdullah Bouhamad  
Abdullah Aljaafar





# Project Description

- A scientific community located in Flagstaff, AZ
- Branching down 50 ideas into one
- Connecting the piano to the Arduino Circuit from one side and the RGB LED strip to the other
- The box will serve as a housing for the circuit and LED lights

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# Updates

- Container manufactured
- Code Completed [1]
- DMX+MIDI  Sound Detection Sensor



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# Design Changes

- The brackets used on the container were removed.
  - Unstable
  - May collapse when used
  - Base added for stabilization
  - Sides glued together
- Dimensions of the acrylic sheets.
  - Lighter in weight
  - Smaller in size meaning easier to move.

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# Design Changes

- DMX to Sound detection sensor
  - Lesser wires/ less hassle to assemble
  - Lowers the risk of malfunction
- LED Projector to RGB LED Strip
  - Weighs less to accommodate the weight requirements
  - Easier to program
  - Lesser wires attached, thus easier assembly

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# Left of Manufacturing

- Continuation of the code
  - Programming the servo motor
- Printing the shapes that are attached to the servo motor.
- Attaching the LED strip into a glass core in way that it will project on to the back surface of the container.

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# Moving Forward (Manufacturing Plans)

Task	Start Date	Goals
Create a base for the arduino	July/ 10	Stabilize the arduino and keep it place
LED strip attachment.	July / 10	Attaching the strip in a spiral way to project on the back
Serve motor code.	July/ 11	Switch shapes.
3-D printing the shapes	July/ 11	So they can be projected on the white sheet.
The microphone is used to translate the sound coming from the piano to a signal.	July/12	The arduino can switch lights

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# Design Testing

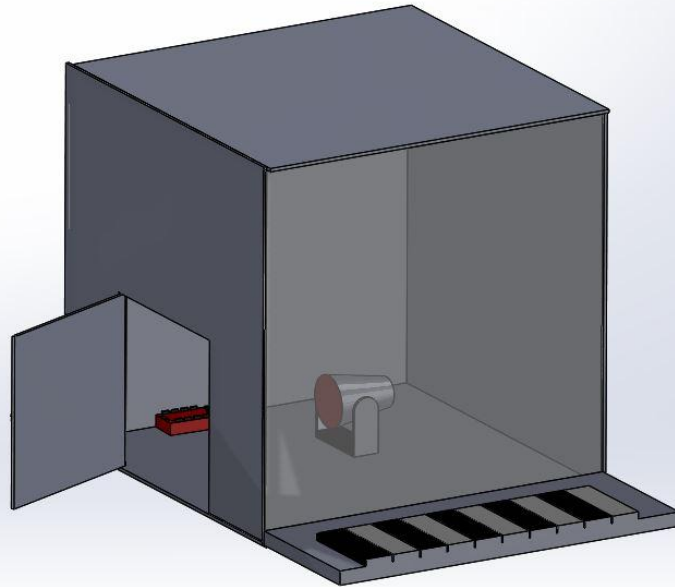
- Displaying it to our clients first
- Acquiring a quiet and a noisy room to prevent or allow mic from catching surrounded noise
- A dimmed-out lights area and a bright one to highlight the shapes

