

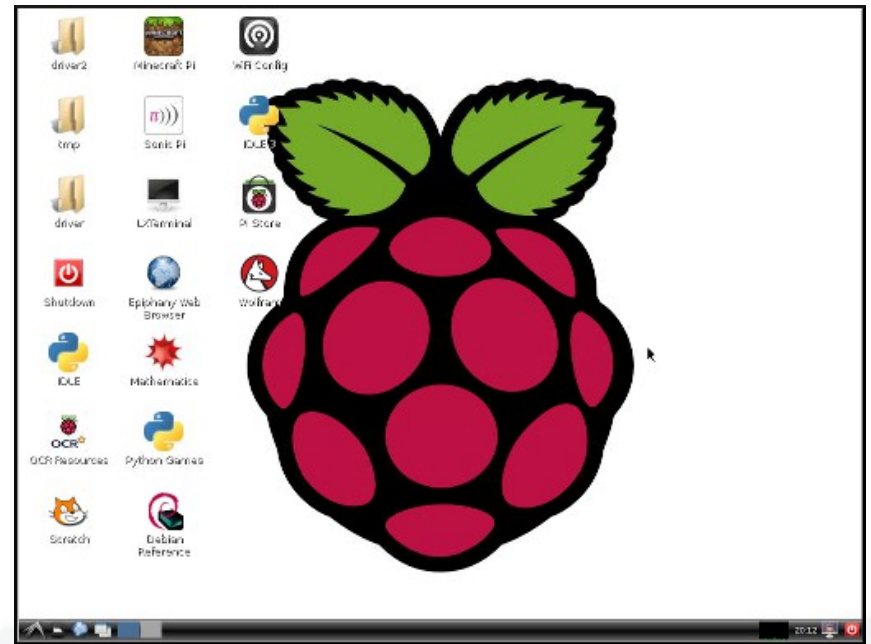
Phase 1: Get a Raspberry Pi,  
Phase 2: ?,  
Phase 3: Rule the World



# Today's Agenda

This presentation will provide an overview of the Raspberry Pi computing platform and some of its implications for transforming education.

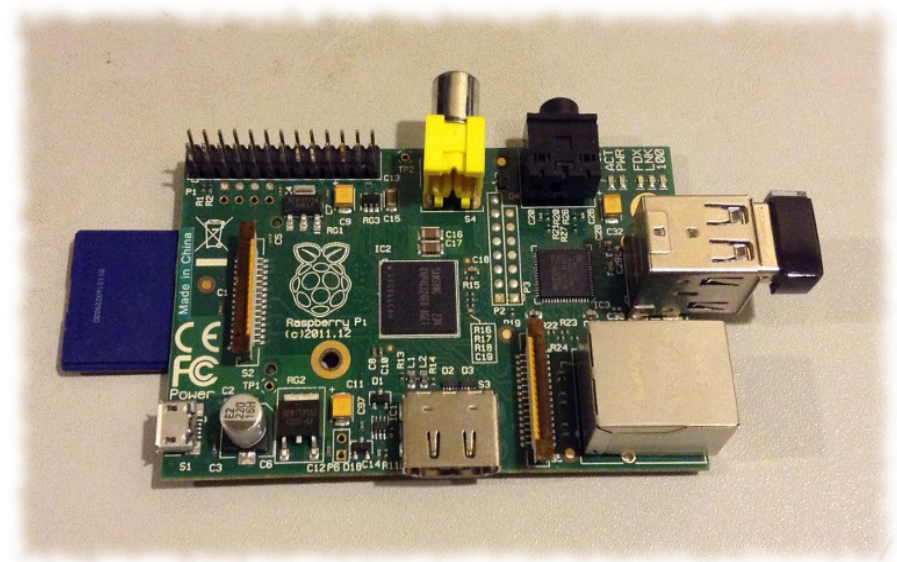
- What is the Raspberry Pi
- Setting up the Raspberry Pi
- Educational Uses
  - Minecraft
  - Scratch
  - Python
  - HTML 5
- Fun Projects
  - Web Kiosk / Information Displayboard
  - Garage Door Opener
  - Voice Controlled Lamp
- Helpful Resources



# What is the Raspberry Pi?

The Raspberry Pi is a computer with the following traits that make it ideal as a tool to help bridge digital divides.

