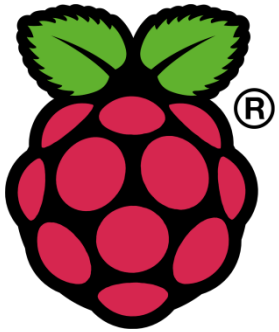
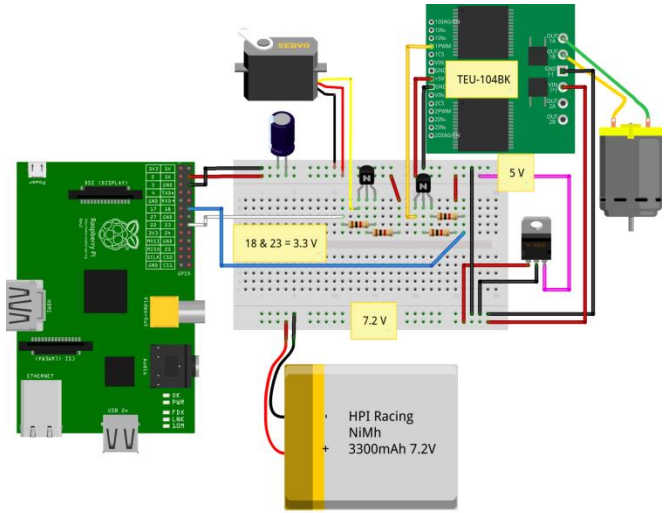
Arduino BOE kit and Raspibot Board

Class 4: RaspiRobot Board Introduction





August 10, 2017

Don Wilcher

Presented by:

DesignNews CEC CONTINUING EDUCATION CENTER Digi-Key ELECTRONICS ROHDE&SCHWARZ

RaspiRobot Board Introduction

Agenda:

- What is the RaspiRobot Board?
- RaspiRobot Board Architecture
- Who created the RaspiRobot Board?
- Installing the RRB Library
- Controlling the onboard LED
- Controlling the dc motors

What is a RaspiRobot Board?

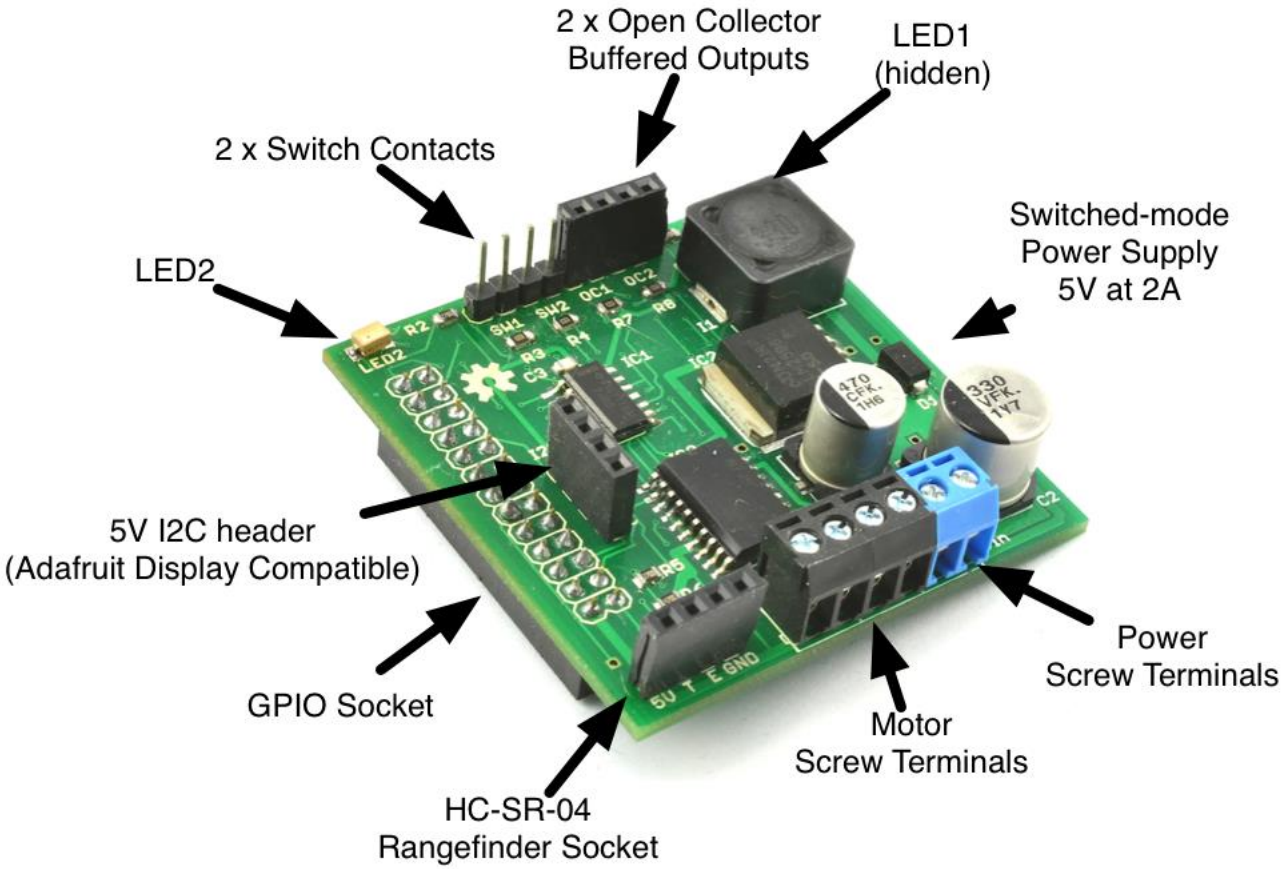
- The RaspiRobot Boards V2 and V3 is an expansion board designed to turn your Raspberry Pi into a motor controller!

