

Very Useful Circuits

Lectrical engineering for all ages

Since launching Lectrify in 2015, we've enabled thousands of children in classrooms and camps to build their first circuits using LEGO™ and common craft materials.



We're excited to launch the newest in our line of circuits: Very Useful Circuits

With Very Useful Circuits you can bring your making to the next level.

Enhance your projects with new features like touch activation, light activation, and blinking.

Improve your soldering and making skills with our easy to use soldering kits.

Explore key concepts in electrical engineering through making.

What are Very Useful Circuits?

Very Useful Circuits enable students to explore foundational electronics concepts through making. With Very Useful Circuits, you can add a new level of control to your creations and learn basic electronic circuits at the same time.

Each Very Useful Circuit is available as either a pre-soldered board or as a soldering kit. The pre-soldered boards come ready for components to be used in projects. They work well for makers and classrooms that don't offer soldering.

We've designed the soldering kits with beginners in mind. Each PCB board includes the circuit diagram and clear instructions on where the components should be placed. There are large holes to keep components in place while soldering.

Whether you choose the pre-assembled boards or the soldering kits, each board comes with a comprehensive lesson plan to explore the circuit along a number of paths. We are introducing 4 types of Very Useful Circuits:

Touchpad - a conductive touchpad to make interactive projects

Blinker - two blinking LEDs

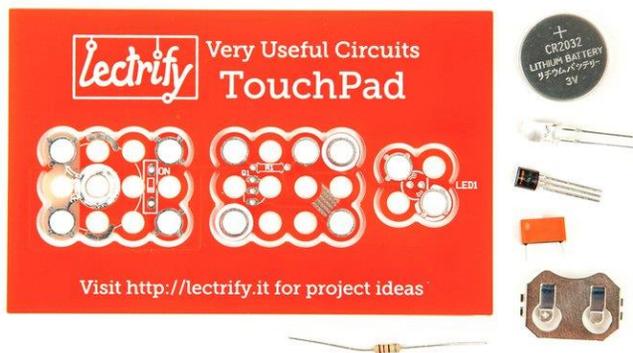
Nitelight - an LED that turns on in the dark

Sensor - a circuit that senses small changes in temperature, pressure, light, or humidity



Each can be embedded into circuit crafts including LEGO™, sewables, and paper circuits! The hands-on projects make it easier to get started using transistors, capacitors, and resistors.

TouchPad: Introducing the Transistor



Explore how a small current can turn on an LED. Use these components to make a touch-based lamp, fruit switch, or a humidity sensor. This board is an introduction to transistors and exploring how objects may be conductive while having high resistance. Concepts: transistors, conductivity

NiteLight: Simple Logic with a Transistor



Create LED projects that turn on automatically when it gets dark. The NiteLight uses simple logic with a transistor to control the light. Example projects include a safety light or a night light for your bedroom. Experiment by swapping out the transistor with another and reversing the circuit to turn on the LED when exposed to light (e.g., a refrigerator alarm).

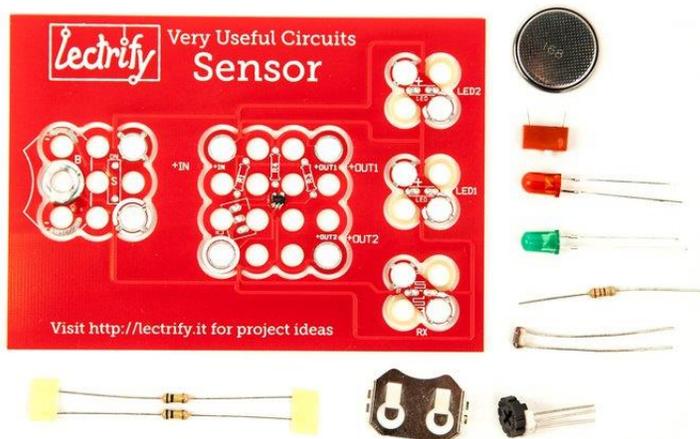
Concepts: simple logic, transistors

Blinker: Keeping Time with Capacitors



Use this board to create projects with blinking LEDs. Create a predictable timer/blinker circuit using two transistors and the properties of the capacitor-resistor discharge. Experiment by changing the capacitor to see what happens to the blink rate. Concepts: capacitors