- Low-cost computer (\$25 - \$35)
- Size of a credit card
- Graphics capabilities roughly equivalent to the original Xbox\*
- Performance close to a 300Mhz Pentium 2\*
- Strong community support
- Energy efficient – can be ran off of batteries



# Setting Up the Raspberry Pi

The Raspberry Pi contains the motherboard, CPU, GPU, and memory, but often needs a few other components to be useful. These include...

- Power adapter 5v - 750 mA - 1A
- SD card – 4Gb or higher (micro-SD for + models)
- Case (optional)
- HDMI or RCA composite video display devices
- Keyboard
- Mouse



# Choosing an Operating System

After acquiring the hardware, one will be able to choose from a number of different operating systems.

- Noobs – Image to choose some of the following
- Raspbian – (Debian variant like Ubuntu)
- Pidora – (Fedora variant like Red Hat)
- Raspbmc – (Specialized media center)
- Risc OS – (Non-linux; First OS for ARM CPUs)

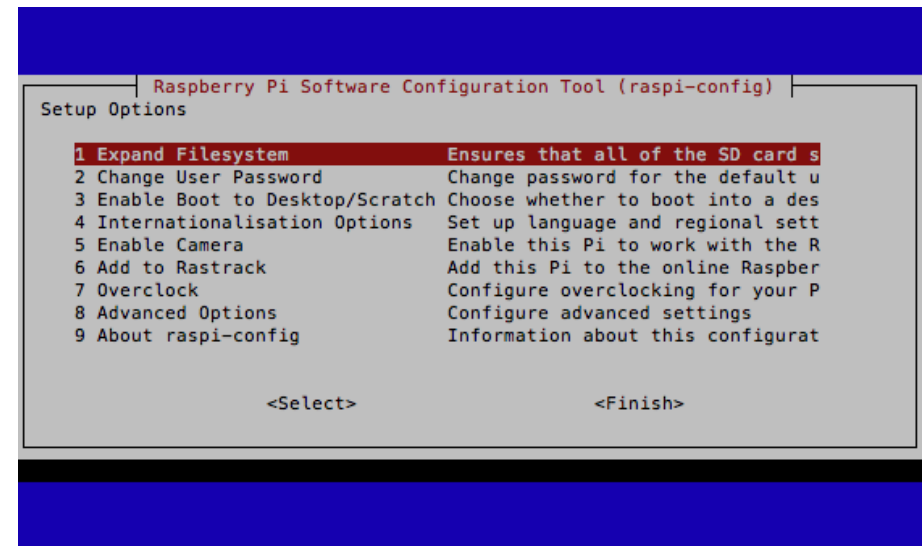




# Configuring the Raspberry Pi

Once the Raspbian Operating System is copied to the memory card, the Pi can be configured.

