Tech Expo, Spring 2026 – Team 36

LittleBits MakerWall

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PURDUE UNIVERSITY
Polytechnic Institute

Endress+Hauser
People for Process Automation

Problem Statement

Endress+Hauser requested a wall-mounted exhibit using littleBits curriculum that is safe, engaging, and educational. The new design will vertically mount components, create a more interactive hands-on learning experience, and replace unsafe 9V batteries with reliable power. This reduces waste and maintenance while supporting up to five pairs of K–6 students during engaging 10–12 minute learning sessions

Customer Background

Endress+Hauser is a global leader in measurement instrumentation, services, and solutions for industrial process engineering. Specializing in industrial sensors and automation technologies, their advanced systems rely heavily on precise signal flow, efficient circuit design, and robust input/output management. To sustain their engineering talent pipeline and foster innovation,

Requirements

The littleBits MakerWall must be an interactive, securely mounted vertical learning space that allows students to easily attach components and build circuits. The permanent installation requires a single centralized power source to replace 9V batteries, integrated component storage below the unit, and an accessible design for future repair and maintenance.

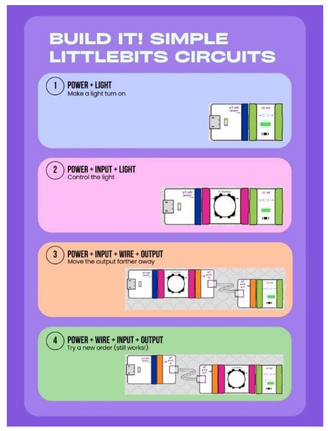
The exhibit must support five groups of two students in grades K-6 as they engage with the curriculum and littleBits for 10–12-minute intervals. It must be educational, interactive, and support student learning.

Furthermore, the wall must feature engaging, age-appropriate design challenges utilizing the surface to adhere to specific size and load constraints approved by the Facilities Manager, and undergo user testing in early Spring 2026 to ensure optimal functionality before final delivery.

Experimentation and Concepts

Curriculum:

This project focused on learning through hands-on experimentation with three LittleBits cards: “LittleBits Basics,” “Build it! Simple Circuits,” and “Challenge: Build A Strom!”. These activities introduced core concepts like signal flow, inputs/outputs, and efficient circuit design while encouraging creativity. Together, they demonstrated how simple, modular circuits can be an engaging educational tool for understanding electrical principles.

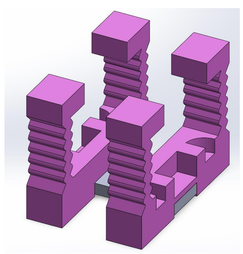


Bit Shoe:

The magnet component and a secure connection method was crucial to attaching the bit shoe to the wall. The bit shoe design started as one piece that could be used for every bit. The different forces acting on the bit shoe in relation to the bit caused us to tighten the measurements around the bit shoe itself. The bit shoe also needed to have a force that opposes the open end of the bit shoe which caused the development of the beam. All the bits can be categorized into 5 size categories that fit into the bit shoe design using a cantilever snap joint.

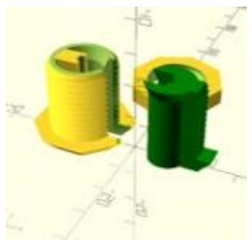
Final Design

The final design of the cards is colorful and engaging, making them easy and fun to use. Bright visuals and simple layouts help guide users through each activity while supporting hands-on learning.



The final design of the bit shoes focuses on safety, stability, easy connection, assembly, and ease of use. The shoes uses compliant mechanisms to increase the flexibility and protection around the bit shoe. The design is stabilized by a cantilever snap joint beam that pushes and outward force to keep the shoes on the bit. The beam houses the magnet component to attach to the wall.

A gromet secures the power cable going to the back of the wall. This custom component, combined with clips, prevents children from being able to yank on exposed section of the cord.



Testing and Results

Component	Rating	Description	Pass/Fail (+4)
Power Supply		**External power supply for the LB circuits.**	**Pass**
Safety	5	Project utilizes commercially available components that meet safety standards	Pass
Accessibility	4	Project cannot be easily accessed by students, but is easily accessed for repair or charging by staff	Pass
Relability	5	LittleBits circuits can be powered for multiple sessions with one full charge of the portable charger. Enabling trickle charge mode keeps the charger on despite low current draw	Pass
Instructional Materials		**Magnetic instruction sheets depicting how to use the LBs to make circuits, removing the need for staff instruction**	**Pass**
Durability	4	Sheets are made from stickers attached to magnetic sheets. Magnets lasted through a month of use. Stickers will scratch if a sharp tool is used	Pass
Effectiveness	5	Instructions are easy to follow and and students are able to understand a bit's function from using the sheets	Pass
Aesthetics	5	Sheets are colorful and engaging in content and appearance	Pass
Wall Mounted Exhibit		**Exhibit is fully mounted to a protable white-board. Bits in Bit Shoes are fully magnetic and are stored on the MakerWall itself**	**Pass**
Functionality	5	The portable whiteboards free up the space and the MakerWall is fully contained on their whiteboards. LB circuits can be built and powered	Pass
Durability	4.5	The whiteboards, magnets, and wallpaper are scratch resistance and commercial products. The bit shoes are 3D printed parts designed with additional support to avoid damage from drops or snaps	Pass
Flexiblity	5	Whiteboards are fully portable for easy move-ment. All components aside from the charger are magnetic, allowing more flexibility. Charger can be removed for easier charging	Pass
Safety	5	Portable whiteboards are commercially available and meet safety standards	Pass
Kid Friendly Experience		**Exhibit is engaging and enjoyable for students from grades K-6th.**	**Pass**
Safety	5	All components meet safety standards for children's toys (ASTM F963)	Pass
Enjoyment	5	MakerWall upgrades the current experience with more time for student free-play	Pass
Aesthetics	4.5	MakerWall is colorful and vibrant with easily accessible LittleBits	Pass