Sensor: Embrace Resistance



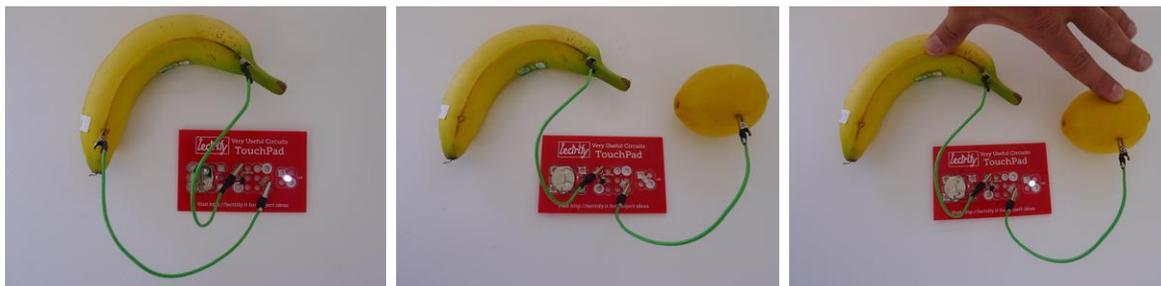
Build projects that could one day link to the Internet of Things (IoT). This board measures small changes in resistance (temperature, pressure, light, and humidity). Use Sensor to create interactive games that control LEDs when there are changes in pressure or temperature. This circuit also helps you explore the properties of the Wheatstone Bridge. Concepts: resistance

Comparisons

	Teaching	Making	Cost	Works with LEGO™
Lectrify	Yes	Yes	<\$15/project	Yes
Traditional Soldering Kits	Limited	Limited	\$10-25/project	No
Snap Circuits	Yes	No	>\$20/project	No
LittleBits	Limited	Limited	>\$20/project	Need additional adapter

Who Needs It and Why?

Very Useful Circuits are designed for curious minds ages 12 to infinity who have mastered simple circuits and are ready to explore more. If you're looking to make your hands-on projects more complex and interactive, these kits are for you. Plus, they also address concepts from AP Physics and undergraduate level Engineering courses. We believe makers, students, and teachers would find value in these circuits.

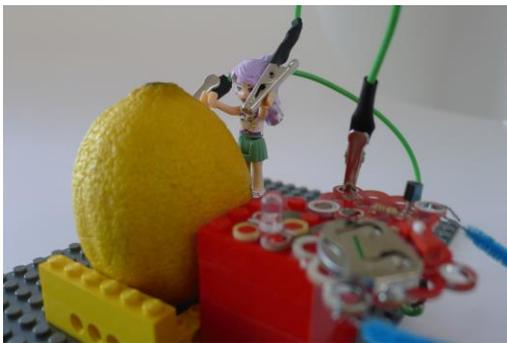


What can I make or do with Very Useful Circuits?

You can use Very Useful Circuits to make craft projects or use them to create your very own science and electronic experiments.

LEGO™ Crafts

Like all Lectrify components, Very Useful Circuits are sized to fit onto LEGO™ bricks. Enhance any LEGO™ project with some conductive tape or alligator clips.



Wearable Tech

Embed Very Useful Circuits into wearables with conductive thread or fabric. Make a night light safety pin that turns on when it's dark outside.

Science Experiments



Use the Touchpad as a probe to test conductivity and resistance.

Conduct science experiments with Very Useful Circuits and everyday materials you have around the house. The Touchpad can be used as a probe to test conductivity and resistance.

IoT Devices

These smart home devices help automate lighting, heating, and more. Build smart gadgets that notify you that a certain temperature has been met and automatically take a follow-up action. Very Useful Circuits allow you to build logic with prototypes that might one day connect to the cloud and other smart devices.

Learn How to Solder

Soldering can be a handy skill when working with electronics. Very Useful Circuits are great for beginners because they have large through-holes to keep components in place.