- This board comes fully assembled and includes a switched-mode power supply so you can supply your Raspberry Pi from a variety of battery packs.

Good for use with any two 5-6V DC Motors or 5VDC Stepper! Not for use with 12V DC motors or steppers (the voltage is too low)

https://www.adafruit.com/products/1940

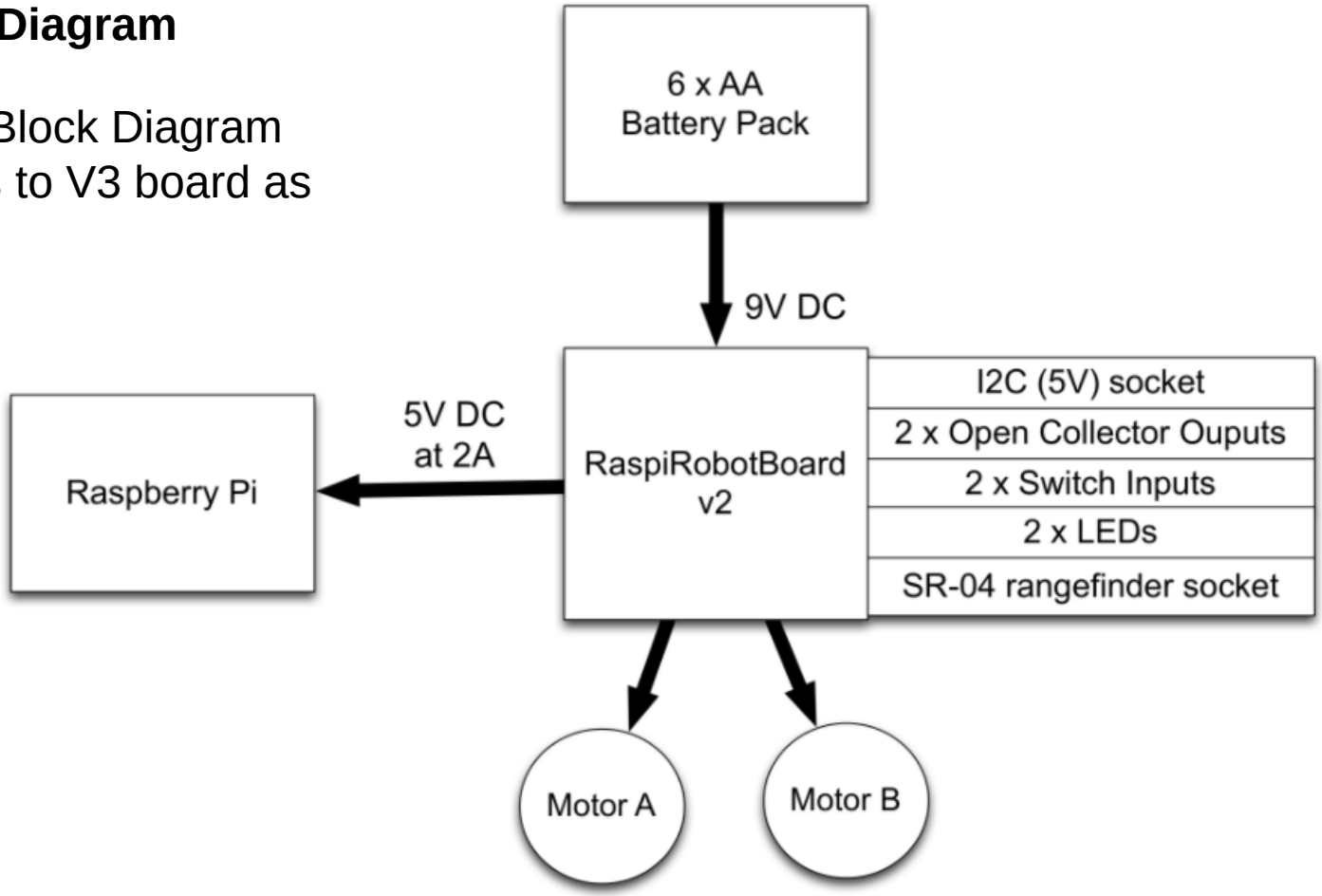
RaspiRobot Board Architecture



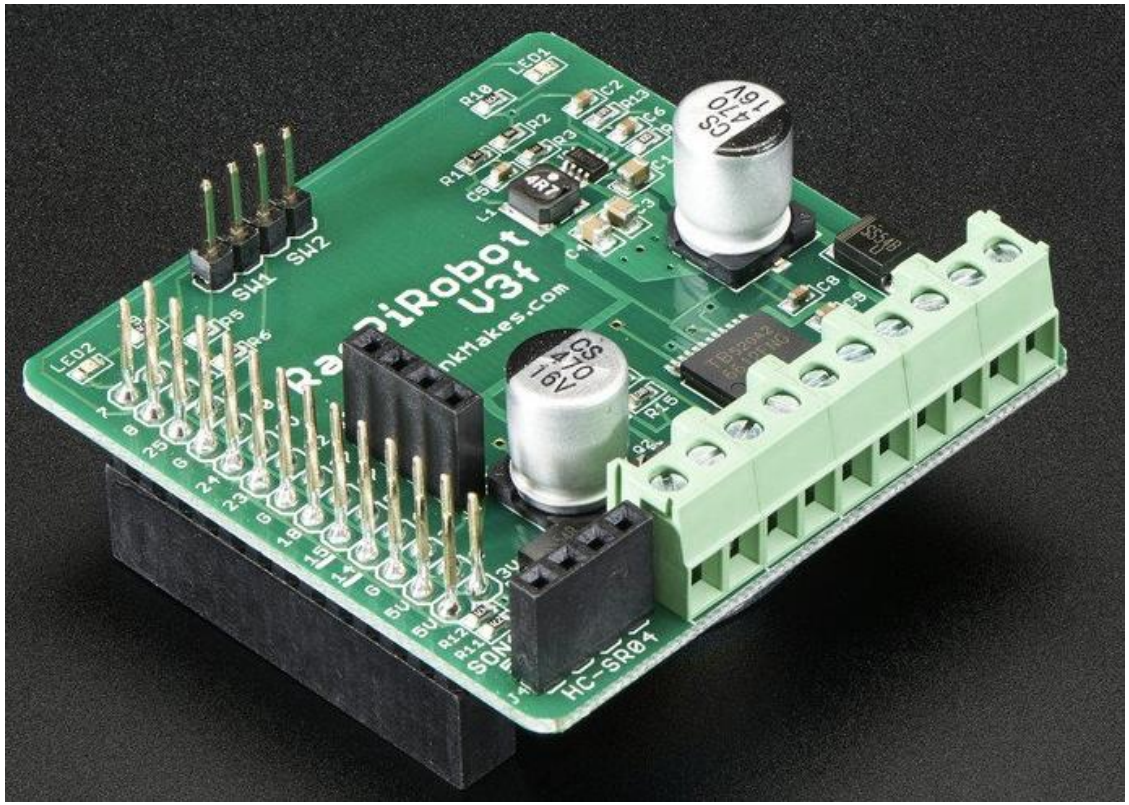
RaspiRobot Board Architecture

Block Diagram

Note: Block Diagram applies to V3 board as well.



