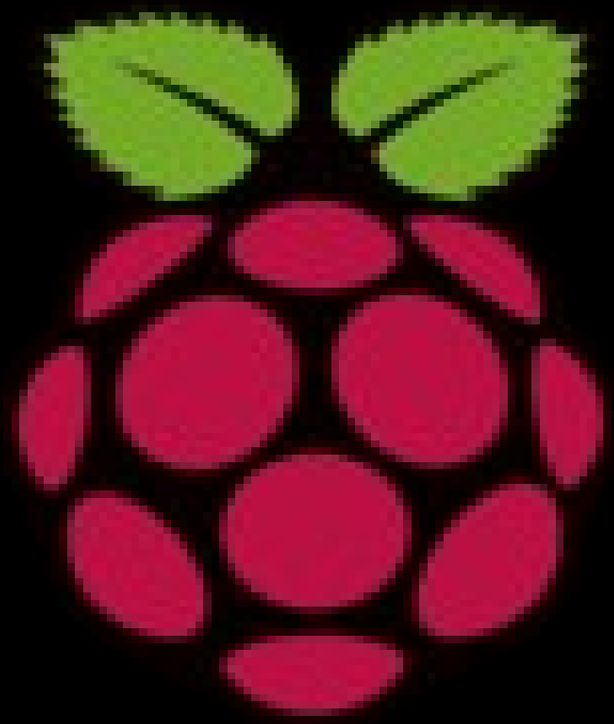
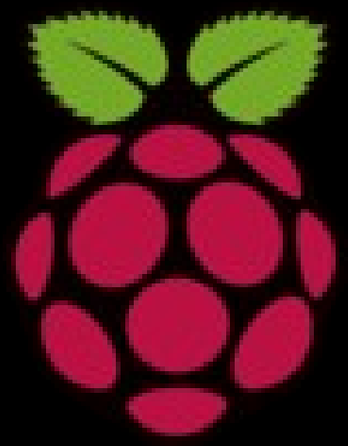
Raspberry Pi



