



Teaching Electronics with the V-One



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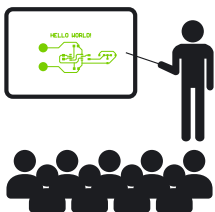
A co-op student using the V-One at the studio of Dr. Philip Beasley, an architect and professor at the University of Waterloo who uses the V-One to print lightweight circuit boards for structures that move and respond to stimuli like living systems.

A New Standard in Electronics Education

At Voltera, we believe that the best way to learn how a circuit works is to build one.

There's a difference between understanding what a capacitor is and seeing what it does. A theoretical foundation is important, and the current education system is good at making sure every student has one. Unfortunately, prototyping custom circuits from scratch has been too expensive and time consuming for use in the classroom. Until now.

Students need a tool that lets them complete electronics projects in under an hour in a way that is hands-on, simple to understand, and that sparks a lifelong love for technology. The reward for solving these problems will be a generation of students enthusiastic about bringing their school projects home, and parents who marvel at their children's technological creations.



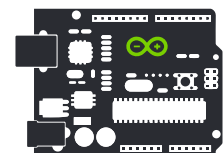
All-in-one circuit design

Print conductive traces, drill through-holes, dispense solder paste and reflow components on your desktop. The V-One is a PCB factory the size of a laptop.



Easy experience

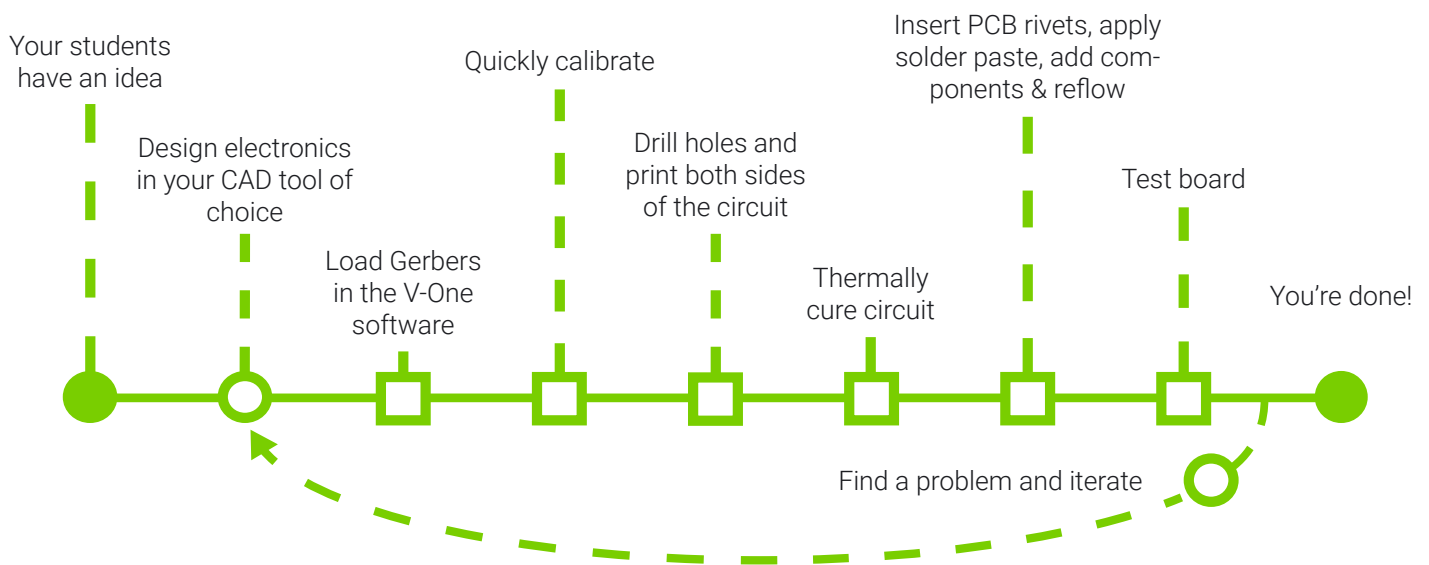
Using the V-One is a breeze. From simple software with in-app video instructions to magnetic attachments, it's as easy to use as an iPad app.



Dev Kit Friendly

The Voltera V-One is designed to work with open source platforms like Arduino, Particle and Raspberry Pi. Go from idea to working prototype in one lesson.

Teaching Electronics Design with the Voltera V-One



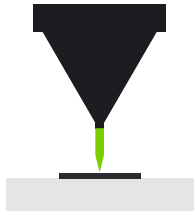
The V-One is used in classrooms around the world to teach the next generation of innovators.



A highschool in Yeongcheon-si, Gyeongsangbuk-do, South Korea where students learn about the fundamentals of electronics design by creating their own circuit boards from scratch with a Voltera V-One in a lab outfitted with a printer for each student.