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# CAD Model



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# Budget

Item	Description	Quantity	Part Number	Cost \$	Vendor/manufacturer	Website Source
1	Arduino		1 KIT-14265	\$100	Sparksfun	<a href="https://www.sparkfun.com/products/14265">https://www.sparkfun.com/products/14265</a>
2	Diffused LED - Yellow 10mm		3 COM-10634	\$1.50	Sparksfun	<a href="https://www.sparkfun.com/products/10634">https://www.sparkfun.com/products/10634</a>
3	Diffused LED - Red 10mm		2 COM-10632	\$1.00	Sparksfun	<a href="https://www.sparkfun.com/products/10632">https://www.sparkfun.com/products/10632</a>
4	Jumper Wires - Connected 6"		2 PRT-12795	\$3.90	Sparksfun	<a href="https://www.sparkfun.com/products/12795">https://www.sparkfun.com/products/12795</a>
5	Resistor 330 Ohm 1/6 Watt P		20 COM-11507	\$0.95	Sparksfun	<a href="https://www.sparkfun.com/products/11507">https://www.sparkfun.com/products/11507</a>
6	Micophone		1 X001NELLZB	\$7.00	amazon	<a href="https://www.amazon.com/gp/product/B0173OAW4/ref=oh_aui_detailpage_o02_s00?ie=UTF8&amp;psc=1">https://www.amazon.com/gp/product/B0173OAW4/ref=oh_aui_detailpage_o02_s00?ie=UTF8&amp;psc=1</a>
7	World Panda MINI Portable		1 P0033273	\$62.99	amazon	<a href="https://www.amazon.com/gp/product/B06VXWPMVW/ref=ask_gl_qh_dp_hza">https://www.amazon.com/gp/product/B06VXWPMVW/ref=ask_gl_qh_dp_hza</a>
8	ALITOVE WS2812B Individuall		1 WS2812B	\$37	amazon	<a href="https://www.amazon.com/ALITOVE-Individually-Addressable-Flexible-Waterproof/dp/B018X04ES2">https://www.amazon.com/ALITOVE-Individually-Addressable-Flexible-Waterproof/dp/B018X04ES2</a>
9	Bronze Tint Acrylic sheet		5 242112	\$159.90	home depot	<a href="https://www.homedepot.com/p/OPTIX-30-in-x-36-in-x-093-in-Bronze-Tint-Acrylic-Sheet-16MC/202090119">https://www.homedepot.com/p/OPTIX-30-in-x-36-in-x-093-in-Bronze-Tint-Acrylic-Sheet-16MC/202090119</a>
10	Acrylic Sheet		1 241903	\$42.98	home depot	<a href="https://www.homedepot.com/s/Acrylic%2520Sheet?NCNI=5">https://www.homedepot.com/s/Acrylic%2520Sheet?NCNI=5</a>
11	DMX shield		1 MAX485	\$27.87	amazon	<a href="https://www.amazon.com/Arduino-Management-Capable-Extended-Functions/dp/B01DUHZAT0/ref=sr_1_1?ie=UTF8&amp;qid=152540053">https://www.amazon.com/Arduino-Management-Capable-Extended-Functions/dp/B01DUHZAT0/ref=sr_1_1?ie=UTF8&amp;qid=152540053</a>
12	SparkFun MIDI Shield		1 DEV-12898	\$19.95	Sparksfun	<a href="https://www.sparkfun.com/products/12898">https://www.sparkfun.com/products/12898</a>
13	Clear Ribbed Bell		1 395072	\$5.27	home Depot	<a href="https://www.homedepot.com/p/Westinghouse-4-1-2-in-Clear-Ribbed-Bell-with-2-1-4-in-Fitter-and-4-3-4-in-Width-8125800/203066143">https://www.homedepot.com/p/Westinghouse-4-1-2-in-Clear-Ribbed-Bell-with-2-1-4-in-Fitter-and-4-3-4-in-Width-8125800/203066143</a>
			Total	\$470.25		

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# Gantt Chart Project Planner

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ACTIVITY	PLAN START	Assigned to	ACTUAL START	ACTUAL DURATION	PERCENT COMPLETE
<b>Role assignment</b>	1/18/2018	Team	1/18/2018	1 hr	<b>100%</b>
<b>Academic Research</b>	1/20/2018	Team	1/19/2018	3 months	<b>100%</b>
<b>Client Meeting</b>	2/1/2018	Team	2/1/2018	one/week	<b>100%</b>
<b>Industrial Visit</b>	2/2/2018	Abdullah &Fawaz	2/2/2018	2 hr	<b>100%</b>
<b>Design Selection</b>	2/4/2018	Fawaz	2/4/2018	1 hr	<b>100%</b>
<b>Cost of Materials</b>	2/4/2018	Abduallah Aljaafar	2/4/2018	3 months	<b>100%</b>
<b>Design Evaluation</b>	2/5/2018	Team	3/1/2018	3 hr	<b>100%</b>

