

Contents

06 SPARK

- 06 Top Projects**
Brilliant builds made by human hands
- 18 Objet 3d'art**
A to-scale functional banana print
- 20 Martian House**
Is there life on Mars? We go to Bristol to find out
- 26 Letters**
On voting (good) and Voron (also good)
- 28 Kickstarting**
Automate your wood carving

31 LENS

- 32 Internet of Things**
Incredible objects that people have attached to the internet
- 44 How I Made: A dive watch**
Like a dive bar, but more water-resistant
- 50 Interview: Debra Ansell**
The chief geek of Geek Mom Projects
- 58 Improviser's Toolbox Tiles**
Ideas for fired and glazed clay
- 62 In the workshop**
Recreating a Victorian stage illusion



102



110



06



58



Bittle

112

A four-legged friend that you can build yourself



Interview

Debra Ansell

50

Why a project is never done until it can be replicated



94

Cover Feature



32

Tutorial

PHA filament



72

Next year our tomatoes will be grown in composted filament



94

67 FORGE

- 68 SoM 3D printing**
Slicing and dicing
- 72 Tutorial PHA filament**
Our worms test compostable filament
- 74 Raspberry Pi Robotics**
Add sensors to a Raspberry Pi-based robot
- 78 Tutorial RP2040 W**
Let MicroPython take the strain
- 82 Tutorial Flat-pack rocket**
Laser-cut, assemble, and fly to the moon!
- 88 Tutorial Smart plant stand**
Monitor greenery with a Raspberry Pi Pico
- 94 Tutorial Pinhole photography**
Who needs lenses, anyhow?

101 FIELD TEST

- 102 Best of Breed**
Keyboards your fingers will love
- 110 Review Game Boy Camera Wi-Fi printer**
Grainy, low-fi images to take you back to 1989
- 112 Review Bittle**
A pet that won't bark at the postman (unless you program it to)

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 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. HackSpace magazine is published monthly by Raspberry Pi Ltd, Maurice Wilkes Building, St. John's Innovation Park, Cowley Road, Cambridge, CB4 0DS, United Kingdom. Publishers Service Associates, 2406 Reach Road, Williamsport, PA, 17701, is the mailing agent for copies distributed in the US. Application to mail at Periodicals prices is pending at Williamsport, PA. Postmaster please send address changes to HackSpace magazine c/o Publishers Service Associates, 2406 Reach Road, Williamsport, PA, 17701.