Design. Print. Test. Repeat.

Build, learn and iterate, all before the bell.



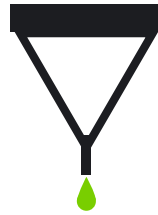
Align

Align quickly using Voltera's smart height probe and existing board features as fiducials for XY alignment.



Drill

Designed to be compact, the V-One drills through-holes and vias at 13,000 RPM with a 3 mil runout.



Dispense

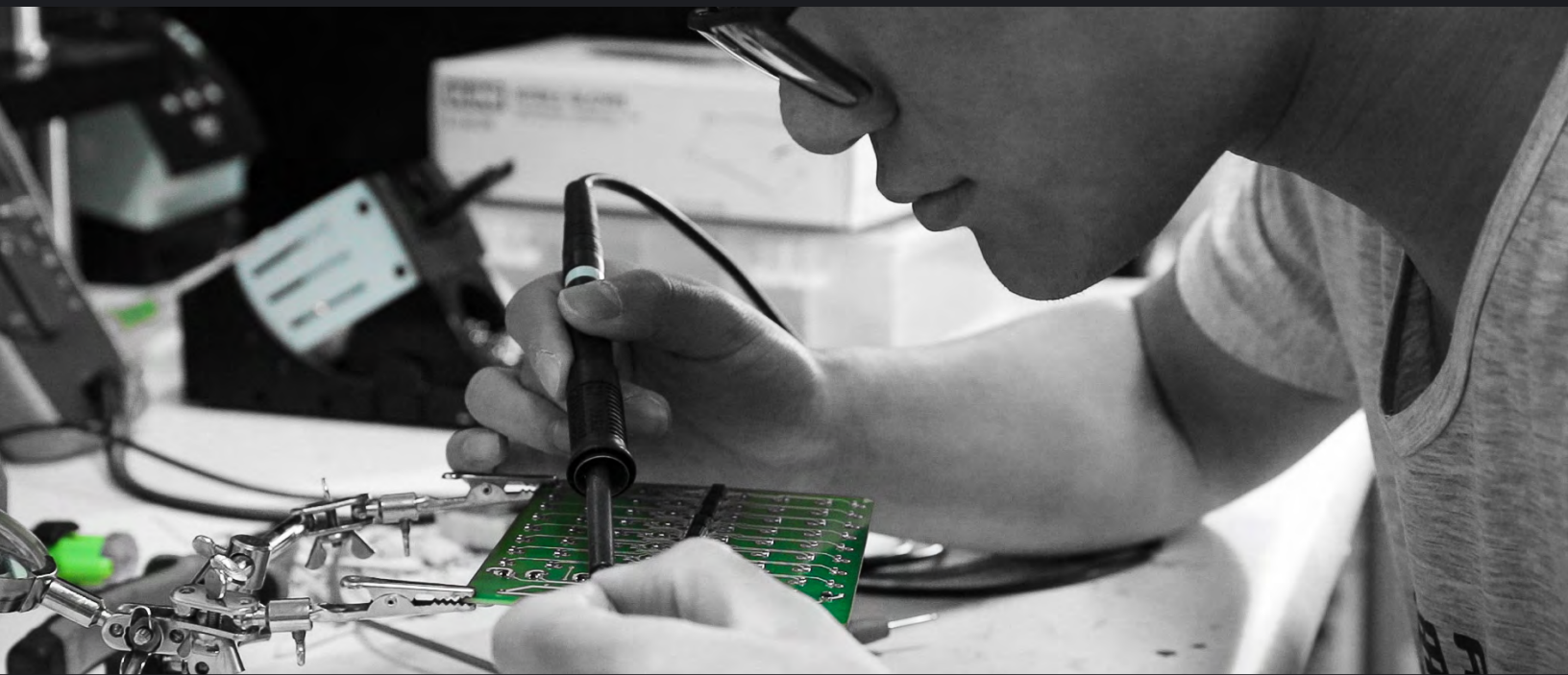
Deposit ink and solder paste on printed or factory-fabbed boards with a 0.65mm pin-to-pin pitch.