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# Gantt Chart

<b>Website 1</b>	1/20/2018	Abdulrahman	1/20/2018	1 month	<b>100%</b>
<b>Analyses Memo</b>	3/9/2018	Team	3/9/2018	1 month	<b>100%</b>
<b>Website 2</b>	2/24/2018	Abdulrahman	2/24/2018	1 month	<b>100%</b>
<b>Analytical report</b>	3/29/2018	Team	3/29/2018	1 month	<b>100%</b>
<b>Peer Eval. 2</b>	4/11/2018	Team	4/10/2018	1 hr	<b>100%</b>
<b>Final Presentation</b>	4/18/2018	Team	4/11/2018	1 week	<b>50%</b>
<b>Final Report</b>	4/29/2018	Team	3/18/2018	1 month	<b>100%</b>
<b>Final CAD</b>	4/2/2018	Team	4/2/2018	1 month	<b>85%</b>
<b>Website 3</b>	4/2/2018	Abdulrahman	4/2/2018	1 month	<b>100%</b>
<b>Peer Eval. 3</b>	4/4/2018	Team	4/4/2018	1 month	<b>100%</b>
<b>Final proposal</b>	6/1/2018	Team	6/1/2018	4 Days	<b>100%</b>

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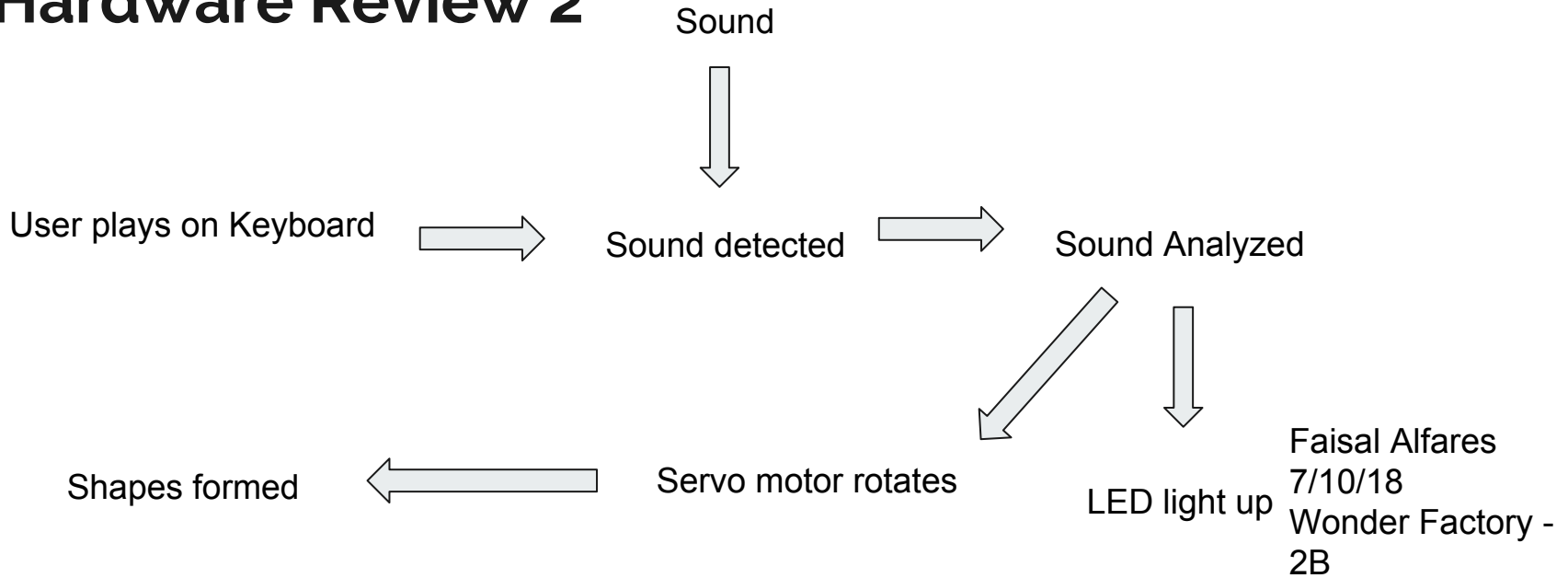
# Gantt Chart