RaspiRobot Board V3



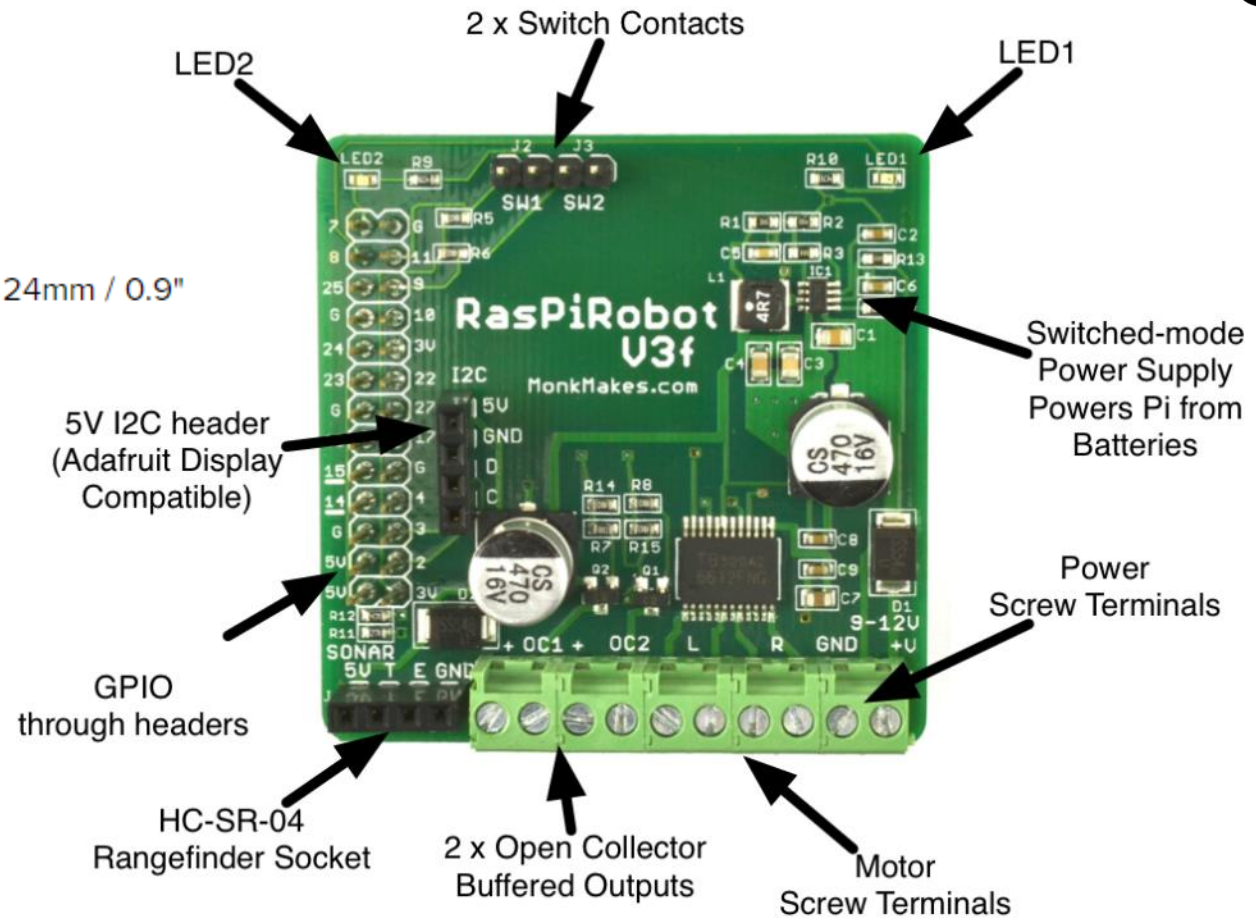
Source:

https://www.adafruit.com/product/1940

RaspiRobot Board V3 Architecture

Dimensions

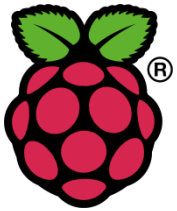
- 51mm x 51mm / 2.0" x 2.0"
- Thickness w/ Components: 24mm / 0.9"
- Weight: 21.8g



Source:

https://www.adafruit.com/product/1940

RaspiRobot Board V3…



Good for use with any two 5-12V DC Motors or Steppers!

V3 Features:

- Dual bi-directional motor control using TB6612FNG dual H-bridge
- Dual open drain 2A MOSFET outputs
- Socket for HC-SRo4 Rangfinder
- Socket for 5V i2c Interface
- Provides 5V regulated power to Raspberry Pi (efficient SMPS)
- 2 x user controllable LEDs
- 2 x header pins for switches
- Reverse polarity protection
- Open Source Python Software library
- Screw terminals for motor connections

Compatible with:

- Raspberry Pi Model B+
- Raspberry Pi Model A+
- Raspberry Pi 2

Source:

https://www.adafruit.com/product/1940

RaspiRobot Board V3…

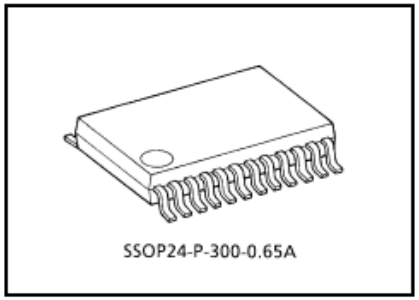
TOSHIBA TB6612FNG

Toshiba Bi-CD Integrated Circuit Silicon Monolithic

TB6612FNG

Driver IC for Dual DC motor

TB6612FNG is a driver IC for DC motor with output transistor in LD MOS structure with low ON-resistor. Two input signals, IN1 and IN2, can choose one of four modes such as CW, CCW, short brake, and stop mode.