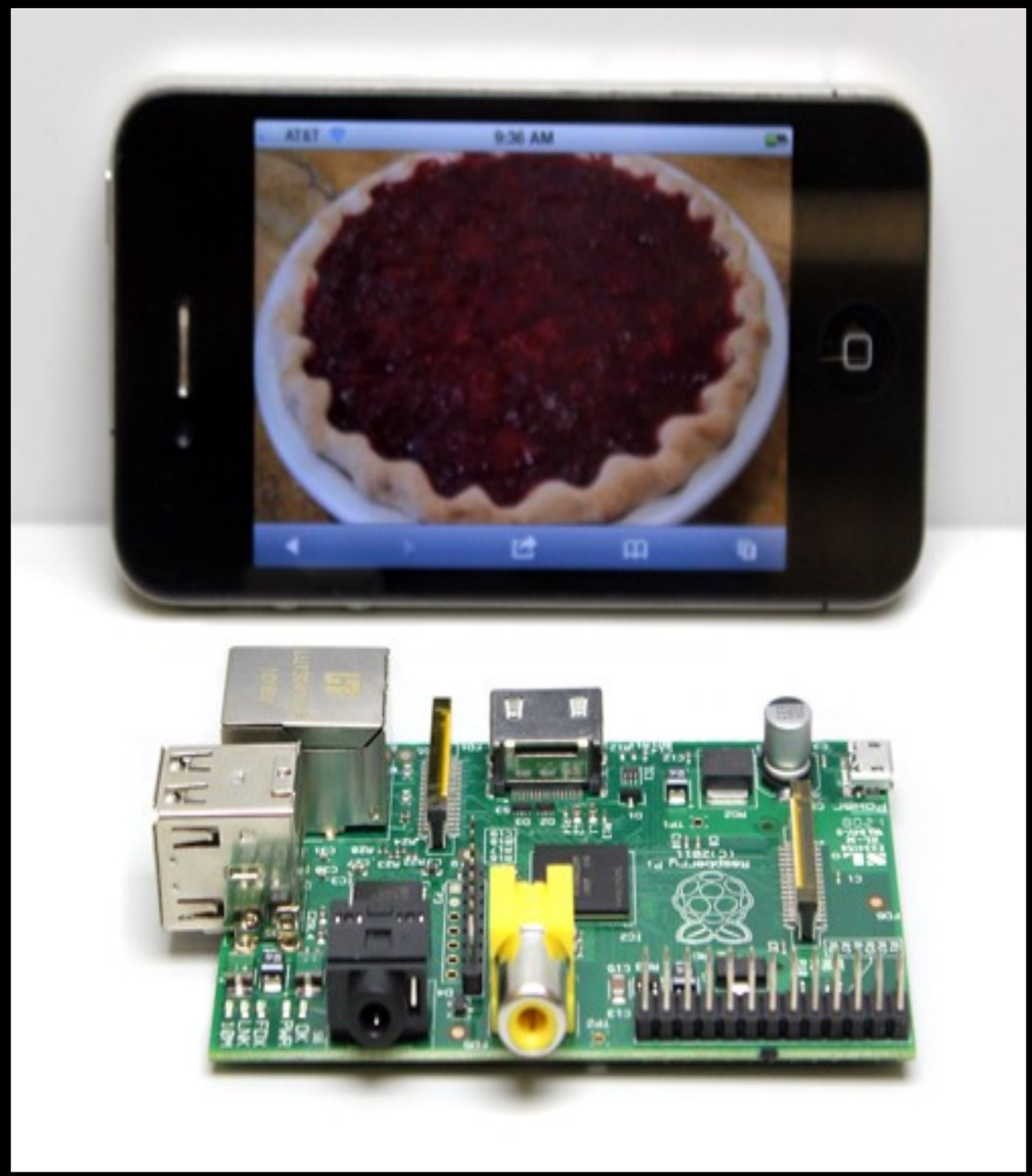


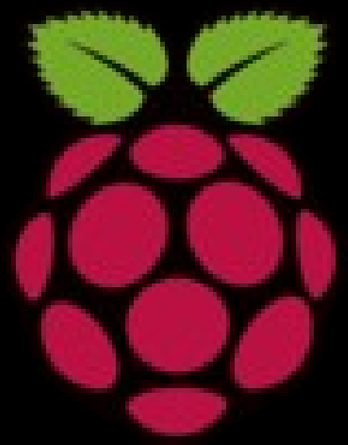
Introduction

- The Raspberry Pi is a *credit-card* sized computer
- It can be plugged into your TV and a keyboard, and can be used for many of the things that your average desktop does - spreadsheets, word-processing, games and it also plays high-definition video.

Introduction

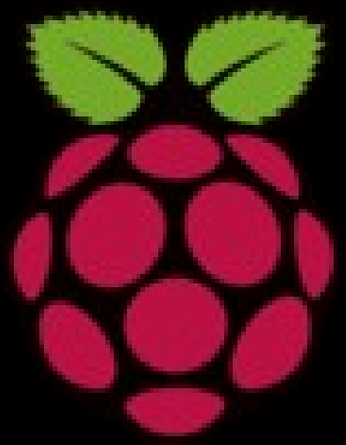
- measuring approximately 9cm x 5.5cm





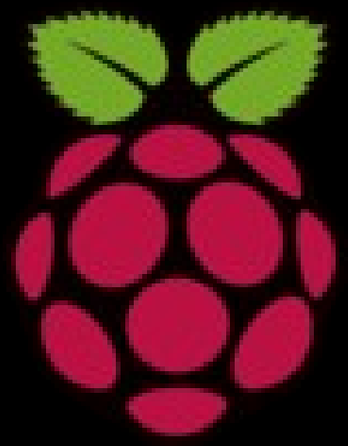
History

- The Raspberry Pi is the work of the Raspberry Pi Foundation, a charitable organisation.
