Timpan-E:

An Affordable & Portable, DIY Music-Engineering Education Kit

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In Cooperation with the Saint Ignatius High School Band Program

Electrical Engineering and Computer Science Department

What is Timpan-E?

A customizable, modular, DIY digital instrument kit, capable of replacing physical concert instruments. The system can be configured to play custom sound fonts of real analog instruments, allowing musicians and students to practice almost any percussion or keyboard instrument, anywhere they can bring a laptop. Timpan-E snaps together in minutes and connects to a computer using USB-C, allowing anyone to build their dream ensemble.

Capturing Personality in Music

Timpan-E uses recordings of you playing your instrument to create a sound font that accurately reproduces your unique style, without having to book time in a recording studio and without having to pay for commercial sound fonts.

Our process starts by meeting the musician and recording different facets of the musician's style. In under 2 hours, enough data can be captured to produce a sound font of your style, which can be reproduced on any MIDI system.

For this project, we went to Saint Ignatius High School and recorded the samples in the band room, using just two microphones carefully positioned to capture both high and low frequency harmonics.

Powering a Performer's Creativity

After capturing a musician's style in a sound font, we designed custom hardware that reproduces that sound for a fraction of the cost of the real instrument, all while maintaining that one of a kind feeling of playing the real instrument.

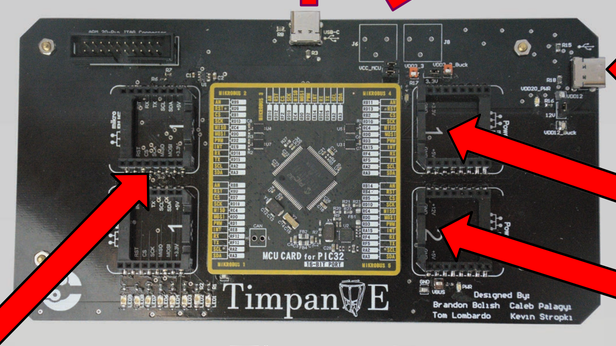
Timpan-E's modular design allows a musician's wildest dreams to come true, from glow in the dark drumheads to an AGO standard organ manual that fits in a backpack. Timpan-E gives the performer the power to build an instrument, use it, then instantly change to a completely new instrument that is only limited by his or her imagination.

This also gives the musician the flexibility to change instruments, without having to buy a new instrument. If a student wants to change from piano or organ to drums or xylophone, that change is just a snap away.

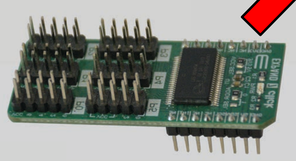
Custom High-Fidelity Sound Font

USB-C to Computer

Speaker or Headset

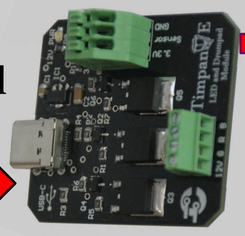


Timpan-E Motherboard



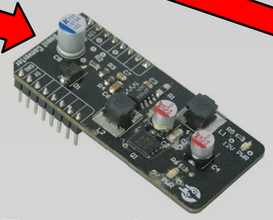
Compatible with 1200+ Expansion Boards

USB-C to Drum Pad Module

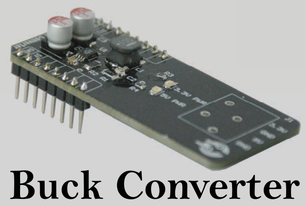


LED and Drum Pad Module

Drum Pad



Boost Converter

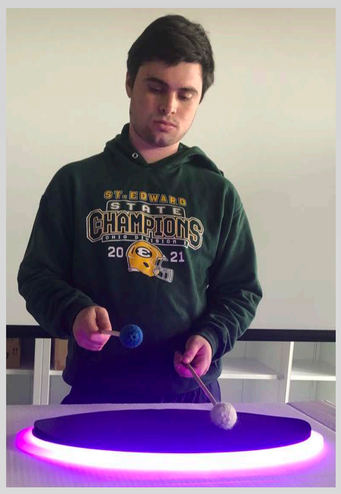


Buck Converter

Fusing Engineering and Music

A key moment in any student's first musical endeavor is when he or she picks an instrument. Similarly, a student's first hands-on project is often the spark that ignites a passion for engineering. Timpan-E takes these two moments and fuses them together to show students how science, technology, engineering, math, and music are all interconnected.

Timpan-E instrument housings can be pre-made or laser cut by students. Assembly doesn't require custom tools or soldering, everything snaps together; even connecting wires is as simple as the press of a button.

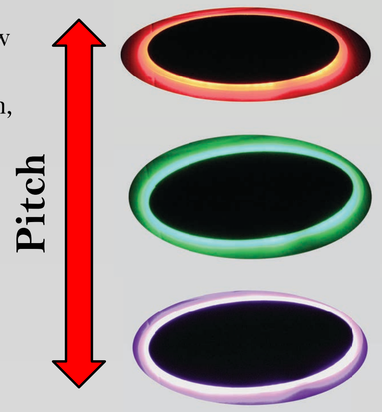


Making Music Colorful

As timpani are pitched drums, students must learn how to tune the drum. Timpan-E features color changing backlighting that corresponds to the pitch of the drum, allowing students to associate a note with a color.

This can also enhance music therapy, by adding visual feedback to the user and providing the therapist increased flexibility.

Lastly, the backlighting allows a musician to see the drum in dark places, such as an orchestra pit, without the complication and heat of overhead lighting.



Connecting the Classroom to the Community

Culminating our education, this project utilized skills from many engineering courses:

ESC 120: Mechanical Housings and 3D Modelling
EEC 314, 318, 440: Custom High-Fidelity Sound Font
EEC 383, 517, 580 : Timpan-E Motherboard
EEC 470, 471, 574: Boost and Buck Converters
EEC 313, 315, 430, 499: LED Driver and Drum Pad Module
EEC 587; ESC 151; CIS 265, 340, 434: Firmware and Velocity Algorithm

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Washkewicz College of Engineering

Presented By: Brandon Bolish, Thomas Lombardo, Kevin Stropki, Caleb Palagyi (Team Leader)