

Contents

06 SPARK

- 06 **Top Projects**
The best, most beautiful builds
- 16 **Objet 3d'art**
A giant boat printed out of wood cellulose
- 18 **Meet the Maker: Dalibor Farny**
The man keeping the flame of Nixie tubes alive
- 22 **Columns**
Open hardware is alive and well
- 24 **Letters**
Mead, cider, and the joy of making a mess
- 26 **Kickstarting**
DepthAI: processing power for depth perception
- 28 **Hackspace Hackerspace.gr**
The cradle of the Libre Space Foundation

33 LENS

- 34 **Maker Christmas**
Here's what we're hoping Santa brings us...
- 52 **How I Made: Artificial candle**
A flickering flame controlled by fire and breath
- 58 **In the workshop: Free-form circuits**
Electrical ornaments inspired by some brilliant makers
- 62 **Interview: Sam Underwood**
Making, music, and why function comes before form
- 70 **Improviser's Toolbox** Cotton buds
Make your own fun with common bathroom implements
- 74 **Bela and BeagleBone**
The number one platform for musical tinkering



98 **Tutorial Bearings**
May your mechanical moving parts never get stuck again



96

Cover Feature

MAKER CHRISTMAS

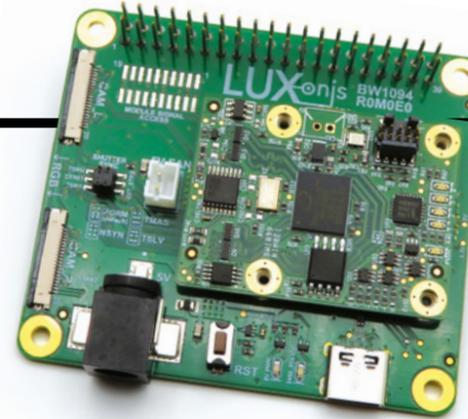
The fun things every maker hopes to find under the Christmas tree

34

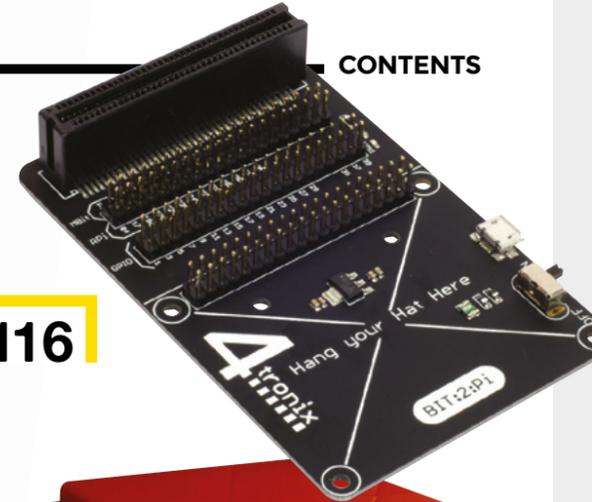
CONTENTS



18



26



116

Direct from Shenzhen

Chainsaw wheel



114 **Chainsaw wheel**
If you love danger, get one of these death wheels

Interview

Sam Underwood



62 **Sam Underwood**
Why digital modular synths are last year's model



122

81 FORGE

- 82 **SoM CircuitPython**
Use Bluetooth on your Adafruit device
- 84 **SoM Designing for CNC**
Make widgets with FreeCAD
- 92 **Tutorial Mini synth**
Control beeps and bleeps on an Adafruit NeoTrellis
- 96 **Tutorial Measuring**
Marking and cutting straight lines
- 98 **Tutorial Bearings**
Understand the world of low friction
- 104 **Tutorial Multimeters**
Say hello to your workshop's best friend
- 106 **Tutorial Finishing 3D prints**
Get that mirror-smooth finish on printed plastic

113 FIELD TEST

- 114 **Direct from Shenzhen Chainsaw wheel**
Remove spare fingers with a spinny wheel of death
- 116 **Best of Breed**
The best add-ons for your micro:bit
- 122 **Can I Hack It?**
Mess with the internals of toy teddy picker
- 124 **Review Pillar drill**
Workshop upgrade for when a hand drill just isn't enough
- 126 **Review RC2014 Micro Kit**
Build your own tiny retro computer
- 128 **Review Engineering Edge**
New listening fodder from our Dr Rogers
- 129 **Book Review Designing the Internet of Things**
The essential handbook for IoT innovators

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 Magazine are different between countries, and are always subject to change. You are responsible for understanding the requirements 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 may go beyond. It is your responsibility to understand the manufacturer's limits.