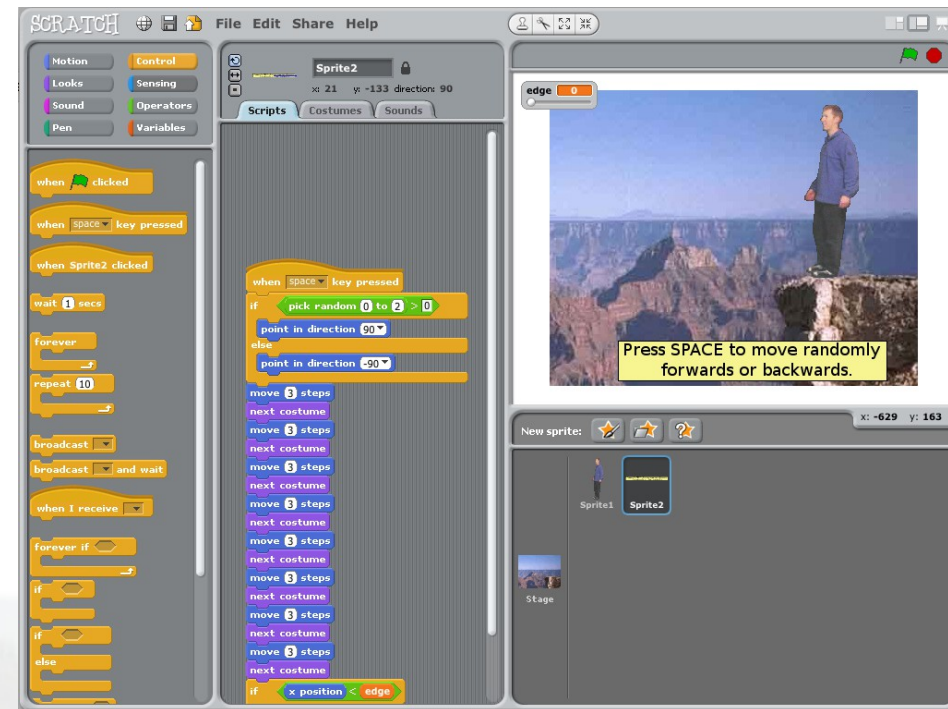
- Language and keyboard settings
- Time zone preferences
- Overclocking speed
- Video memory split



# Educational Uses - Scratch

One of the most difficult things in teaching programming is in helping students get past the barriers of understanding syntax, keywords, and available operations. The second difficult feat is in making programming engaging. The Raspberry Pi runs Scratch which...

- Allows for visual programming and graphic editing
- Shows available options as widgets that can be drag-and-dropped
- Makes creating animations easy
- Allows sharing of completed applications with peers



# Educational Uses - Python

The Raspberry Pi supports the Python programming language. This is a general purpose language emphasizing readability. One exercise to try is programming the game of Fizz Buzz which has the following requirements.

- Output numbers from 1 to 100
- Print out the word Fizz for multiples of 3
- Print out the word Buzz for multiples of 5
- Print out the word FizzBuzz for multiples of both 3 and 5

```
*Python Shell*
File Edit Shell Debug Options Windows Help
Python 2.7.3 (default, Mar 18 2014, 05:13:23)
[GCC 4.6.3] on linux2
Type "copyright", "credits" or "license()" for more information.
>>> for num in xrange(1,101):
    msg = ''
    if num %3 == 0:
        msg += 'Fizz'
    if num %5 == 0:
        msg += 'Buzz'
    if not msg:
        msg += str(num)
    print msg
```

```
Python Shell
File Edit Shell Debug Options Windows Help
62
Fizz
64
Buzz
Fizz
67
68
Fizz
Buzz
71
Fizz
73
74
FizzBuzz
76
77
Fizz
79
```

