

MAKE | BUILD | HACK | CREATE

HackSpace

TECHNOLOGY IN YOUR HANDS

hsmag.cc

August 2018

Issue #09



› **Remap project**

Use your maker skills to help others

› **Electronics for beginners**

Discover the might of the electron!

› **Pi Wars**

Inside the ultimate Pi challenge



ULTIMATE LED CUBE

The challenges of building a giant illuminated box

BUILD A DRUM MACHINE

Kraft homemade electronic beats

AUTOMATIC WATER CANNON

Blast your way to garden supremacy



RACHEL WONG

Meet the woman mixing fashion and LEDs

Everything you need to build (almost) anything



YOUTUBE

Use a machine to count your online followers

Aug 2018
Issue #09 £6



HYDROPONICS **MASTER MIDI** NAIL CLIPPERS **MEASURE INERTIA**

CanaKit Raspberry Pi 3 Ultimate Starter Kit**Model B | 1 GB RAM | 1.2 GHz | Quad-Core CPU**

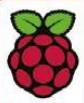
- > Learn to Code
- > Explore Computing
- > Get started with Electronics

Kit INCLUDES RASPBERRY PI 3 AND ...**PREMIUM CASE &
HEAT SINKS****2.5A
POWER ADAPTER****32 GB CLASS 10
MICROSD CARD**PRE-LOADED
WITH OPERATING SYSTEM**USB MICROSD
CARD READER****PREMIUM
HDMI CABLE****QUICK-START GUIDE****GPIO TO BREADBOARD
INTERFACE BOARD****RIBBON CABLE****FULL-SIZE
BREADBOARD****JUMPERS**MALE TO MALE &
MALE TO FEMALE**LEDs****RESISTORS &
PUSH-BUTTONS**

Available for worldwide shipping at:

WWW.CANAKIT.COM

Raspberry Pi Zero W
Available at CanaKit!

**Raspberry Pi**

APPROVED RESELLER

ELECTRONIC KITS • ELECTRONIC PARTS • RASPBERRY PI • ARDUINO



Welcome to HackSpace magazine

When you get used to a tool, it almost seems like it becomes an extension of yourself. It can even affect the way you think about the world. As the saying goes, when you have a hammer, everything looks like a nail. Likewise, when you have a soldering iron, you start seeing the potential for incorporating electronics in everything, and when you get a welding kit, everything looks like it would be better if it were made out of scrap metal stuck together, and you start dreaming of great finds in scrap heaps (or is that one just me?).

Getting the right tools isn't just an economical decision, it's a philosophical one as well

Getting the right tools, then, isn't just an economical

decision, it's a philosophical one as well. It's not just about the things you want to make, but the way you want to approach life. Take a look at our cover feature on page 32 for inspiration on what tools you need to go in the direction you want with your making.

Whatever tools you have, the most important thing is that you actually use them. There are few things sadder than an unused tool gathering dust, so get out there and get making!

BEN EVERARD

Editor ben.everard@raspberrypi.org

GET IN TOUCH

- hackspace@raspberrypi.org
- [hackspacemag](#)
- [hackspacemag](#)

ONLINE

- hsmag.cc



EDITORIAL

Editor

Ben Everard

ben.everard@raspberrypi.org

Features Editor

Andrew Gregory

andrew.gregory@raspberrypi.org

Sub Editors

Nicola King, Jem Roberts

DESIGN

Critical Media

criticalmedia.co.uk

Head of Design

Dougal Matthews

Designer

Lee Allen

Photography

Brian O'Halloran,
Connor Ballard-Pateman

CONTRIBUTORS

Lucy Rogers, Andrew Huang, Jen Botezat, Lorraine Underwood, Cameron Norris, Mayank Sharma, Graham Morrison, Dave Astels, Andy Clark, Oliver Jones, Paul Freeman-Powell, Alex Eames, Sophy Wong, Marc de Vinck, Les Pounder

PUBLISHING

Publishing Director

Russell Barnes

russell@raspberrypi.org

DISTRIBUTION

Seymour Distribution Ltd
2 East Poultry Ave,
London EC1A 9PT
 +44 (0)207 429 4000

SUBSCRIPTIONS

Select Publisher Services Ltd, PO Box 6337, BH1 9EH
 +44 (0)1202 586 848

Mann Enterprises Ltd,
Unit E, Brocks Business Centre, CB9 8QP
 hsmag.cc/subscribe



This magazine is printed on paper sourced from sustainable forests. The printer operates an environmental management system which has been assessed as conforming to ISO 14001.

HackSpace magazine is published by Raspberry Pi (Trading) Ltd, Station Road, Cambridge, CB1 2JH. The publisher, editor, and contributors accept no responsibility in respect of any omissions or errors relating to goods, products or services referred to or advertised. Except where otherwise noted, content in this magazine is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported (CC BY-NC-SA 3.0). ISSN: 2515-5148.