- UK registered charity (No. 1129409), May 2009
- It's supported by the University of Cambridge Computer Laboratory and tech firm Broadcomm



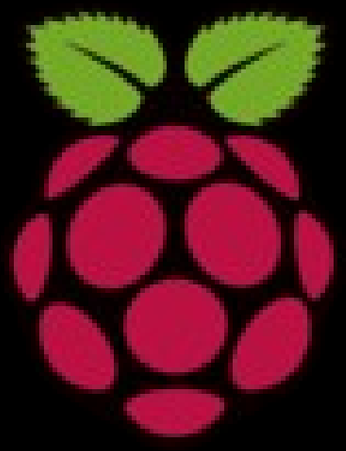
Motivation

- Computer science skills increasingly important
- Decline in CS student numbers
- Access to computers
- Computers are **the tool of the 21st century**
- Computer Science is concerned with much more than simply being able to use a computer.
- Children should understand how they work and how to program them



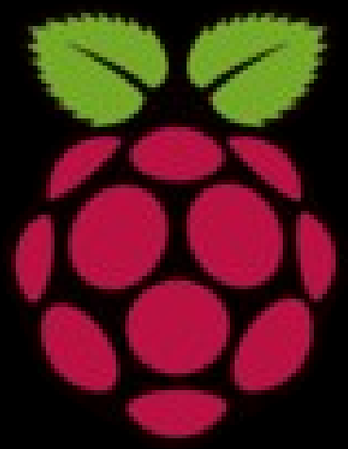
What is Raspberry Pi?