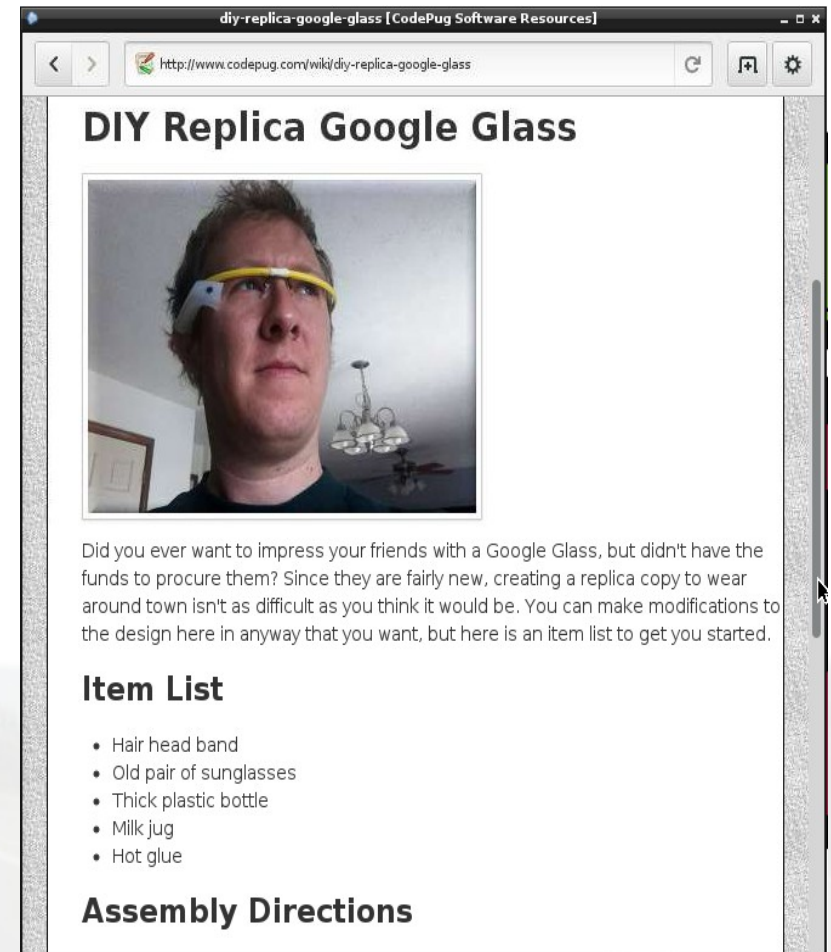




# Educational Uses – HTML 5

With the new Epiphany web browser, students can learn how to create and view projects written to take advantage of the latest web technologies written in HTML 5.

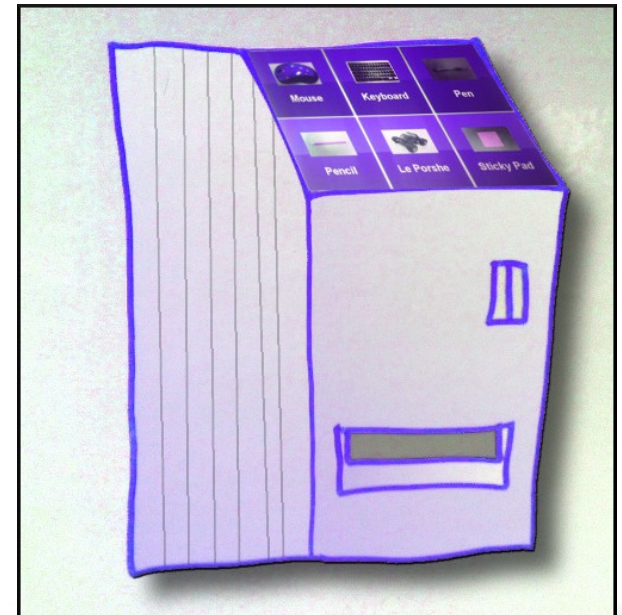
- Use the Pi to learn to write HTML, CSS, JavaScript
- Leverage new frameworks used in the IT field including jQuery, angular, and more
- Support for HTML video tags



# Fun Projects – Web Kiosk

With its built-in web browser, the Raspberry Pi can be readily configured to serve as an information display to show current events or with some hardware expertise even a digital vending machine.

- Update the display from a local or remote website
- Prevent the screen from going to sleep
- Low cost / low power
- Can even display video
- GPIO pins can control the dispensing of items

