Keysight Hacking Platform Hardware Overview

Blake Vermeer

March 29, 2017

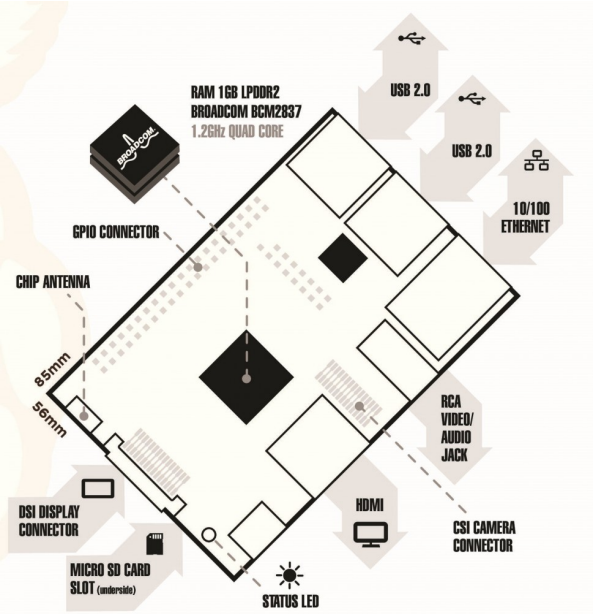
Date Performed: March 26, 2017
Company: Keysight Technologies

1 Overview

This document gives a general hardware architecture overview of the Keysight Hacking Platform. A general hardware overview of the Raspberry Pi 3 and then a detailed description of how the touch-screen is connected to the Raspberry Pi 3 is given in the sections below.

2 Raspberry Pi 3 Block Diagram

At the heart of the Keysight Hacking Platform is a Raspberry Pi 3. The Raspberry Pi 3 is a general purpose embedded ARM Linux device.



- CPU: 1.2 GHz quad-core ARM Cortex A53
- Memory: 1 GB LPDDR2-900 SDRAM
- 4 USB ports (Max current draw of 1.2A combined on all the USB ports)
- 10/100 Ethernet
- HDMI
- Bluetooth 4.0
- 802.11n Wireless LAN
- Combination RCA Video / Audio jack
- 40 Pin GPIO Connector

3 Raspberry Pi 3 Used GPIO Lines

This section explains which GPIO lines are used by the touchscreen and which GPIO lines are connected to the four push-buttons. The LCD is driven by an SPI interface. The Raspberry Pi 3 contains three independent SPI bus drivers and in the case the screen is connect to SPI bus 0. The Raspberry Pi 3 has two I2C buses available on the GPIO header and both are used by the screen (I2C bus 0 is used by the configuration EEPROM and I2C bus 1 is used by the touchscreen). Figure 1 shows the GPIO lines used by the touchscreen and the LCD.

Communication Bus	Used by
I2C Bus 0	Configuration EEPROM
I2C Bus 1	Touchscreen
SPI Bus 0	LCD
SPI Bus 1	nothing
SPI Bus 2	nothing

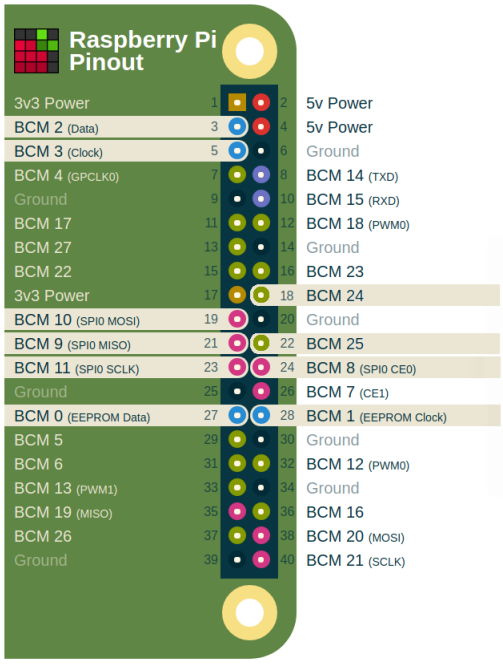


Figure 1: GPIO Lines Used by the Screen

The touch-screen also features four hardware push-buttons which are connected directly to GPIO lines are shown in the section of the touch-screen schematic shown in Figure 2.

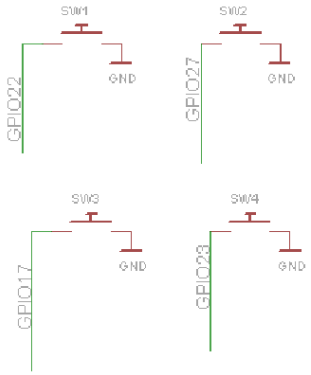


Figure 2: Screen Push-Buttons Schematic

In order to use the push-buttons, the GPIO lines connected to the push-buttons need to be configured as inputs and the internal pull-up resistors enabled (external pull-up resistors could alternatively be used). The push-buttons are connected to the GPIO lines on the Raspberry Pi 3 header as shown in Figure 3.

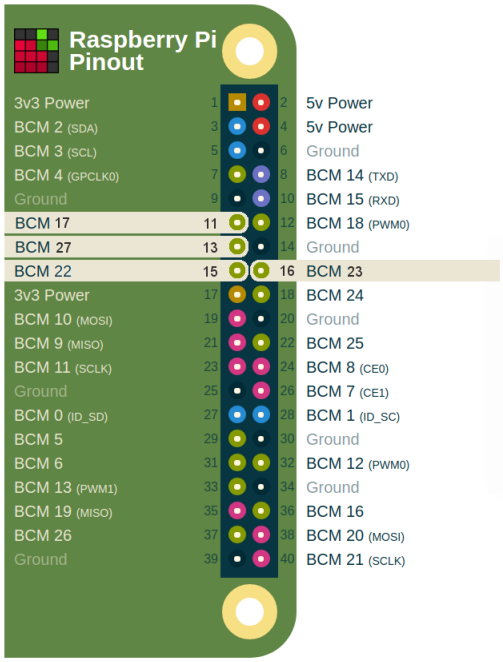


Figure 3: GPIO Lines used by Push-Buttons

It is also possible to figure out which push-button is connected to which GPIO line by looking at the silkscreen labels next to the push-buttons on the screen. Note: the numbers on the labels are the Broadcom pin numbers (BCM numbers) and not the physical pin numbers on the header!

Figure 4: Push Button Labels

In summary, Figure 5 shows all the GPIO lines in use.

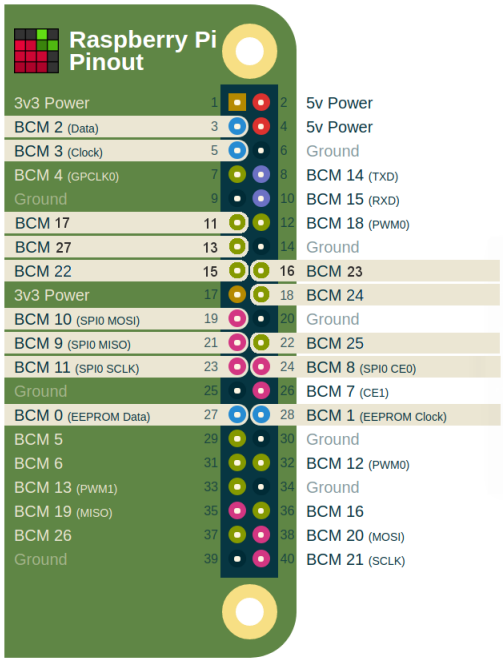


Figure 5: All Used GPIO

4 Raspberry Pi 3 Available GPIO and Interfaces