

"TAKPAD" Block Diagram

Authors

Aaron Halim

Daniel Christiansen

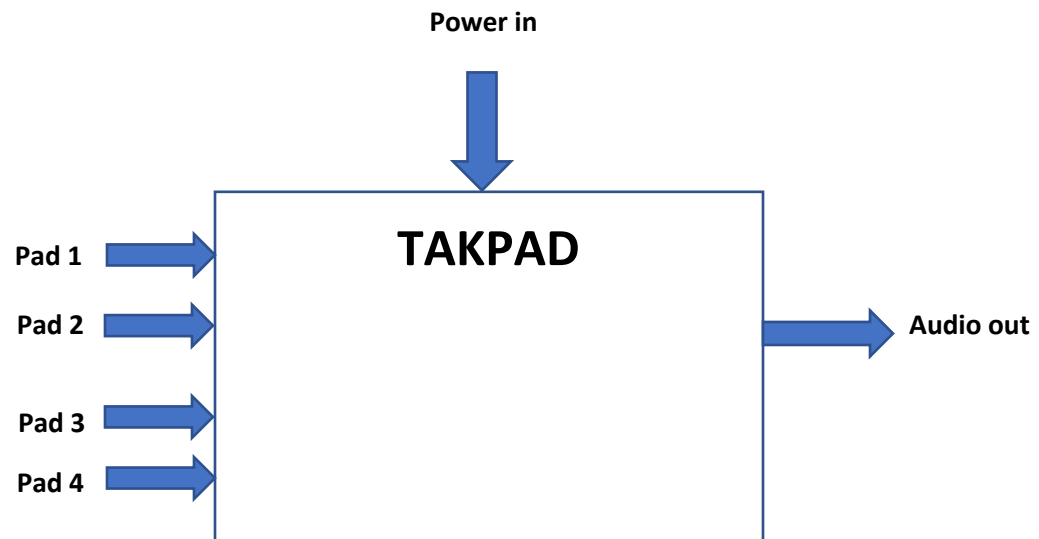
Jesse Zelaya

Tyler Thompson

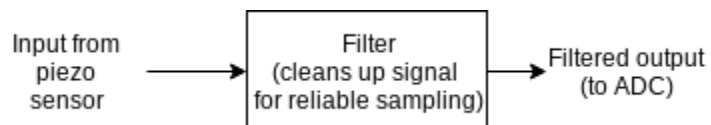
Tsegaslase Mebrahtu

High Level Block Diagram

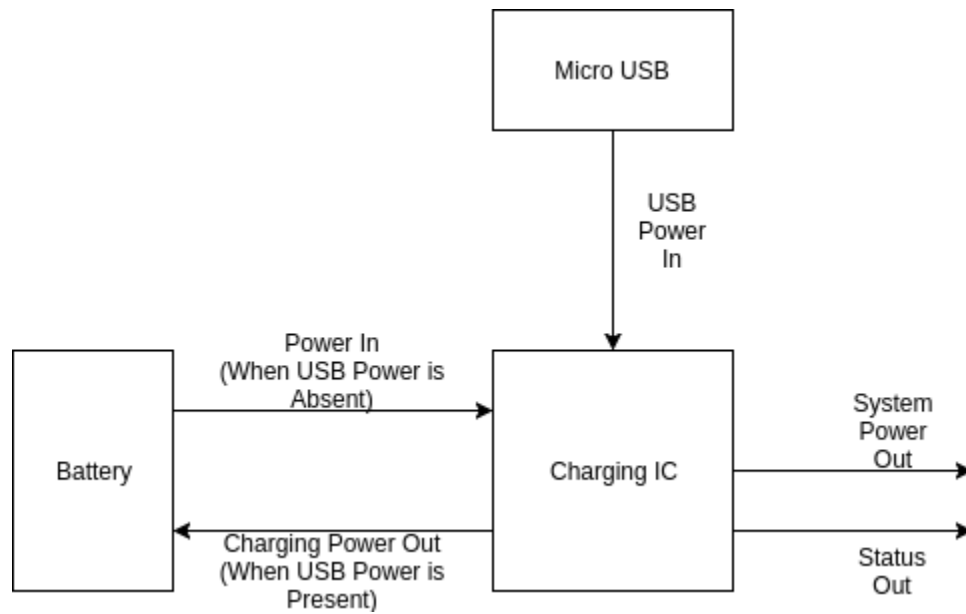
TAKPAD



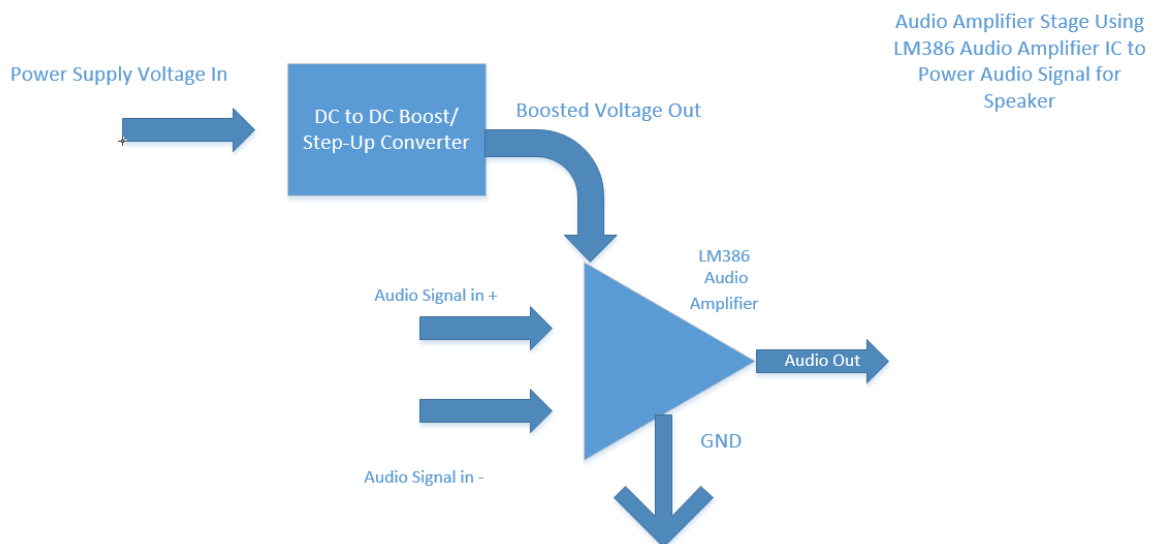
Input Filter



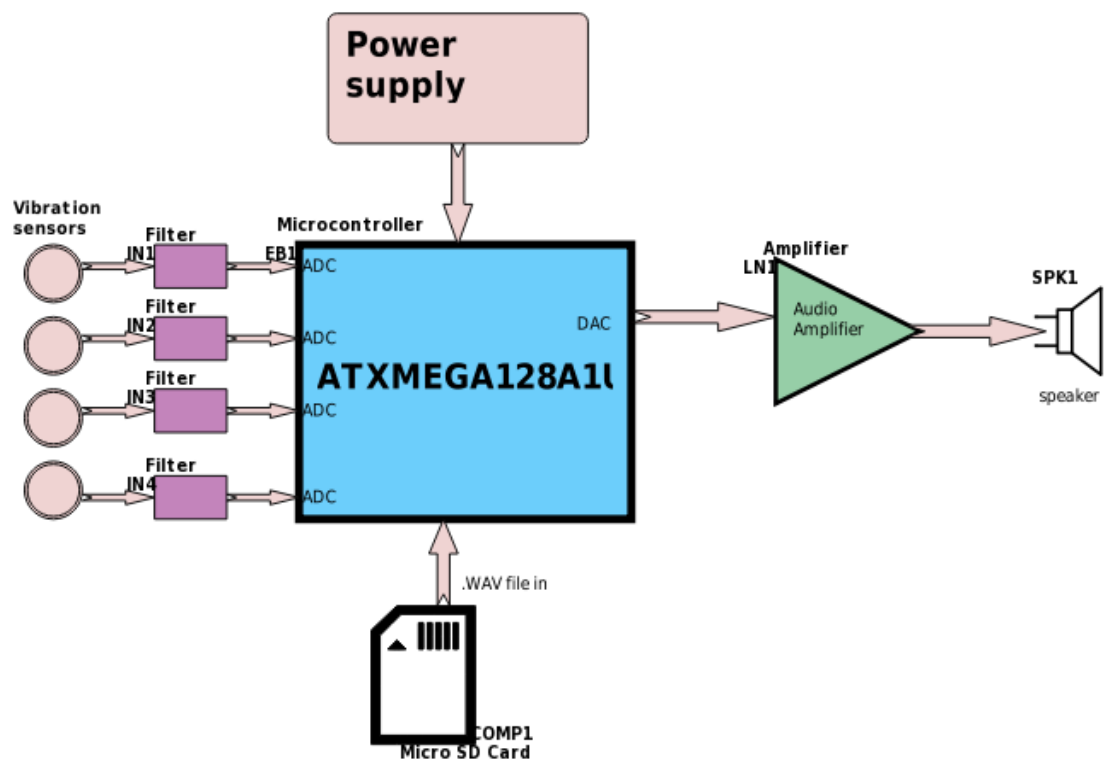
Power supply



Audio amplifier



Detailed Block Diagram



Vibration sensor (piezo element)

Input: Push or press the piezo element

Output: Analog voltage wave

Functionality: The piezoelectric element generates voltage when deformed. It basically measures change in pressure, strain or force by converting the mechanical change into electrical charges. The bigger the applied force, the higher the voltage output's amplitude.

Pre-filters

Input: voltage output from the piezo element

Output: Filtered voltage output that looks like an analog pulse.

Functionality: the pre-filter is designed to remove the high frequency components of the sensor output and regulate the output voltage into 3.3V level. This would make it easier to process the output signal from the sensor in the microcontroller.

Microcontroller(ATXMEGA128A1U)

Input: Analog voltage output from the filters and **.wav** files from MicroSD

Output: processed **.wav** signal into audio amplifier.

Functionality: the microcontroller outputs a unique processed **.wav** file based on the magnitude of the vibration. Change in the magnitude of the applied force on the sensors would result an altered pitch version of the **.wav** file.

Audio amplifier

Input: **.wav** file from the microcontroller

Output: amplified **.wav** signal into speaker

Functionality: the amplitude of the **.wav** signal from the microcontroller is small, so the audio amplifier will amplify the signal with high gain so that the **.wav** signal will be audible to a room of audience.

Speaker

Input: **.wav** signal from the Audio amplifier

Output: sound wave that is audible to the human ear

Functionality: the function of the speaker is to convert an electrical signal into sound wave.

MicroSD

Input: N/A

Output: .wav files into the microcontroller

Functionality : it is the source for the .wav files that will be accessed and processed by the microcontroller

Rechargeable Battery:

Input: Battery charger when it run out charge

Output: 3 – 4 Volts into the regulator.

Functionality: it is the power supply for the **TAKPAD** board.

Power supply:

Input: 3 – 4 volts from the battery

Output: 3.3 volts into the microcontroller

Functionality: it regulates the voltage from the battery into the proper rating for the microcontroller.