RaspberryPi
Outline

• Introduction to Raspberry Pi
• Python
• Electronics
• Linux
What is a Raspberry Pi?

- University of Cambridge’s Computer Laboratory
  - Decline in skill level
  - Designed for education
- A credit card sized PC
- Plugs into a TV or monitor
- Inexpensive(ish) ~$35 each
- Capability:
  - Programming
  - Electronic Projects
  - Office
  - Play HD Videos
Variations of Raspberry Pi

• Hardware platform
  – Raspberry Pi Zero ($5)
  – Raspberry Pi
  – Raspberry Pi 2
  – Raspberry Pi 3 (with Wifi + Bluetooth)

• Software platform
  – Noobs
  – Raspbian
  – 3rd OS
Kit Components

• Essential:
  – Raspberry Pi board
  – Prepared Operating System SD Card
  – USB keyboard
  – Display (with HDMI, DVI, or Composite input)
  – Power Supply

• Highly suggested extras include:
  – USB mouse
  – Internet connectivity - LAN cable
  – Powered USB Hub
  – Case
Programming Languages

• The Raspberry Pi Foundation recommends Python
• Any language which will compile for ARMv6 can be used
• Installed by default on the Raspberry Pi:
  – C
  – C++
  – Java
  – Scratch
  – Ruby
Challenges and Opportunities

• New operating system: linux
• Open-source, all almost tools/software are free
• Rich resources on the web due to its popularity
• Resources link: www.raspberrypicamp.org
• Pi Educational Document (resources above link)
• Pinet: Centralised user accounts and file storage system for a Raspberry Pi classroom. http://pinet.org.uk/
Linux

- Interesting, powerful
- Variations (Ubuntu, debian, feroda, redhat)
- Command line
- Raspberry Pi: Raspian (Debian-based)
- Pinet: Ubuntu server + Raspberry Pis
- Linux: robust, secure, easy to use, powerful
Raspberry Pis in Primary Ed.

http://www.youtube.com/watch?v=KdTwQXre1DU
SETUP
1. **Insert SD card**
   See page 3 for how to prepare the SD card

2a. **Connect display**
   Plug in the micro USB power supply

2b. **Connect display**
   If *not* using HDMI, plug in your analogue TV or display

3. **Connect input**
   Plug in a USB keyboard and mouse

4. **Connect network**
   Connect to your wired network [optional]

5. **Power up**
   Plug in your digital TV or monitor
Power

5v micro USB connector

(Similar to the one on a lot of mobile phones!)
A/V (Audio/Video)

- RCA Video (works with most older TVs)
- 3.5mm Audio Standard headphone socket
- HDMI Audio & Video (works with modern TVs and DVI monitors)
Connectivity

- GPIO (General Purpose Input & Output)
- 2 x USB 2.0 ports
- 10/100Mb Ethernet
DSI (display interface)

LAN Controller

CSI (camera interface)

SOC (System On a Chip)
Broadcom BCM2835 700Mhz
Storage

SD Card Slot
(supports SD cards up to 32GB)
10 USES FOR A RASPBERRY PI
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10 Office
Office

LibreOffice
The Document Foundation
Programming
Programming

Python

SCRATCH
Operating System

- Linux on a bootable SD card
  - Fedora
  - Debian
  - ArchLinux
Programming

• By default, supporting Python as the educational language.
• Any language which will compile for ARMv6 can be used with the Raspberry Pi, though; so you’re not limited to using Python.
• For primary age SCRATCH game maker is bundled
Scratch

scratch is free from MIT .. thanks MIT !
Scratch
Python Code

```python
# polygon.py
# draws polygons

import turtle

def polygon(length, sides):
    for i in range(sides):
        turtle.fd(length)
        turtle.left(360/sides)

# main
print("Let's draw a polygon. ")
how_many = int(input("How many sides would you like?"))
how_big = int(input("How long do you want the sides?"))
polygon(how_big, how_many)
input("Press a key to quit. ")
```

http://teampython.wordpress.com/category/pi
What kind of projects?

- Video DJ Mixer integrated Media player for your TV to fight the rampant Lego Robot Monster who is detected by your Home monitoring webcam network which reports also from the Weather Station that uses the Car Super Bramble Computer to tell the School Notice-board that the Solar powered Wireless Rocket Widget should be sent back to earth...
Tinkering

• GPIO pins if you’re after an interesting electronics project.
• Gertboard - A GPIO expansion board from the foundation for electronics projects
• USB Devices / Ethernet / Hubs / AV out
• Can be powered by 4 x AA batteries ...
Game Console
Game Console
7  Web Server
Web Server

APACHE HTTP SERVER
6   Tor Router
Tor Router
HTPC
4 Bird House
Bird House
Super Computer
Supercomputer
2 Clock
Clock
1 PiBot!
PiBot!
Many of the slides were borrowed from the Raspberry Pi Foundation, Ethan Sprissler @ UAlbany

and from

http://damnfineraspberrypi.com/