質量: 0.14 g (標準)

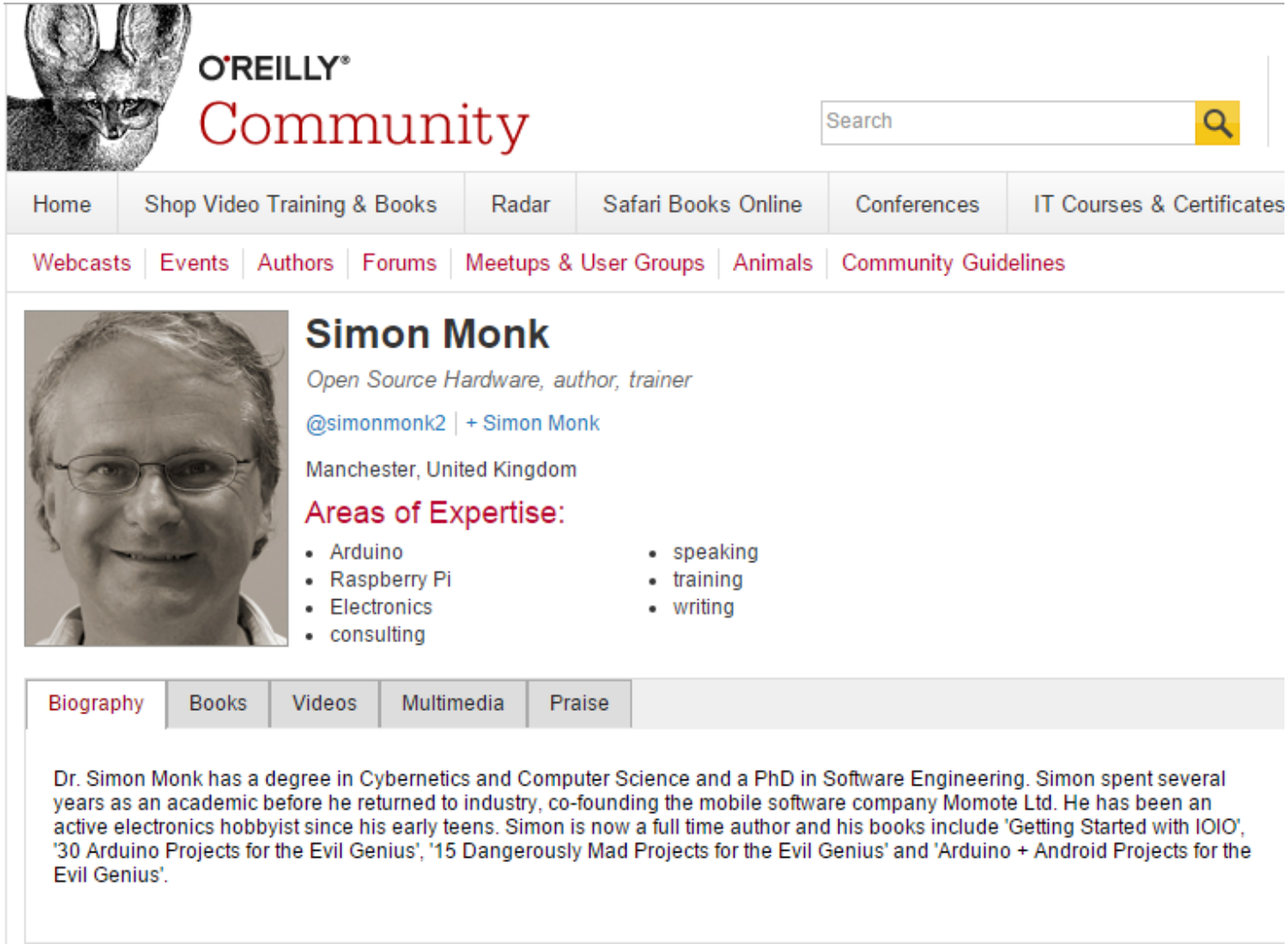
Features

- Power supply voltage; V_M = 15 V(Max)
- Output current; I_{OUT}=1.2 A(ave) / 3.2 A (peak)
- Output low ON resistor; 0.5 Ω (upper+lower Typ. @V_M ≥ 5 V)
- Standby (Power save) system
- CW / CCW / short brake / stop function modes
- Built-in thermal shutdown circuit and low voltage detecting circuit
- Small faced package(SSOP24: 0.65 mm Lead pitch)
- Response to Pb free packaging

Source:

https://cdn-shop.adafruit.com/product-files/1944/TB6612FNG+datasheet.pdf

Who created the RaspiRobot Board?



