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# Project Proposal: YouPlay Team B5

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# Use Case

## Areas

- Digital Signal Processing
- Software Systems

Software to help aspiring musicians based on an easy to use chord detection, key detection, and pitch analysis

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# Equipment



Microphone-  
Shure SM58-X2U Cardioid  
Dynamic Vocal Microphone  
with X2U XLR-to-USB Signal  
Adapter

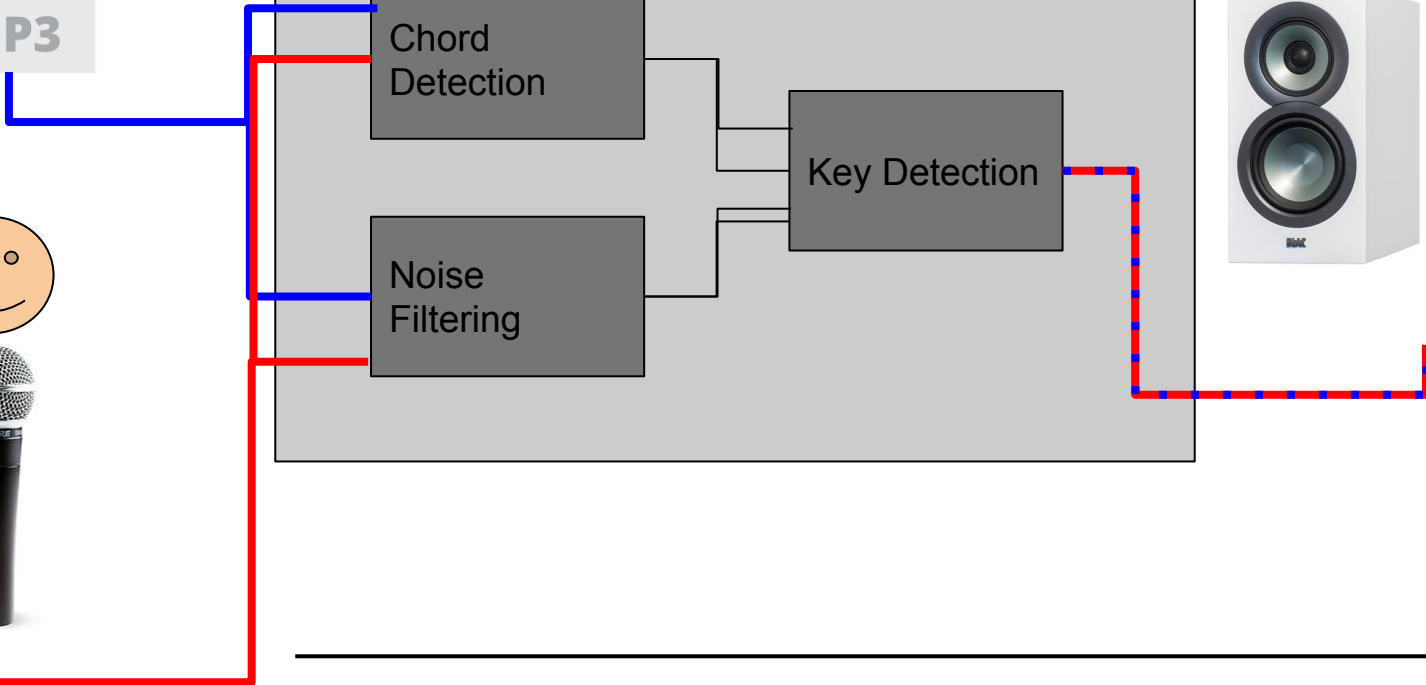
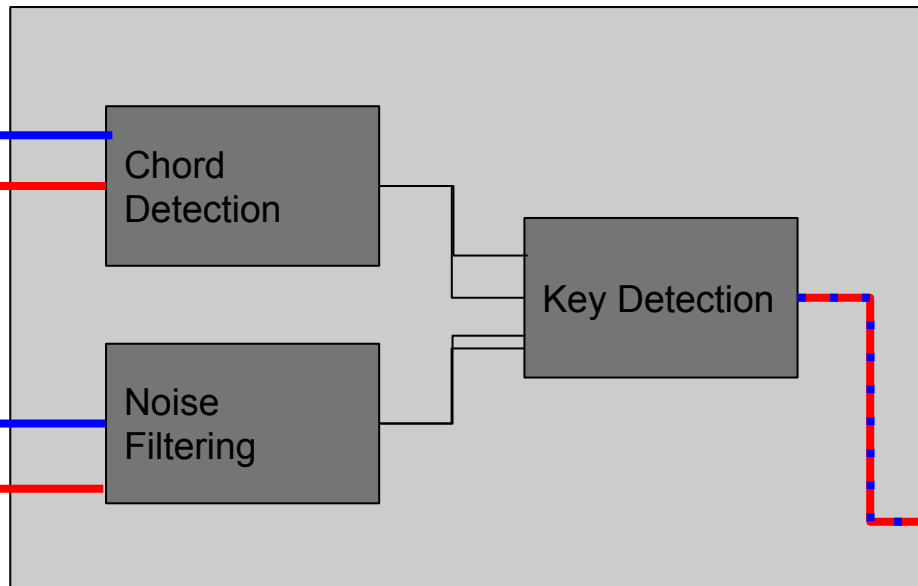


Speakers-  
Creative Pebble 2.0 USB-Powered  
Desktop Speakers with Far-Field  
Drivers and Passive Radiators for  
Pcs and Laptops (Black)





## Framework



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# Noise Filtering

- **Requirement:**
    - It can be a challenge to filter out background noise while not losing the sounds that come from the voice
  - **Solution:**
    - We plan to use MATLAB to make a bandpass filter with cutoff frequencies of 300 Hz and 3.4kHz, which is a filter that is commonly used by telephones
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# Chord Detection

- **Requirement:** The software will correctly identify the chords being played
  - **Solution:**
    - FFT on ~half second intervals
    - Calculate likelihood to match certain chord
    - Find correct chord over ~2-3 second period
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# Key Detection

- **Requirement:** The system should be able to detect the correct key of the song provided as an input
  - **Solution:**
    - Based on chord detection
    - Find the most common frequencies over the whole song
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# Software Stack

Wad.js Frontend

Flask Backend

Deployed using Gevent, Gunicorn on AWS

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# Testing & Verification

- **Static and Dynamic testing of the Software Stack using Linters, and Code review respectively**
  - **Black and white box testing of every component**
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# Target Metrics

Synthesized sine waves	99%
Single note recording	99%
Multiple note (chord) recording	>95%
Song recording	>80%
Latency	100ms
SNR	25dB

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# Potential Difficulties

- Being able to obtain clear mic data without expensive physical pre-filtering
  - Obtaining note/chord data amidst background noise
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