Contents



Cover Feature

SPARK

- 06 **Top Projects** Feast your eves on homemade loveliness
- 16 **Objet 3d'art** Form and function in one hot plastic package
- 18 Meet the Maker: David Shorey All hail the king of 3D printing on fabric
- 22 Columns What does snow have in common with electrons?
- 24 Letters We get things wrong sometimes. Oh well..
- 25 Kickstarting Controllable pneumatics for soft robots
- Hackspace Tinker Kitchen 26 We've seen food hacking heaven
- 30 Cool build Kombucha cosplay Making faux leather from tea

MAKER TIPS

Get better at everything

with our guide to superior

craftsmanship



LENS

- 36 50 top maker tips Read this to upgrade your brain and your builds
- How I Made: CNC PCB mill 50 Speed up your PCB-making process with a home mill
- 56 **Open-source hardware certification** How open-source hardware went official
- 60 Interview How do you coordinate 750 makers to build one thing?
- 68 Improviser's Toolbox Drinks cans Drinking: a great way to acquire building materials



Swap wearable electronic patches in and out

114





Tutorial

Jen Schachter



Grow tasty fresh veg from the 88 comfort of your workbench

74

60





| SoM Electronics |
|---------------------------------|
| Drive motors with direct curren |

| 82 | SoM Drilling and tapping Put screw holes in metal safely and accurately | - |
|-----|---|---|
| 86 | Tutorial Circuit Python Turn an Adafruit CPX into a games machine | |
| 88 | Tutorial Desktop hydroponics Grow veg indoors in small spaces | - |
| 94 | Tutorial Datasheets How to understand the instruction manual | |
| 96 | Tutorial LED patches Modular wearable electronics | |
| 400 | • • • • • • • • • | |

102 Tutorial Word clock Put your laser cutter to good use

108 Tutorial Fusion 360 Design moving mechanisms on your computer

Some of the tools and techniques shown in HackSpace Magazine are dangerous unless used with skill, experience and appropriate personal protection equipment. While we attempt to guide the reader, ultimately you are responsible for your own safety and understanding the limits of yourself and your equipment. HackSpace Magazine is intended for an adult audience and some projects may be dangerous for children. Raspberry Pi (Trading) Ltd does not accept responsibility for any injuries, damage to equipment, or costs incurred from projects, tutorials or suggestions in HackSpace Magazine. Laws and regulations covering many of the topics in HackSpace Magaze are different between countries, and are always subject to change. You are responsible for understanding the equirements in your jurisdiction and ensuring that you comply with them. Some manufacturers place limits on the use of their hardware which some projects or suggestions in HackSpace Magazine to understand the manufacturer's limits.

QØ

36



CONTENTS

Why failing isn't really failing (as long as you learn something)



- 114 Direct from Shenzhen RC car kit Drive a remote-controlled car (or anything else) for cheap
- 116 Best of Breed The clearest, brightest, and best OLED screens
- 122 Can I Hack It? Build your own IoT bubble-blower
- 124 Review SparkFun Transparent OLED Open up new possibilities for project displays
- 126 Review Open-source loom Art and heritage combine to form this gift for makers
- 128 Review Parkside battery-powered soldering iron A guick and convenient addition to your toolkit
- **129 Book Review** The Art of Tinkering Putting the A (for art) in STEAM