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@simonmonk2 | + Simon Monk

Manchester, United Kingdom

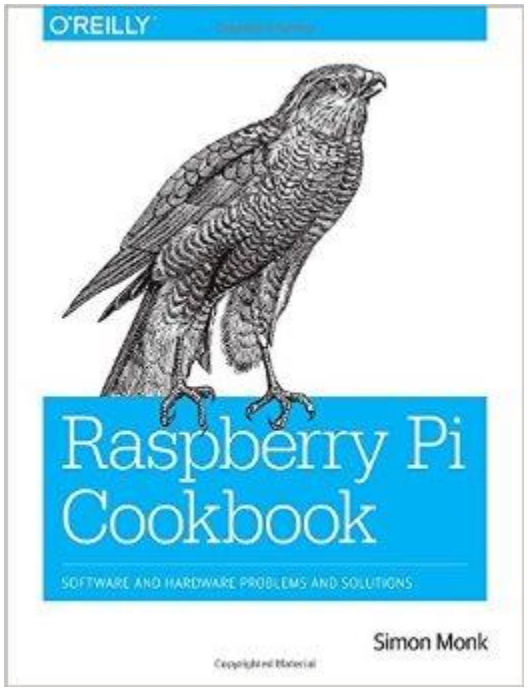
Areas of Expertise:

- Arduino
- Raspberry Pi
- Electronics
- consulting
- speaking
- training
- writing

Biography | Books | Videos | Multimedia | Praise

Dr. Simon Monk has a degree in Cybernetics and Computer Science and a PhD in Software Engineering. Simon spent several years as an academic before he returned to industry, co-founding the mobile software company Momote Ltd. He has been an active electronics hobbyist since his early teens. Simon is now a full time author and his books include 'Getting Started with IOIO', '30 Arduino Projects for the Evil Genius', '15 Dangerously Mad Projects for the Evil Genius' and 'Arduino + Android Projects for the Evil Genius'.

Who created the RaspiRobot Board?...



Simon Monk Raspberry Pi resources

Source:

https://www.monkmakes.com/product/

Question 1

True or False:

The Switched-mode power supply on the RaspiRobot Board is rated at 5.5V at 2A.

Installing the RRB library module on the Raspberry Pi

Type linux commands using the LXTerminal

```
$ wget https://github.com/simonmonk/raspirobotboard2/raw/master/python/dist/rrb2-1.1.tar.gz
$ tar -xzf rrb2-1.1.tar.gz
$ cd rrb2-1.1
$ sudo python setup.py install
```

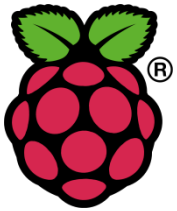
Placing the RaspiRobot Board on top of the Raspberry Pi

Question 2

True or False:

DIY book author Hank Monks created the RaspiRobot Board?

Controlling a LED with the RaspiRobot Board



```
from rrb2 import *
rr = RRB2()
```

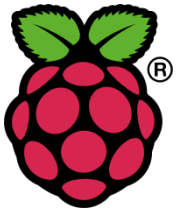
Type the following instruction to turn on The RaspiRobot Board LED1:

rr.set_led1(1)

To turn off the LED1:

rr.set_led1(0)

Controlling a LED with the RaspiRobot Board…



Type the following instruction to turn on The RaspiRobot Board LED2:

rr.set_led2(1)