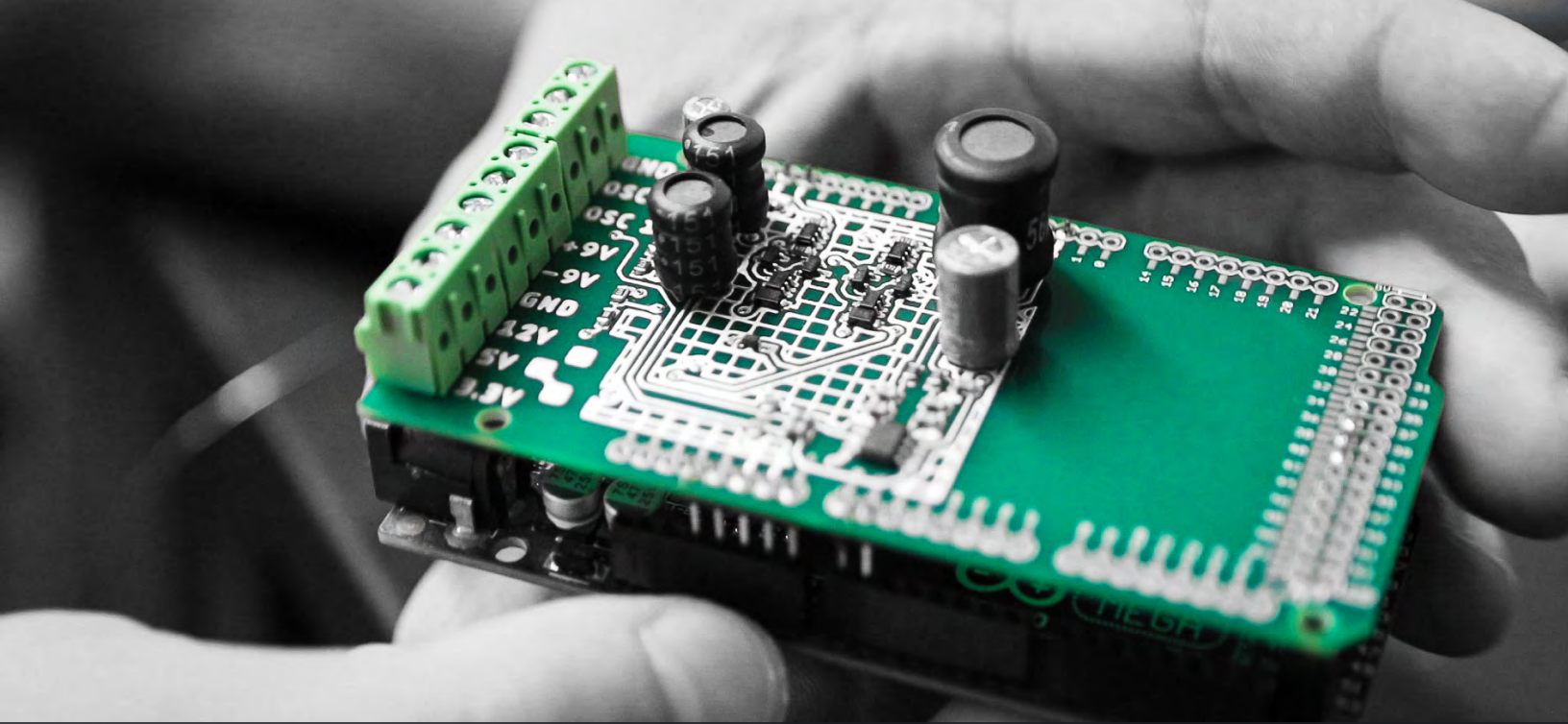
Reflow

Cure ink and reflow with one click using pre-registered heating profiles on the 550W heater.

Research teams and maker labs at institutions like Princeton, Stanford, Harvard and Oxford, as well as highschools around the world, use the V-One to rapidly design hardware.



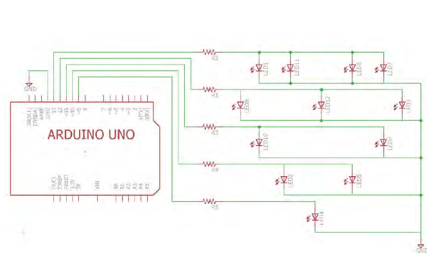
Co-op student Sherman Qui hand soldering through-hole components to a board printed on the Voltera V-One.



An Arduino Mega shield with custom printed traces, populated and reflowed on the Voltera V-One.

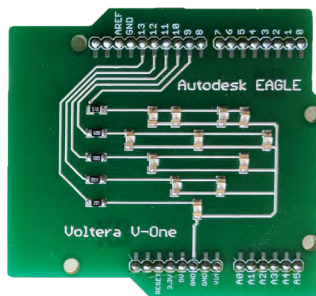
Template shields for Arduino, Raspberry Pi and more.

Give your students the hands-on experience they'll need in industry.



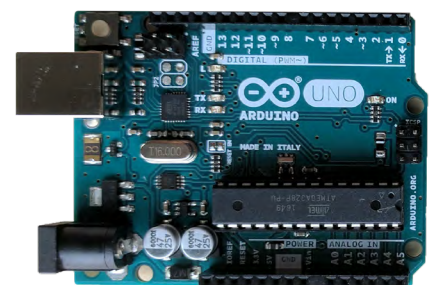
Design

Design your schematic and layout in Eagle, Altium, KiCad, or any other design software with Gerber output. Then, load your design to the V-One software and you're ready to print.