{Picture of Haley soldering Nitelight}

Curriculum Guides/Tutorials

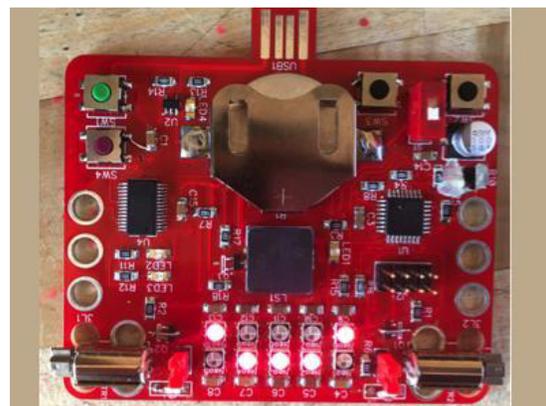
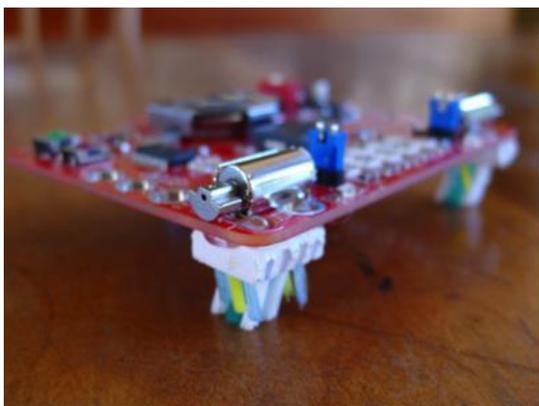
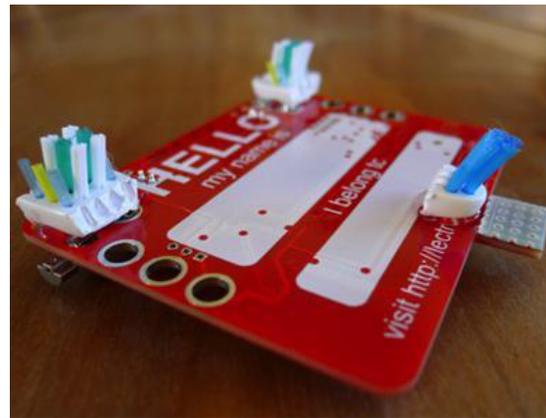
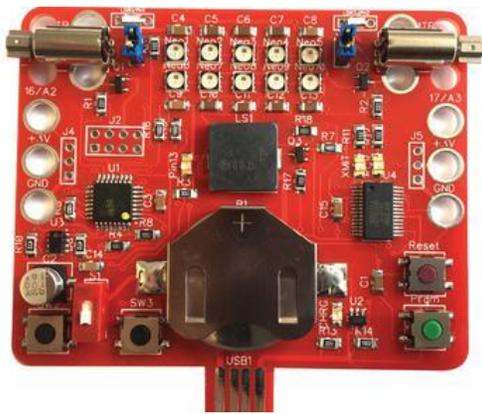
Each Very Useful Circuit comes with a set of instructions and a sample project to help you get started. We know that there are lots of different ways to use Very Useful Circuits and hope to expand the curriculum with more project ideas for makers and classrooms.



Our simple circuit kits map to Next Generation Science Standards. We plan to align our Very Useful Circuit curriculum to the CS Framework and AP Physics standards.

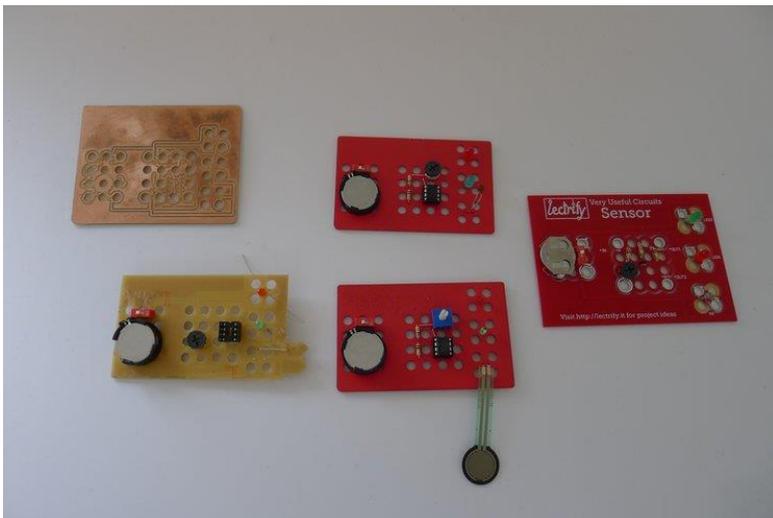
What About Coding?