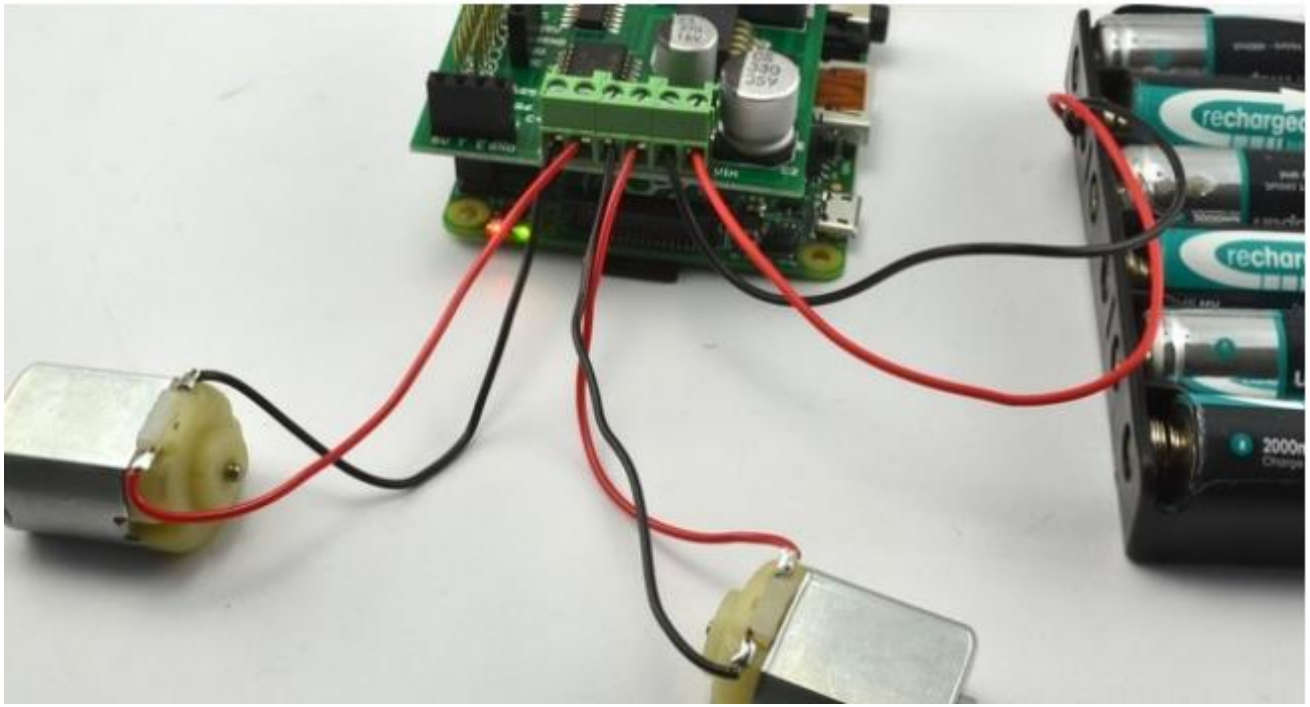
To turn off the LED2:

rr.set_led2(0)

Question 3

What linux command is used to obtain the RRB library?

Controlling dc motors with the RaspiRobot Board…



Attach two dc motors along with a 6volt battery to the RaspiRobot Board.

Controlling dc motors with the RaspiRobot Board…

```
from rrb2 import *
rr = RRB2()
```

Type the following instruction to turn on the attached dc motors:

rr.forward()

To turn off the dc motors:

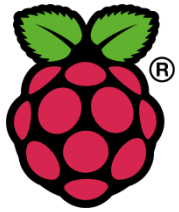
rr.stop(0)

Controlling dc motors with the RaspiRobot Board…

Other commands to control the dc motos are:

- rr.forward(5) : forward for 5 secs at ½ speed
- rr. forward(5, 1) : forward for 5 secs at full speed
- rr.set_motors(1, 0, 1, 0) :set both motors forward at full speed

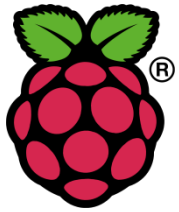
Controlling dc motors with the RaspiRobot Board…



Other commands to control the dc motos are:

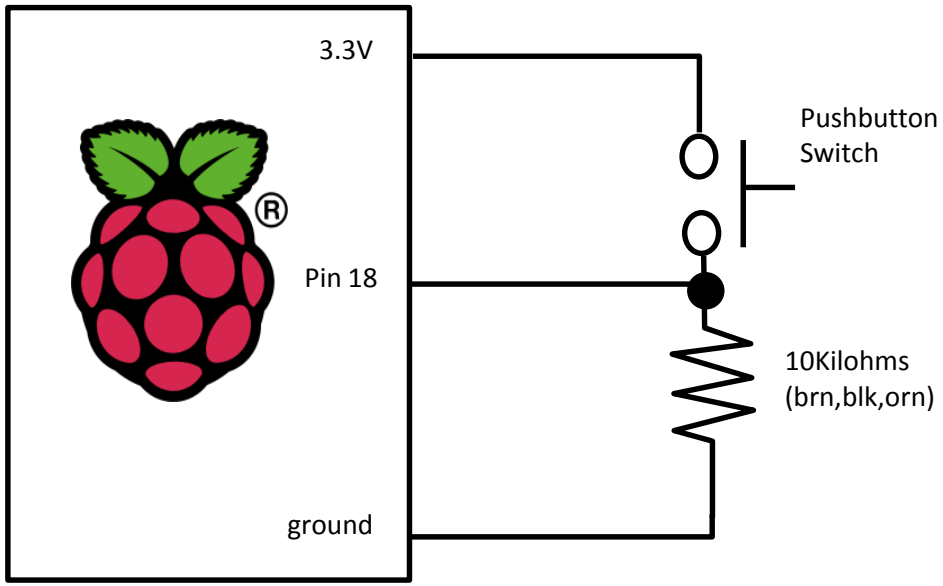
- rr.set_motors(0.5, 0, 0.5, 0) :set both dc motors at ½ speed
- rr.set_motors(0.5, 1, 0.5, 0) :set both dc motors at ½ speed in opposite directions