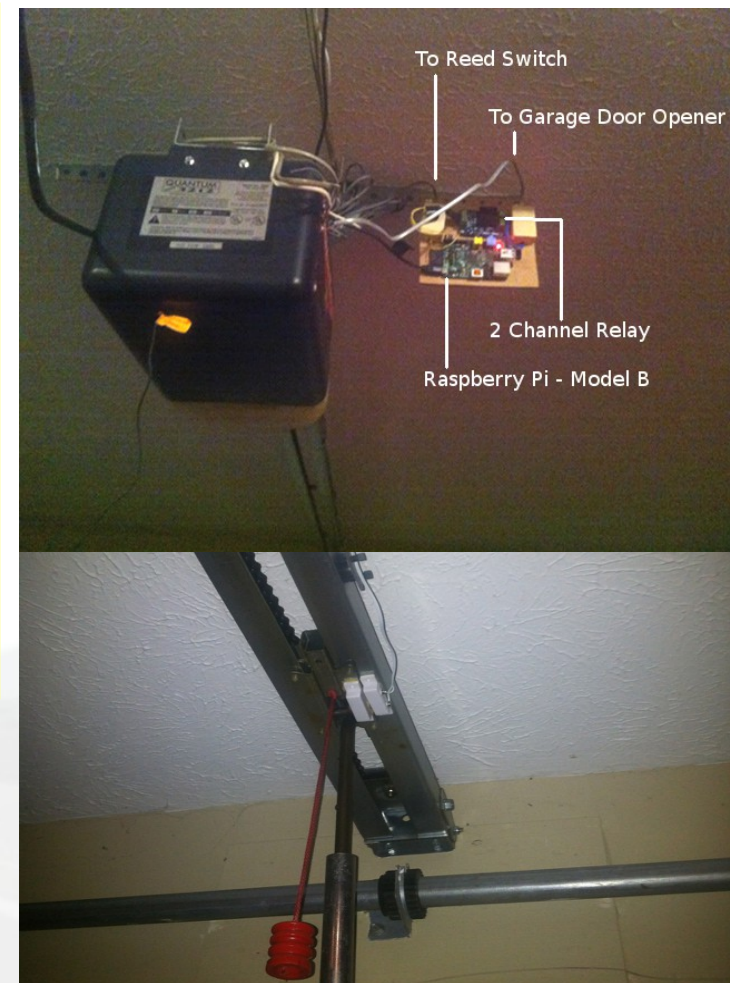


# Fun Projects – Garage Door Opener

With a relay, wifi adapter, and a magnetic reed switch, the Raspberry Pi can be used to control a garage door from the Internet.

```
#!/bin/sh
if [ `gpio read 2` -eq 1 ]
then
  /home/pi/t.sh Please standby, the door is now opening.
else
  /home/pi/t.sh Please standby, the door is now closing.
fi

/usr/local/bin/gpio -g write 4 1
sleep .75
/usr/local/bin/gpio -g write 4 0
```



# Educational Uses - Minecraft

Minecraft is now recognized as the 3<sup>rd</sup> most popular computer game of all time. \* Not only does it have the ability to excite kids, but it also has a number of educational benefits.

- Encourages reading (inventory items, online strategies)
- Develops math skills (3D coordinates, building figures and shapes, calculating amount of materials)
- Integrates with Python scripts via the Minecraft Python API





# Fun Projects – Voice Controlled Lamp

Using some LED Christmas light bulbs, a microphone, and the PocketSphinx open source voice recognition library...

- Retrofitted an old night light to hold a Raspberry Pi
- Connected a microphone to an USB adapter
- Trained the Pi to recognize a couple of words
- Wrote code to activate the LED lights via the GPIO pins





# If I Haven't Hooked You Yet...



Did I mention that the Raspberry Pi also has...

- Sonic Pi – An open source programming environment for creating new sounds with code
- Mathematica 10 – computational programming tool used in science, maths, computing, and engineering
- A version of the latest Java 8 Development Kit that can be installed from Oracle



# Helpful Resources

The following web sites provide additional information about the Raspberry Pi.

- The Official Raspberry PI - FAQ

<http://www.raspberrypi.org/help/faqs/#videoDisplays>

- CodePug Wiki – Project How-To's

<http://www.codepug.com/wiki>

- Amazon Offerings

[http://www.amazon.com/s/ref=nb\\_sb\\_noss?url=search-alias%3Delectronics&field-keywords=raspberry+pi&rh=n%3A172282%2Ck%3Araspberry+pi&ajr=0](http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Delectronics&field-keywords=raspberry+pi&rh=n%3A172282%2Ck%3Araspberry+pi&ajr=0)

- Risc OS FAQ

[http://www.riscos.com/the\\_faqs/](http://www.riscos.com/the_faqs/)