- The Raspberry Pi is a fully featured micro-computer squashed onto a circuit board measuring approximately 9cm x 5.5cm.



Features

- Ultra low-cost (Model A $25, Model B $35)
- Ultra low-power ~1W
- Credit-card sized, fanless, instant start-up
- Complete easy-to-program computer

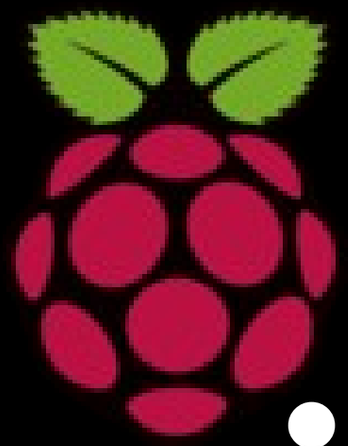


Features

- Provide a fun environment for experimenting with programming and electronics
- Inexpensive, simple, open and easy to maintain computer for schools
- Fun computer for children to experiment with at home(programming, robotics, etc...)

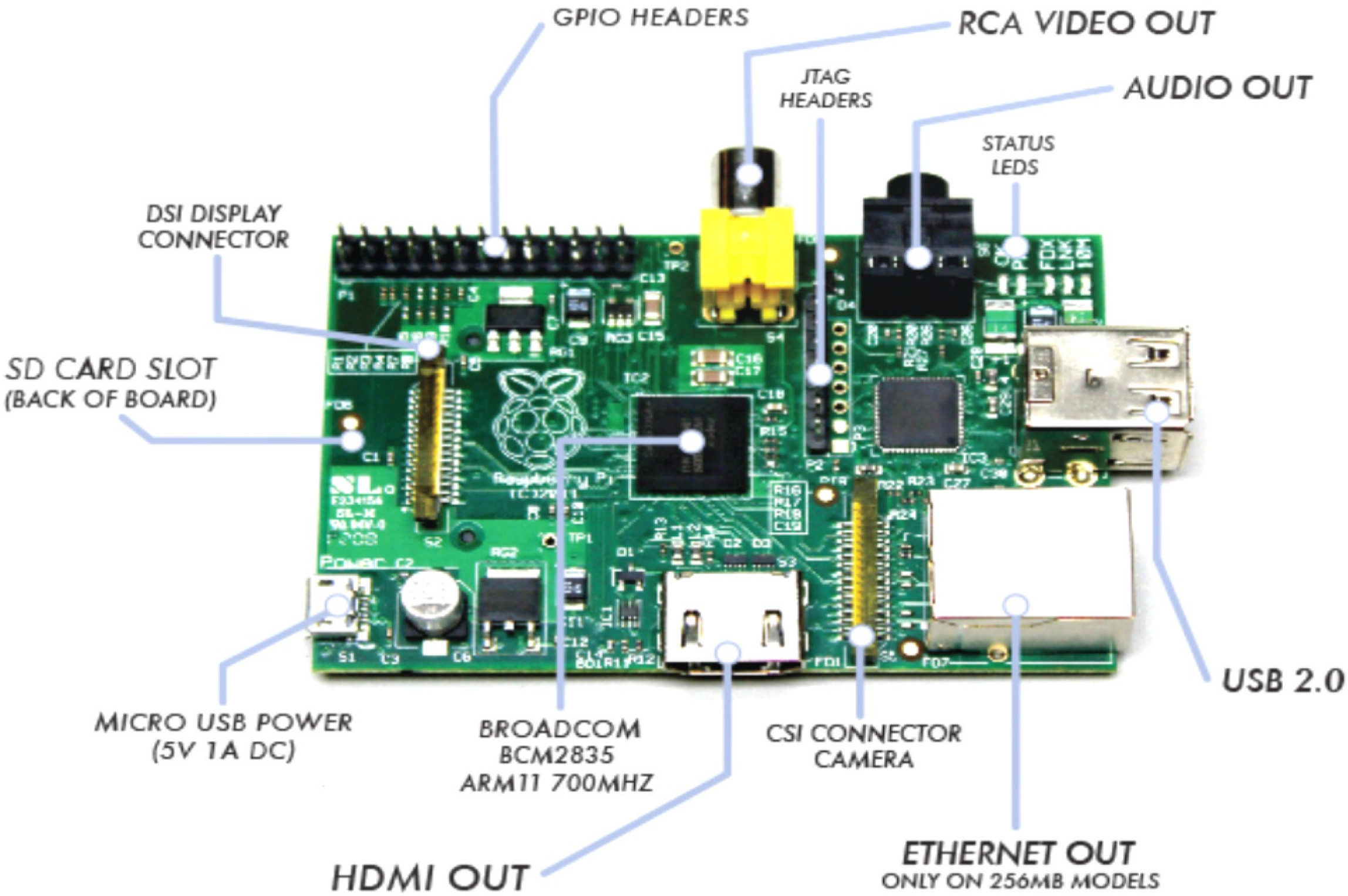
Technology

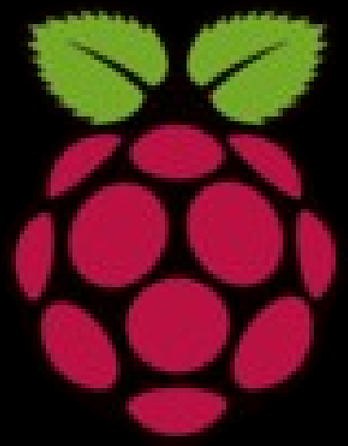
- The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC),which includes an ARM1176JZF-S 700 MHz processor
- Video Core IV GPU
- originally shipped with 256 megabytes of RAM, later upgraded to 512MB.
- It does not include a built-in hard disk , but uses an SD card for booting and long-term storage.



Hardware

- 10/100 BaseT Ethernet socket
- HDMI socket
- USB 2.0 socket
- RCA video socket
- SD card socket
- Powered from microUSB socket
- 3.5mm audio out jack
- Header footprint for camera connection


GPIO HEADERS
RCA VIDEO OUT
JTAG HEADERS
AUDIO OUT
STATUS LEDS
DSI DISPLAY CONNECTOR
SD CARD SLOT
(BACK OF BOARD)
USB 2.0
MICRO USB POWER
(5V 1A DC)
BROADCOM
BCM2835
ARM11 700MHZ
CSI CONNECTOR
CAMERA
HDMI OUT
ETHERNET OUT
ONLY ON 256MB MODELS



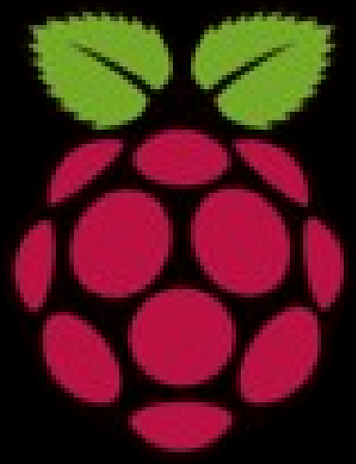
Operating System

- Linux on a bootable SD card
  - **Fedora**
  - **Raspbian**
  - Debian
  - ArchLinux ARM

How to make it work!

Programming

- By default, supporting Python as the educational language.
- Any language which will compile for ARMv6 can be used with the Raspberry Pi.