Print & populate

Print and cure your circuit design on template boards specifically designed by Voltera to work with open source microcontrollers. Then dispense solder paste, populate & reflow.



Watch it work

Once the circuit is finished, mount it onto the Arduino and program your prototype. All in all, the above project took less than 2.5 hours from start to finished, functioning device.



Software that teaches every step of the way

Lab software that's as easy and intuitive as a smartphone app

Sick of making your students use software that was created in the days of dial-up internet and beepers? They are too.

Our software is simple and straightforward, with instructional videos to guide you every step of the way. Support chat is built right into the app, and a playlist of detailed

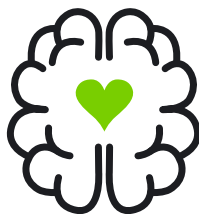
support videos will make sure you never get stuck. Our software is also completely free: no recurring licenses or big up-front payments required.

Your students can get started with learning electronics moments after your IT team installs the software from our website.



Easy

The V-One was designed to be used by everyone. Even with no experience, you can sit down and print your first circuit in minutes.



Intuitive

Our software is part of what makes the V-One so intuitive. Follow our workflow and you'll go from a blank board to a finished circuit in under an hour.

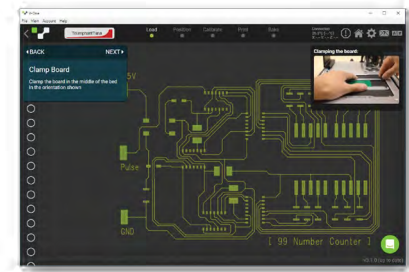


Free

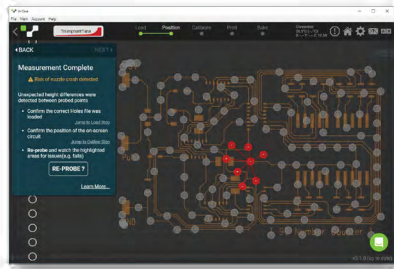
Our goal is to help the world build hardware faster, and completely free software is a part of that. No upfront costs or recurring license fees required.



Simple and elegant design.



Step-by-step video instructions.



Smart alerts prevent printing issues.



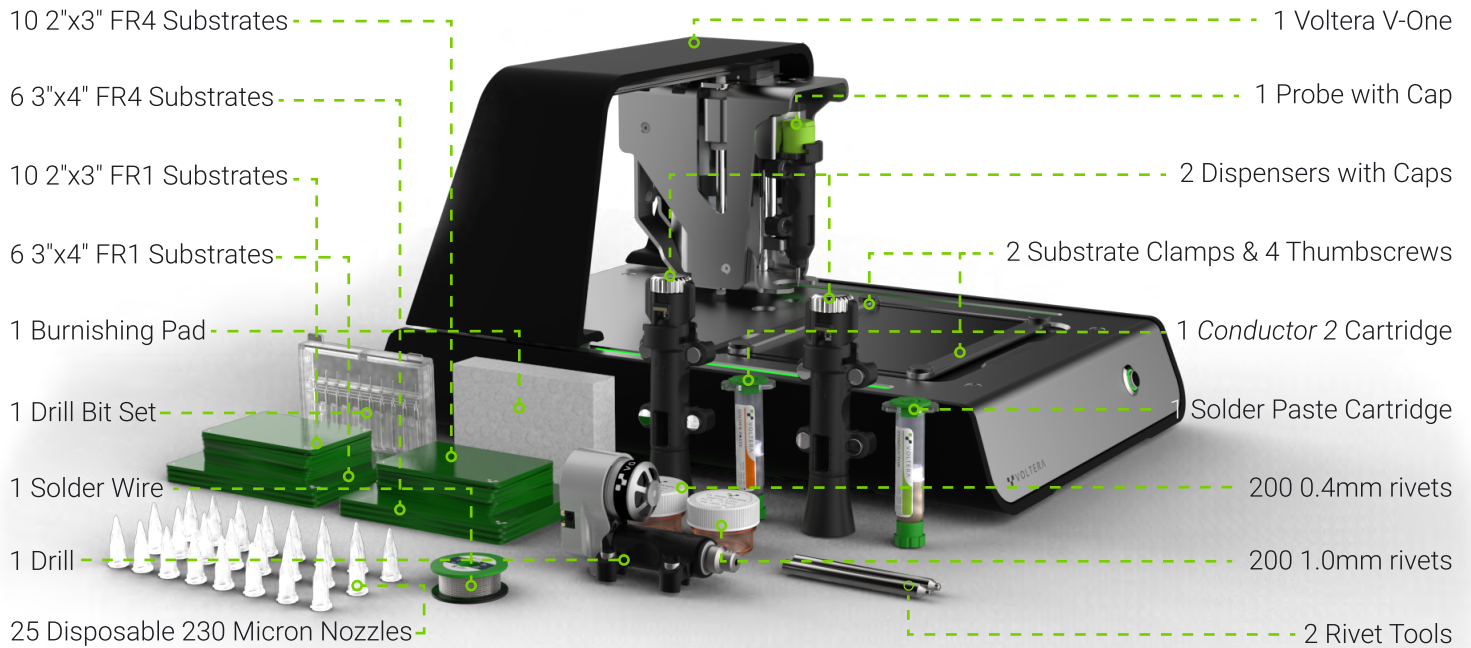
In-app support chat.