We are actively testing an Arduino based board called CODE that enables students to explore physical computing. CODE is in its final stages of development and we hope to launch it later this year for ~\$40. Key features include onboard battery, gesture and motion sensor, Neopixels, peizo buzzer, motors, LEDs and more! It is also designed with a built-in USB port for easy programming and charging, eliminating wire connections. Stay tuned...



Manufacturing Process and Plan

We design, prototype, and manufacture our core products in the beautiful San Francisco Bay Area. Our prototypes are built and tested on an [Othermill](#).

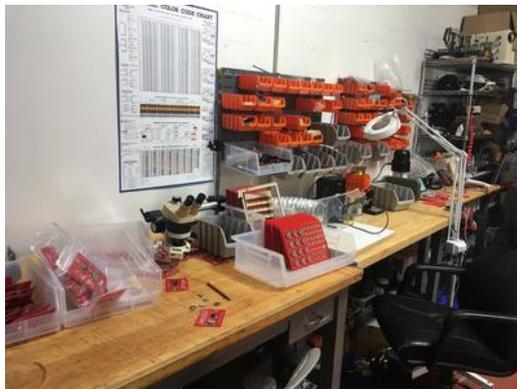


Evolution of the Sensor Board.

The boards are manufactured locally in Oakland, CA by our close partner, Boardworks. We have over two years of experience collaborating with them and have successfully delivered many products together.



Final assembly and packaging is done in our offices in the Mission District of San Francisco.



The curriculum is being drafted by a team of educators including pioneers in the Maker community, former and active High School Physics Teachers, and Electrical Engineering Professors.

Current Manufacturing Status

Three boards are fully designed and available now: TouchPad, NiteLight and Blinker.

The Sensor board is entering final testing in the field and is expected to be available shortly.

The curriculum is still in development and will be the primary focus of this campaign.

Risks & Challenges

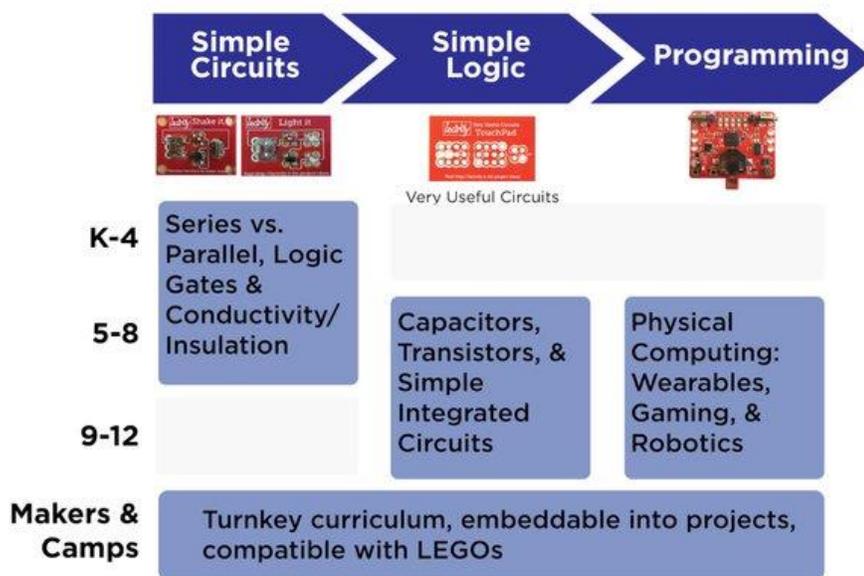
As with any manufactured product, the availability of materials, manufacturing delays, and curriculum delays are all technically possible. Luckily, three out of four of the kits are already manufactured and available. Also, our manufacturing partners are physically nearby (easy to access) and their lead times are short, which makes a huge difference. Therefore our greatest risk is in the development.

Shipping & Fulfillment

All orders will ship from our warehouse in San Francisco, California. If this plan changes, we will notify all backers with an update.

What is Lectrify?

We offer students and makers a series of open-ended kits that follow a logical sequence from simple circuits to programming. We first introduced two simple circuit kits - Light it and Shake it - to provide students opportunities to learn basic electronics and engineering. We find that many of the hands-on STEM kits on the market today address either only simple circuits or robotics/programming. Most fail to address concepts of simple logic that are foundational for programming. We designed Very Useful Circuits to fill this gap.



<https://www.crowdsupply.com/lectrify/very-useful-circuits> 1-5-18