Question 4



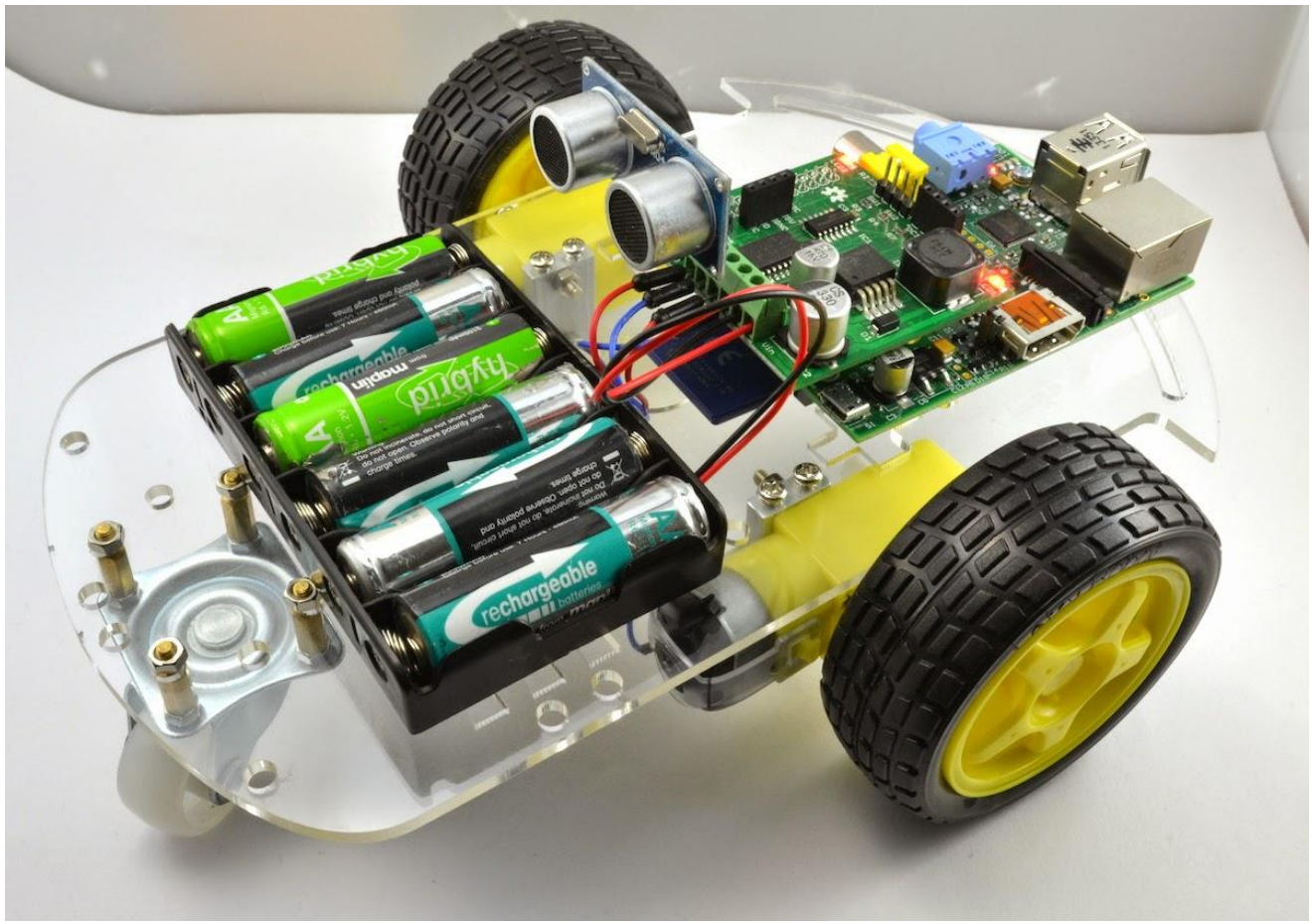
Write the command to set both dc motors at ½ speed.

Reading a switch with the RPi.GPIO module…



Switch-Raspberry Pi circuit schematic diagram

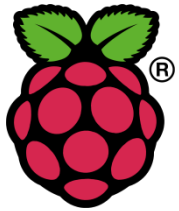
RaspiRobot example



Question 5

What sensor on the RaspiRobot provides object detection?

Additional Resource



Simon Monk's github site for RaspiRobot board documentation.

https://github.com/simonmonk/raspirobotboard2

https://github.com/simonmonk/raspirobotboard3