Lab 01 – Lab Safety and Lab Kit Introduction

Overview:

This lab covers safe operations with lab equipment and provides an introduces the hardware lab kit.

Objectives:

Upon completion of this lab you will
1. Know how to be safe when working on CS250 lab assignments.
2. Be familiar with the parts you will use to design and build digital logic circuits in future labs.

Timeframe for lab completion:

Complete this lab before the end of your lab session today.

Grading:

This lab is ungraded.

Lab 01 Instructions

1. GTA presentation

Your Graduate Teaching Assistant will now present lab introduction and safety information.

2. Login on LWSN B160 lab station computer

After your GTA completes the presentation, log in to the computer at your lab station using your Purdue Career Account's username and password. If you cannot log in, or have any other issues with your account, contact ITaP to get it resolved.

3. Piazza class discussion board enrollment

Sign in to Blackboard and follow the instructions on the CS250 homepage on Blackboard to enroll in the Piazza class discussion board. Your participation will help you and other students learn.

4. Lab 01 Tasks

a. Lab 01 Safety Quiz on Blackboard

In Blackboard, navigate to the Labs folder, then the Lab 01 folder, and find the Safety Quiz. Take this quiz and pass it.

b. Lab 01 Kit Inventory

Show your GTA the evidence on Blackboard that you have passed the Lab 01 Safety Quiz. Then receive and sign for your lab kit.

The kit is your responsibility for the semester and yours to keep after the semester ends.

Next perform an inventory of your lab kit using the Text BOM and Visual BOM documents available in the Lab 01 folder on Blackboard. If you find that your lab kit is missing any part(s) inform your GTA to obtain the missing part(s).

5. Getting Started with the Raspberry Pi

The **Raspberry Pi (RPi or Pi)** is a computer intended for students and hobbyists to learn and apply computer science and electronics skills. The Raspberry Pi (or just Pi for short) is called a single-board computer because all of its components are located on one circuit board. This packaging makes the Pi physically small and low in cost, but it also means that human/Pi input/output requires that additional separate components, e.g., keyboard, mouse, and screen, be attached to the Pi. The Pi comes with a 64-bit ARM processor chip, 1 Gbyte of main memory, and a 16 GByte microSD card to hold a file system. This is sufficient to run a variety of modern operating systems: we will use the Raspbian version of Debian Linux for CS250 labs.

The Raspberry Pi 3 Model B with 16GB NOOBS technical specifications:

- 1.2 GHz Quad-Core ARMv8 CPU and 1GB DRAM
- HDMI port
- DSI port for touchscreen and CSI port for camera
- 4 USB ports
- Ethernet port
- Micro-USB power connector
- Micro-SD card slot
- 40 input/output pins to interface the Pi to other computers and electronic circuits
- IEEE 802.11 Wi-Fi
- Bluetooth Low Energy
- stereo audio output and composite video port
- 16GB micro-SD card with NOOBS (New Out-Of-the-Box Software)
- Product Dimensions: 86.9mm x 58.5mm x 19.1mm / 3.4" x 2.3" x 0.8"
- Product Weight: 41.2g / 1.5oz
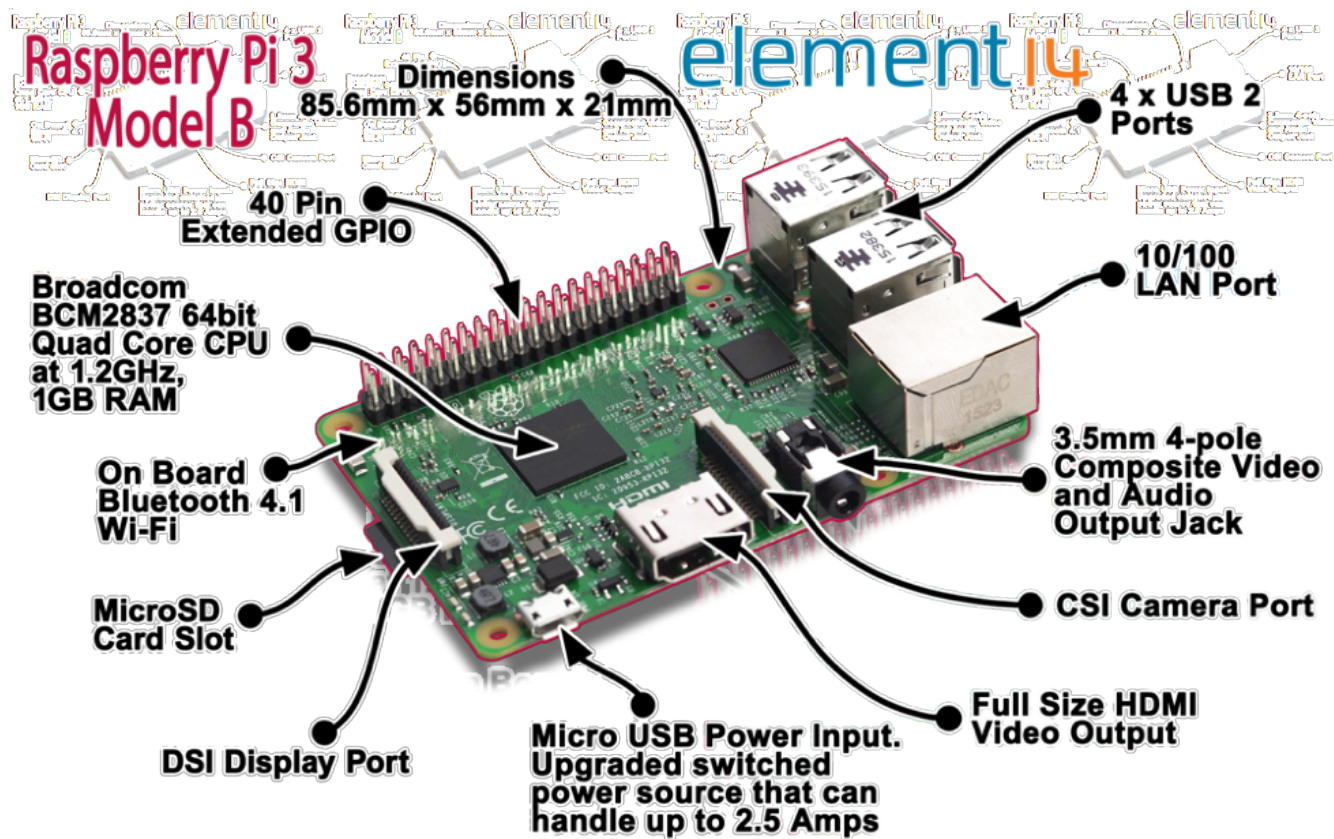
5.1 Safety for you and your Pi