Whether you are teaching at a high school, college, or graduate level, the simplicity of the V-One platform makes it easy to learn and to use.

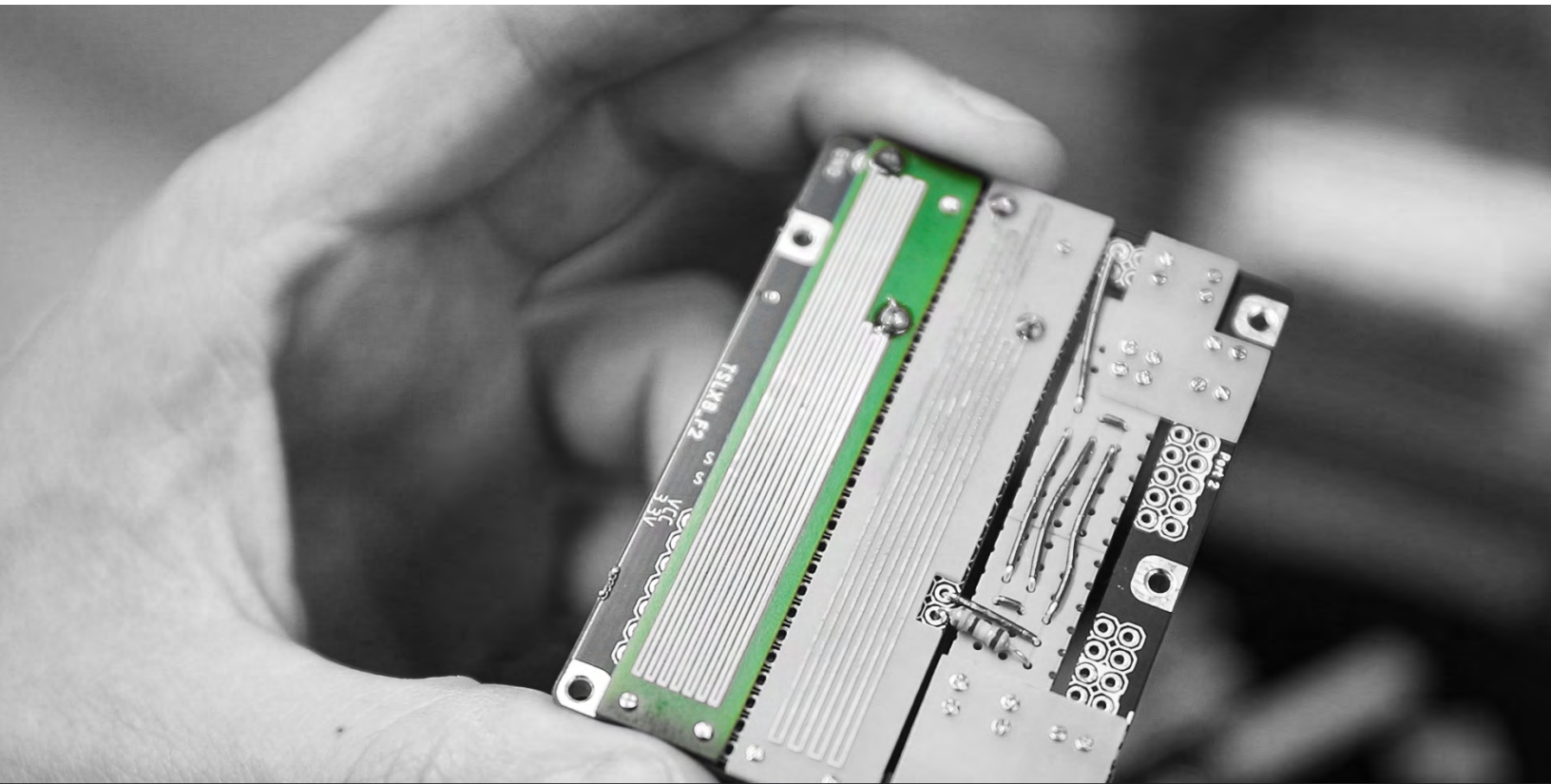


Shannon Prindle, an Aerospace Engineering student at Princeton University, who who fabricated a circuit on the Voltera V-One that will be launched into space on a cube satellite.

