## Interface Definitions

![Diagram](https://via.placeholder.com/150)

**Figure 1: Processing AC Signal**

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Interface Type</th>
<th>Specifics</th>
</tr>
</thead>
</table>
| Signal Source  | Source of the signal (ex. Phone) | - Any signal from the outside environment  
|                |                              | - Best signal would be from a phone or another processor with music        |
| Audio Signal   | Traveling through air or a channel | - Starting AC signal from the source  
|                |                              | - This signal is traveling through air and gets picked up by the mic     |
| Microphone     | Analog signal processor      | - Operating voltage: 2V to 10V  
|                |                              | - Operating frequency: 100 to 20,000 HZ  
|                |                              | - Sensitivity: -42 ± 3 dB  
|                |                              | - Operating Temperature: -20 to 70°C                                      |

![Diagram](https://via.placeholder.com/150)

**Figure 2: Amplifying the Signal**

<table>
<thead>
<tr>
<th>Interface Name</th>
<th>Interface Type</th>
<th>Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Audio Signal</td>
<td>Analog Signal from the Mic</td>
<td>- Voltage Range peak to peak: 30 to 70 mV</td>
</tr>
</tbody>
</table>
| Amplifier       | Op Amp                         | - Offset voltage 3mV max over temp  
|                |                              | - Input current 100nA max over temp  
|                |                              | - Offset current 20nA max over temp  
|                |                              | - Has twice a gain of the non-inverting input signal                     |
### Amplified Signal

- Analog Signal increased with gain
- AC Signal that is the output of the Amplifier.
- Voltage range peak to peak: 60 to 200mV
- Doubled the Raw Audio signal

### Arduino Uno

- Data rate: 9600 baud rate
- Logic: 5 Volts
- Min Current: 2 uA
- Word size: 8 bit

### Processing Input

- Code
  - Arduino software: Arduino IDE
  - Written in C++
  - Uses Arduino library: fix_fft.h
  - Takes input analog signal and transforms it into data

### LED algorithm

- Code
  - Arduino software: Arduino IDE
  - Written in C++
  - Uses Arduino library: fix_fft.h
  - Uses the data from the processing input and turns that into an algorithm to control the LEDs as outputs
LED Logic

Arduino output Signal to LEDs  
- Max output voltage: 5V  
- Sends commands to control the patterns of when the LEDs turn on  
- Uses the LED algorithm to command the LEDs

**Figure 3: Amplifying the Signal**

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</thead>
</table>
| LED Logic      | Arduino output Signal to LEDs | - Max output voltage: 5V  
- Sends commands to control the patterns of when the LEDs turn on  
- Uses the LED algorithm to command the LEDs |
| LED Array      | 3 Bands of LEDs | - Three bands of 4 LEDs  
- Size of LED: 5mm  
- Reverse Voltage: 5V  
- Peak Forward Current: 1A  
- Power dissipation: 180mW |