Your Pi comes with a Safety Guide sheet. Take a minute and read through the Safety Instructions in the language of your choice. Most important is that your Pi should be placed on a stable, non-electrically-conductive surface. Your Pi has many exposed wires, and shorting out these wires or allowing them to come into contact with incompatible voltages may damage a Pi.

5.2 Starting Your Pi

Find the Quick Start Guide in the box with your Pi. Follow the Plugging In Your Raspberry Pi instructions in order. The microSD card must be removed from its full-size SD card carrier before you insert it into the microSD card slot on the bottom side of your Raspberry Pi.

You may disconnect the keyboard and mouse from the computer at your LWSN B160 lab station and connect them to two of the USB ports on your Pi. Alternatively, find the bundled USB cables at your station labeled Keyboard & Mouse and connect them to your Pi. Find the small rectangular button on a wire labeled KEYBD & MS SWITCH. Clicking this switch toggles between the lab PC having the keyboard and mouse, and the external cables linking the keyboard and mouse to your Pi. The transfer of control to the Pi takes a second or two.

Find the blue HDMI cable labeled Monitor and connect that to your Pi; this will let you use the computer display at your station with your Pi.

The last connection you should make is to power. Connect the USB-to-microUSB cable from your lab kit to the USB power source in the lab table and connect the microUSB end to your Pi. Your Pi should start to boot, showing a red LED and a green LED flashing occasionally. A detailed quick start guide with graphics is available at http://www.raspberrypi.org/qsg

The Pi runs its operating system from its SD card. While several operating system distros have been made available for the Pi, the one that we will be using is known as **Raspbian**.**

** Raspbian is a Pi-specific version of the popular Linux distro Debian, which was founded by Ian Murdock while he was a student at Purdue University.

5.3 Changing your password

Your Pi will automatically log you in as user "pi" with password "raspberry". It is a great idea to change your password from the default password. Having access to your Pi's password allows you to remotely access it via a console cable or the Internet. For the sake of security, it is imperative that you change this password to something more secure immediately.

While connected to the Pi's terminal, type the command passwd. This will prompt you for your current password (raspberry) and then ask you to enter a new password. For more information, consult man passwd.

5.4 Changing the default keyboard

Raspbian defaults to the standard keyboard layout for United Kingdom, which is a little different from that of the United States. For example, the pressing "SHIFT+3" will be interpreted as the character '£' instead of '#'. If you prefer the US keyboard layout, you can change it via the terminal. We don't recommend using the GUI to change the default keyboard because the change may not hold across restarts of your Pi.

Use your favorite text editor to edit /etc/default/keyboard This file must be edited as root. E.g.,

$ sudo vim /etc/default/keyboard

Next, change the line:
   XKBLAYOUT="gb"
to:
   XKBLAYOUT="us"

The change will go into effect after you restart your Raspberry Pi, because the Pi reads /etc/default/keyboard only during the boot up process.

5.5 Connecting to the Internet and installing other software

Raspbian is a Debian-based Linux distro, so you can install software using the tool apt-get once you have access to the internet from RPi. You can connect to the internet via Ethernet cables or WiFi. Ethernet ports are available at each lab position in LWSN B160, This is the

recommended way to connect your Pi to the internet in lab because you will have a high-speed, hassle-free connection.

5.6 Congratulations, you have completed ungraded Lab 01.
You may leave the lab. See you next week.