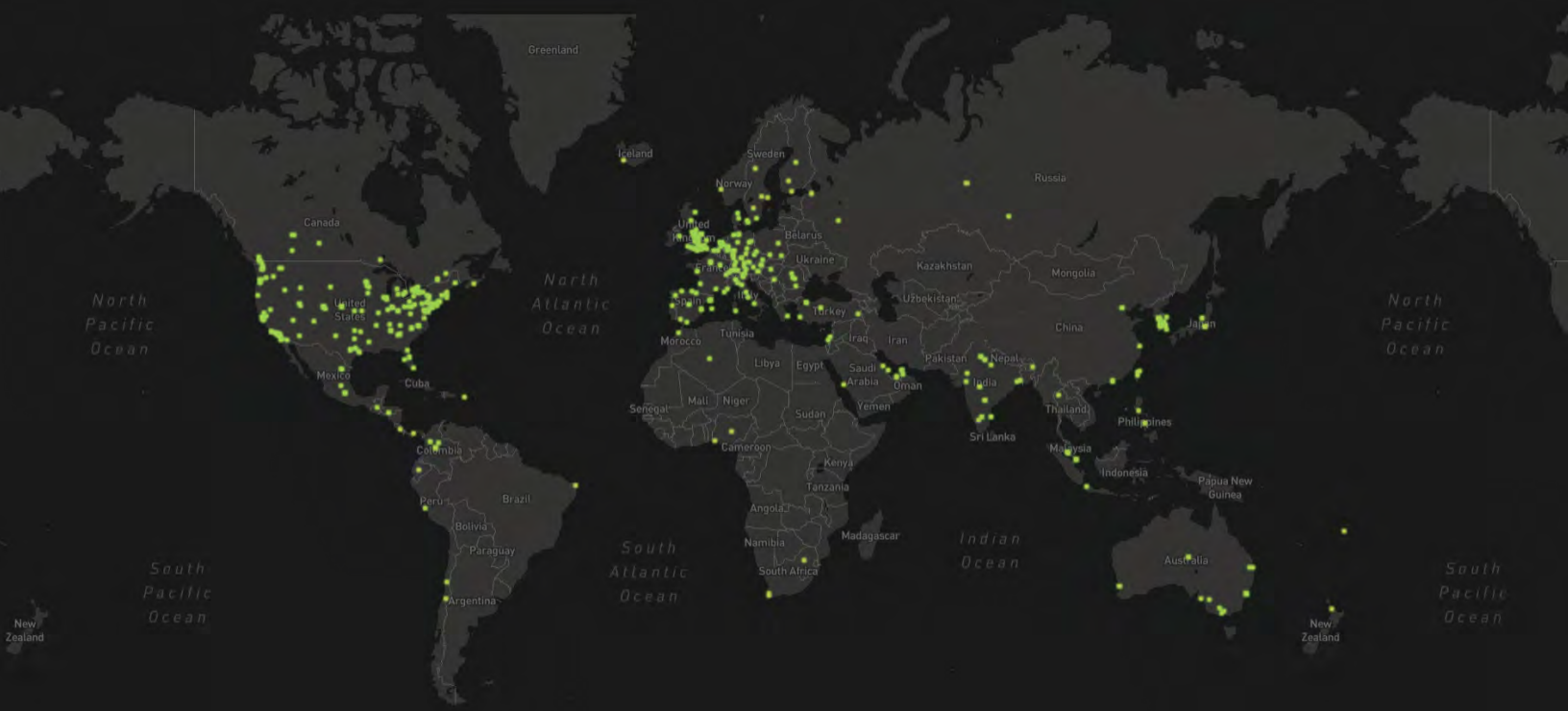
What's in the box?



(Not pictured) 1 Sacrificial Layer 1 Hello World Starter Kit 1 Punk Console Starter Kit 1 Voltera Anti-Static Tweezers 1 Set of Safety Glasses



The circuit designed by Shannon Prindle at Princeton, part of the payload for a cube satellite scheduled for launch. The circuit is designed in part to test the performance of conductive ink in low Earth orbit for aerospace applications.



A global community of users.

Join the researchers, educators and engineers around the world innovating with the V-One.

We have shipped thousands V-Ones to over 60 countries and counting with more than a dozen resellers globally.

Academic reserachers creating exotic printed electronics, product developers at the world's top tech companies and instructors helping students learn the fundamentals of electronics design are using the V-One:

"I'm setting up our small spacecraft design lab with a strong focus on enabling our students to make every piece

of the spacecraft in-house here, because a trap that a lot of these cube-sat projects fall into is that they end up having to buy a lot of the subsystems or hardware from outside vendors. I think it's not as rewarding, I don't think it's as pedagogically valuable, and it robs students the opportunity to learn the nuts and bolts of how every subsystem works."

