Product Design Specification for "**TAKPAD**"
Version 0.1: 2017-10-18

- **Authors**

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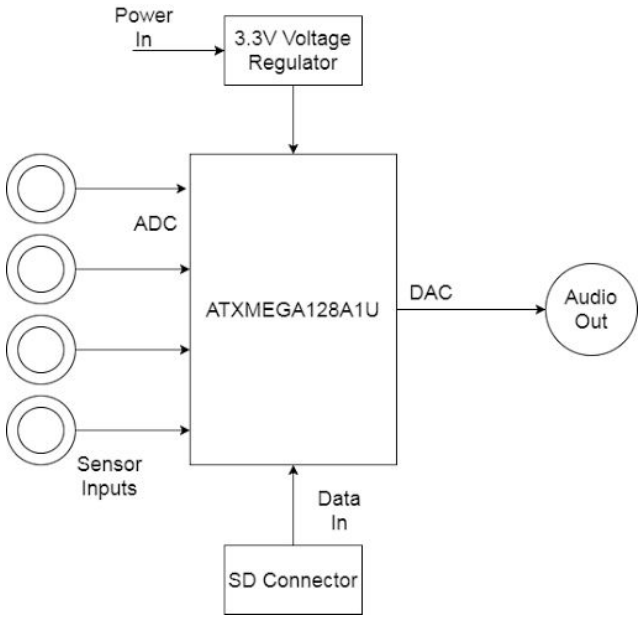
- **Project Objectives**

The goal of this project is to design and build a MIDI synthesizer with multiple drum pad inputs. The input pads will use sensors to detect tapping, and play sounds based on the force of the taps.



- **Background**

This project is the result of many ideas that involved various types of audio devices. These proposals contained too wide a variety of components to fit in a single project. The Takpad was created from the common elements that the group wanted in a device. With the option to change the programming to fit the needs of the individual, the project also includes the option to change the sounds created, and the specifics of the interface. We are aware some products like this exist and have a huge market, but the ability to have a low power drum pad that is customizable and with its own portable amplified sound output this can also be marketed toward musicians that want the convenience of a small amplified drum kit.

- **Needs Identification**
    - The purpose of this project is to provide a device capable of the instant auditory playback of a grid controller with the audio distortion capability of an effects pedal all in a portable package that is not solely dependent by a cabled power source (via USB or wall socket)
        - Consistent power input
        - Plays sound from SD card upon recognizing sensor input
        - Amplified speaker output

- **Must**
    - Play sound as a result of a sensor input
    - Have reasonable response time
    - Have a working amplified speaker
    - Light feedback or VU meter

- **Should**
    - Alter the pitch of the sound depending on velocity of sensor strike
    - Have option to change different drum/sound packages
    - Have an input for another instrument input on amplifier
    - Lights to indicate different states

- **May Have**
    - An option to loop a drum sound
    - An output to plug into an external ¼” input to amplifier

- **Sound Board Requirements**
    - Functionality
        - Must alter pitch of audio sample playback based on force of impact
        - Must read audio playback data from sd card

    - Performance
        - Must play sound with little to no delay
        - Must have little to no added distortion other than what is set by the adjustments from the sensor output data

    - Economic
        - Should cost under $80 for parts, components, and materials

A complete aggregate cost breakdown will be documented in a bill of materials for the project, nearing its completion

- **Energy**
  - Should draw under 150mA of current with an input voltage of 3.3V
  - May draw from battery source, ideally rechargeable for renewability
  - Roughly 0.5 watts of power to the system based on voltage and current draw

- **Legal and Regulatory**
  - FCC compliance on electronic devices

- **Environmental**
  Low power consumption
  Does not require batteries