Contents



88

06

SPARK

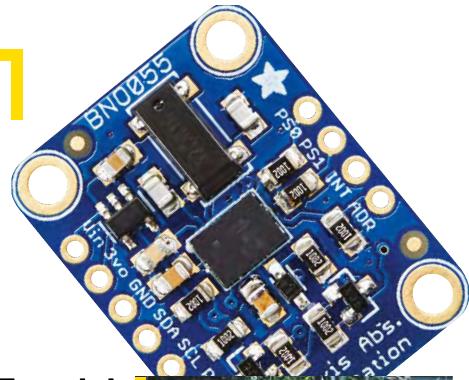
- 06 Top Projects**
Show us what you've been making!
- 16 Objet 3d'art**
Summer special 3D prints
- 18 Meet the Maker: Rachel Wong**
Cutesy wearables for all you Japanophiles
- 22 Columns**
Why a trade war is bad for makers
- 24 Letters**
Streamlining, safety, and classical music
- 25 Kickstarting**
Stumble in darkness no longer
- 26 Hackspace Ipswich Makerspace**
Making for fun in the far east

31

LENS

- 32 50 Essential Tools**
Build more and better with some shiny new tools
- 46 How I Made: Cubert**
Inside the building of a programmable LED cube
- 50 Remap**
How volunteer makers are sharing their skills
- 54 Interview Tim Richardson**
The robot ringmaster of Pi Wars!
- 62 Improviser's Toolbox** Nail clippers
From manicure to man at war

118



Tutorial

School of making:
Google AIY Vision robot sentry



82

Defend the garden with
an intelligent water pistol

Cover Feature



32



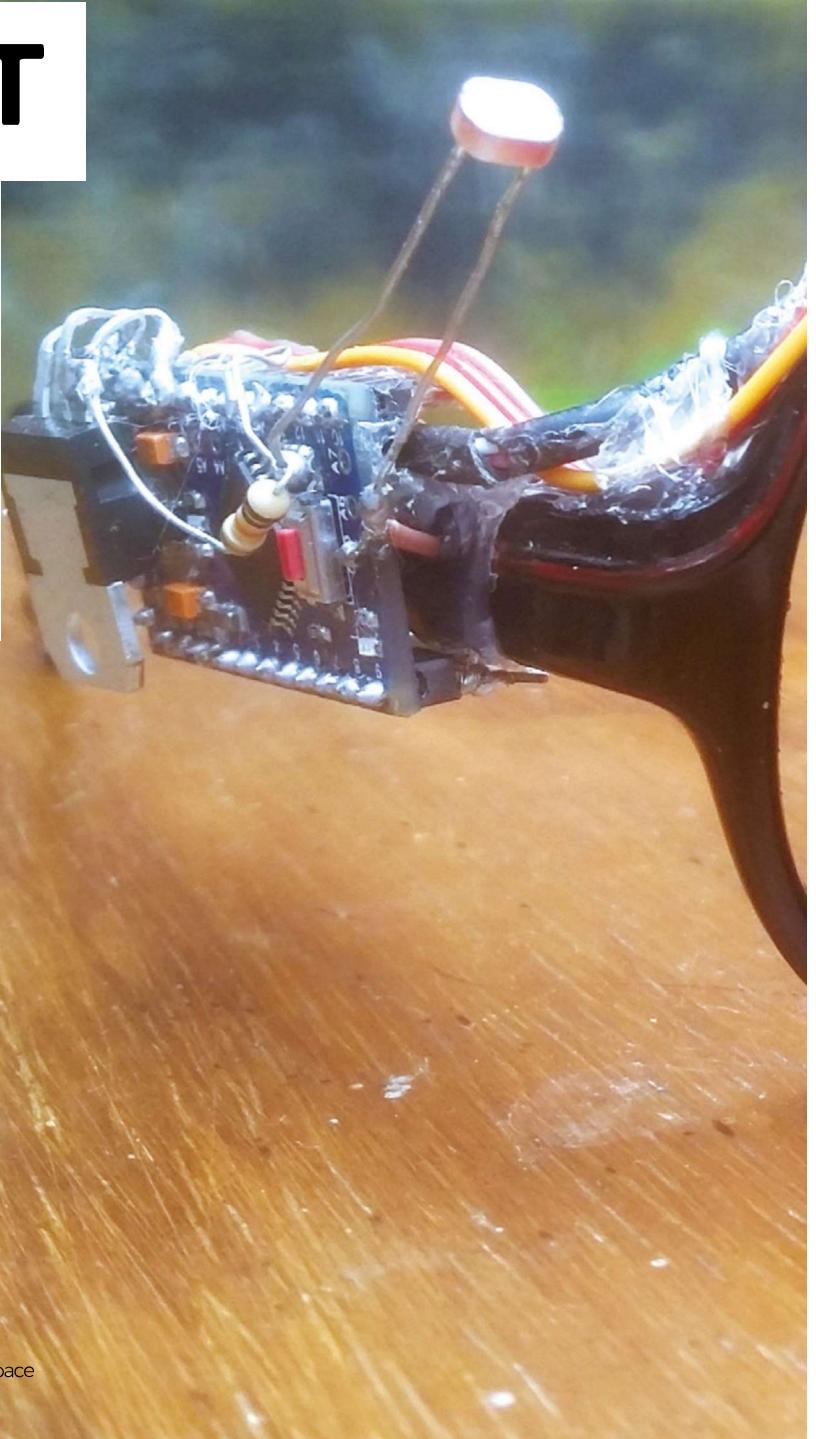
SunGlassBOT

By Ashraf Minhaj

 hsmag.cc/PYfkUK

I am a first-year Computer Science student. I love to make robots and program them. I want to build my career in AI and robotics, and am also interested to work anywhere with anyone in robotics.

I believe everything can be turned into a robot or automated machine. That's why, when the idea came up, I took an Arduino a $10\text{k}\Omega$ resistor, LDR and a servo motor, and made this – an automatic, robotically-controlled pair of sunglasses that protect your eyes if it gets too bright. I believe I can make anything if I have an idea. □



Right 

We predict commercial success for Ashraf's design, at least on a par with that of Google Glass