—Dr. Michael Galvin, Senior Technical Support Staff
Department of Mechanical & Aerospace Engineering
Princeton University



Save money

Save time and money on shipping fees and board spins while gaining the pedagogical advantage of printing circuits in the classroom.



0-day lead time

The V-One works for short attention spans. Your students can watch their circuit come to life in an hour and test their prototype board as homework.



Online help center

Searchable guides, safety data sheets, getting started projects, video tutorials & educational content. All with technical support staff a message away.



VOLTERA V-ONE

Spec Sheet

PRINTING

METRIC

IMPERIAL

Minimum Trace Width

0.2mm

8mil

Minimum Passive Size

1005

0402

Resistivity

12mΩ/Sq @ 70um Height

12mΩ/Sq @ 3mil Height

Supplied Substrate Material

FR4

FR4

Maximum Board Thickness

3mm

0.125"

SOLDERING

METRIC

IMPERIAL

Minimum Passive Size

1005

0402

Minimum Pin-to-Pin Pitch

0.5mm

20mil

Solder Paste Alloy

Sn42/Bi57.6/Ag0.4

Sn42/Bi57.6/Ag0.4

Solder Wire Alloy

SnBiAg1

SnBiAg1

Soldering Iron Temperature

180-200°C

355-390°F

FOOTPRINT & PRINT BED

METRIC

IMPERIAL

Dimensions (L × W × H)

390mm × 257mm × 207mm

15.4" × 10.1" × 8.2"

Weight

7kg

15.4lbs

Print Area

128mm × 116mm

5" × 4.5"

Max. Heated Bed Temperature

240°C

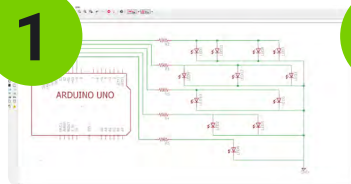
464°F

DRILLING	METRIC	IMPERIAL
Spindle Speed (Max.)	13,000 RPM	13,000 RPM
Power	12V, 25W	12V, 25W
Runout (TIR)	0.076mm	0.003"
Shank Diameter	3.175mm	1/8"
Supplied Substrate Material	FR1	FR1
Bit Diameter (Max.)	2mm	0.078"
Bit Length (Max.)	38.1mm	1.5"

SOLDER COMPATIBILITY	Sn42/Bi57.6/Ag0.4 Solder	Sn63/Pb37 Solder
Standard Ink	✓	✗
Flexible Ink	✓	✗
Copper PCBs	✓	✓
HASL PCBs	✗	✓

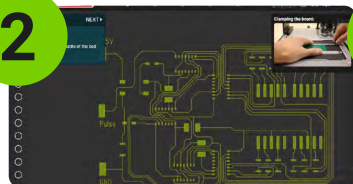
SOFTWARE REQUIREMENTS		
Operating Systems	Windows 7, 8, 10 (64bit), OSX 10.11+	
Compatible File Format	Gerber	
Connection Type	Wired USB 2.0	

1



Design your circuit and export a Gerber file

2



Load your design into the V-One software

3

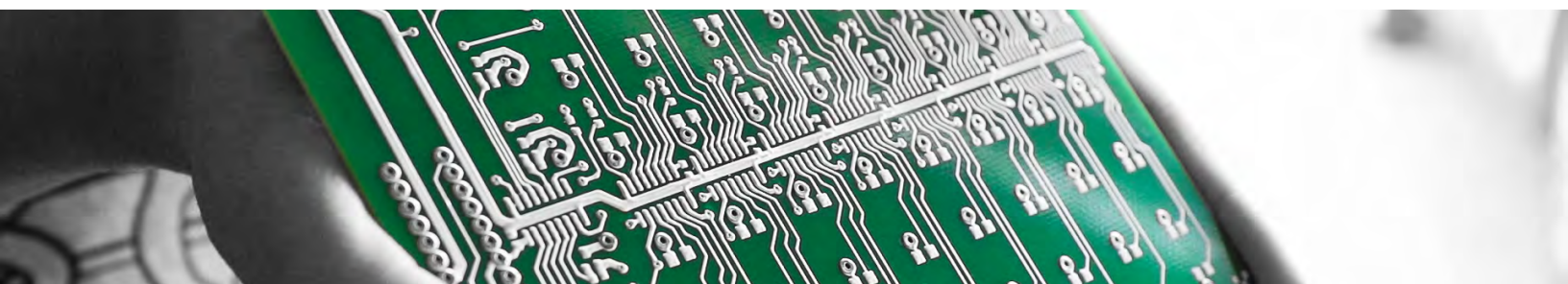


Drill, print, solder and reflow your board

4



Test your prototype, iterate and repeat.