<b>Midpoint Report</b>	7/4/2018	Team	6/26/2018	3 Days	<b>100%</b>
<b>HR2 summary</b>	7/10/2018	Team	7/13/2018	6 Days	<b>0%</b>
<b>Peer Eval 2</b>	7/11/2018	Team	7/14/2018	1 Day	<b>0%</b>
<b>Final Product Testing Proof</b>	7/25/2018	Team	7/25/2018	1 week	<b>0%</b>
<b>UGRADS Poster</b>	7/25/2018	Abdulahman	8/1/2018	5 Days	<b>0%</b>
<b>Final Report</b>	8/3/2018	Team	8/6/2018	1 week	<b>0%</b>
<b>Website Check 3</b>	8/5/2018	Abdulahman	8/7/2018	6 Days	<b>0%</b>
<b>Final CAD package</b>	7/8/2018	Team	8/7/2018	4 Days	<b>0%</b>
<b>Final Peer Evaluation</b>	8/8/2018	Team	8/8/2018	1 Day	<b>0%</b>

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# Hardware Review 2







Any Questions?

Thankyou





# References

[1] Hansjny, “hansjny/Natural-Nerd,” *GitHub*. [Online]. Available:

[https://github.com/hansjny/Natural-Nerd/blob/master/arduino/soundsread2/sound\\_reactive.ino](https://github.com/hansjny/Natural-Nerd/blob/master/arduino/soundsread2/sound_reactive.ino).



# Appendix A

```
#include <FastLED.h>

/** BASIC CONFIGURATION */

//The amount of LEDs in the setup
#define NUM_LEDS 150
//The pin that controls the LEDs
#define LED_PIN 6
//The pin that we read sensor values from
#define ANALOG_READ 0

//Confirmed microphone low value, and max value
#define MIC_LOW 0.0
#define MIC_HIGH 737.0
/** Other macros */
//How many previous sensor values effects the operating average?
#define AVGLEN 5
//How many previous sensor values decides if we are on a peak/HIGH (e.g. in a song)
#define LONG_SECTOR 20

//Mnemonics
#define HIGH 3
#define NORMAL 2

//How long do we keep the "current average" sound, before restarting the measuring
#define MSECS 30 * 1000
#define CYCLES MSECS / DELAY

/**Sometimes readings are wrong or strange. How much is a reading allowed
to deviate from the average to not be discarded? */
#define DEV_THRESH 0.8

//Arduino loop delay
#define DELAY 1

float fscale( float originalMin, float originalMax, float newBegin, float newEnd, float inputValue, float curve);
void insert(int val, int *avgs, int len);
int compute_average(int *avgs, int len);
void visualize_music();

//How many LEDs to we display
int curshow = NUM_LEDS;

/**Not really used yet. Thought to be able to switch between sound reactive
mode, and general gradient pulsing/static color*/
int mode = 0;

//Showing different colors based on the mode.
int songmode = NORMAL;
```



```
//The amount of iterations since the song_avg was reset
int iter = 0;

//The speed the LEDs fade to black if not relit
float fade_scale = 1.2;

//Led array
CRGB leds[NUM_LEDS];

/*Short sound avg used to "normalize" the input values.
We use the short average instead of using the sensor input directly */
int avgs[AVGLEN] = {-1};

//Longer sound avg
int long_avg[LONG_SECTOR] = {-1};

//Keeping track how often, and how long times we hit a certain mode
struct time_keeping {
    unsigned long times_start;
    short times;
};

//How much to increment or decrement each color every cycle
struct color {
    int r;
    int g;
    int b;
};

struct time_keeping high;
struct color Color;

void setup() {
    Serial.begin(9600);
    //Set all lights to make sure all are working as expected
    FastLED.addLeds<NEOPIXEL, LED_PIN>(leds, NUM_LEDS);
    for (int i = 0; i < NUM_LEDS; i++)
        leds[i] = CRGB(0, 0, 255);
    FastLED.show();
    delay(1000);

    //bootstrap average with some low values
    for (int i = 0; i < AVGLEN; i++) {
        insert(250, avgs, AVGLEN);
    }

    //Initial values
```