FAQs

How long does it take to make a board?

It's very quick! A simple board like the Hello World will take about 5 minutes to print, 30 minutes to bake (the ink needs to be dried), and depending on how fast you place your components about 30 minutes to dispense solder paste and reflow.

You can comfortably make a simple, single layer board in under an hour.

Can students use the V-One?

Absolutely! The V-One is safety certified, has a step-by-step app with video tutorials, and LED indicators for heating and cooling to make the tool even easier to use safely. We designed the V-One to be easy enough for anyone to use.

Can the V-One make vias and through holes?

Yes! The V-One comes with a drill attachment.

The V-One Drill makes double sided boards easy to create and comes with all the drill bits, rivets and other accessories you need to get started. [Learn more about it here!](#)

What is the print area of the V-One?

128mm x 116mm (5.0" x 4.5"). Visit our specs page for full product details.

Can it print more than two layers?

While multi-layer additive electronics is a dream for Voltera, and we're working hard to enable this functionality, currently we only support 2 layer boards.

Can I use the V-One to dispense on pre-populated boards?

Yes, but only single-sided boards with a maximum height below 7mm, to accommodate the z-axis clearance of the V-One.

Does it update automatically?

Think of apps on your phone. Your software will automatically update with new features, bug fixes, and user experience upgrades. Many of the updates come directly from our users' suggestions. Check out our [release notes](#) to learn more.

Does the software support multiple languages?

Yes, you can use the Voltera V-One software in six different languages: English, French, Korean, Arabic, Spanish and Russian.

Does the solder paste contain lead?

Nope! Elemental analysis of our solder paste alloy shows a 0.01% trace amount of lead. This is well below the maximum of 0.07% required by IPC J-STD-006-B for lead-free solder.

The conductive ink and solder wire are also lead free. Download the [MSDS](#) to learn more.

Do I have to learn a new CAD tool?

The Voltera software allows you to use whatever CAD tool you are already comfortable with! You can use EAGLE,

Altium, KiCad, Mentor Graphics, Cadence, DipTrace and more!
Just export your designs as Gerbers and upload to our software.
Easy as that!

Do you provide education discounts?

Yes! Since consumables can be used up quickly when many students are using the V-One, we offer a discount on our common consumable materials. Reach out to sales@voltera.io to find out more.

How long does an ink cartridge last?

A single ink cartridge will allow you to print up to 85 Hello World boards. This also equates to 100 m of conductive trace at 8 mil width, or 200 cm² of solid pour. The number of boards you are able to print will depend on size and complexity of the circuits you are building.

The ink cartridge has an official shelf life of 12 months and should be stored in the refrigerator when not used.

How long does a paste cartridge last?

A single solder paste cartridge will allow you to dispense up to 11,000 0603 solder pads.

The solder paste cartridge has an official shelf life of 8 months and should be stored in the refrigerator when not used.

How long does it take to paste and reflow?

Once you tell the software where the board is mounted, the V-One will take about 5-10 minutes to dispense paste.

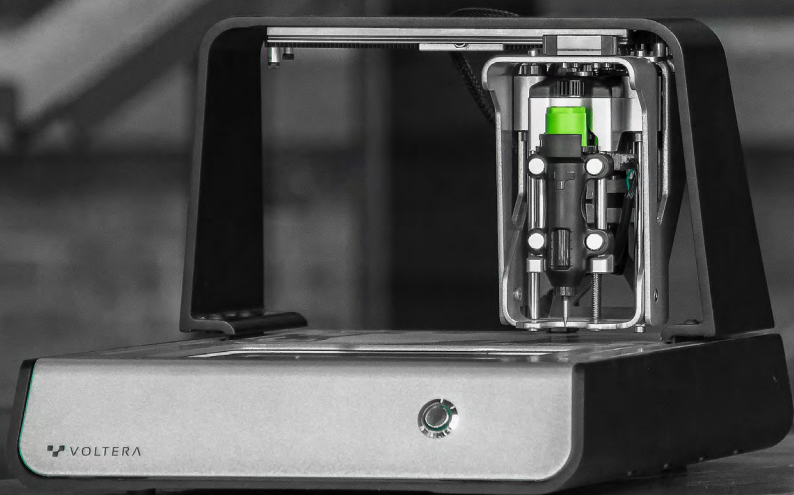
Components need to be placed by hand, but once they are placed, reflowing the board only takes about 2 or 3 minutes.

Scan here to learn more about how teachers at Princeton are using the V-One in education.



Scan here for a walkthrough of the V-One and associated materials.





Book a meeting with one of our
Application Specialists to learn more.

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BUILD HARDWARE FASTER