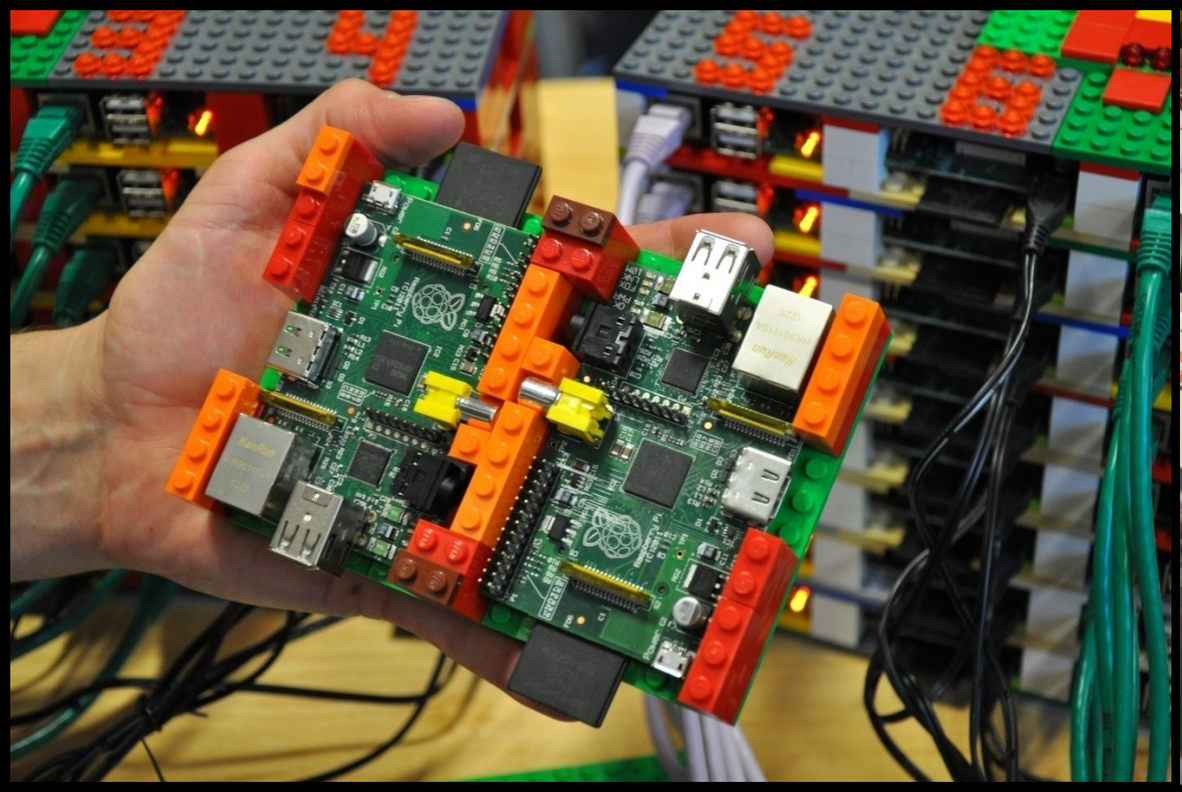


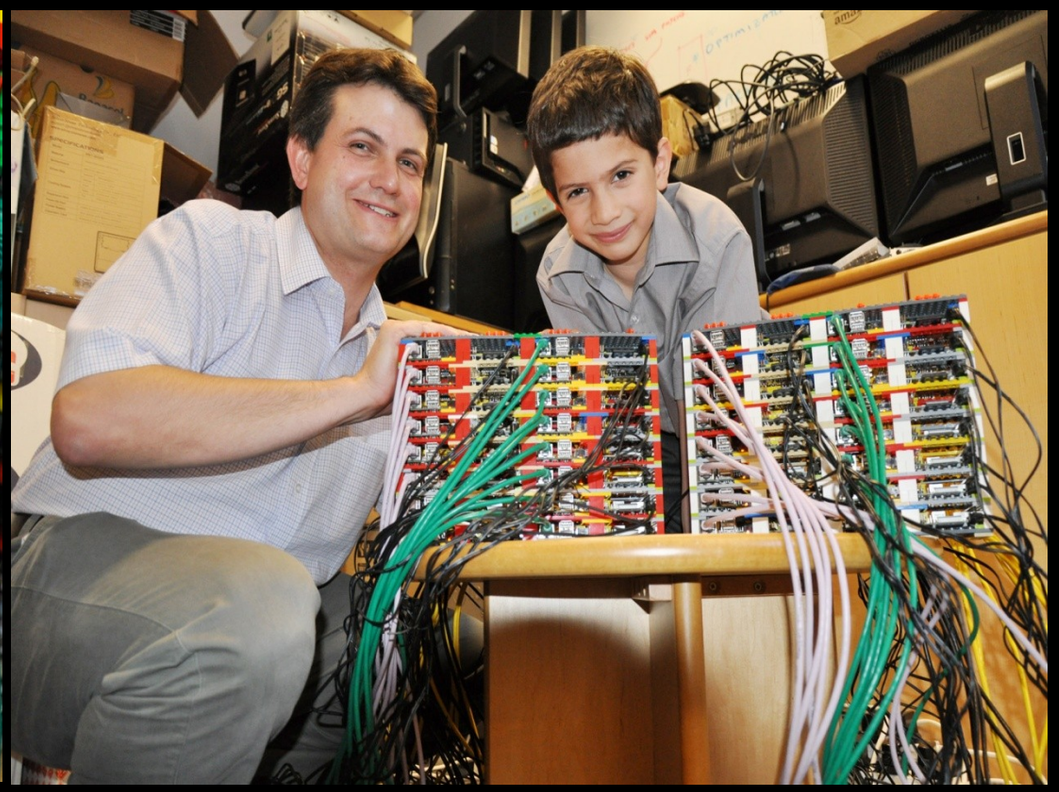
Price

- Model A - $ 25
- Model B - $ 35
- Why so cheap ?
  - SoC - System on a chip, a computer on a single low voltage chip
  - Linux OS

Applications

- Can be used for making super computers



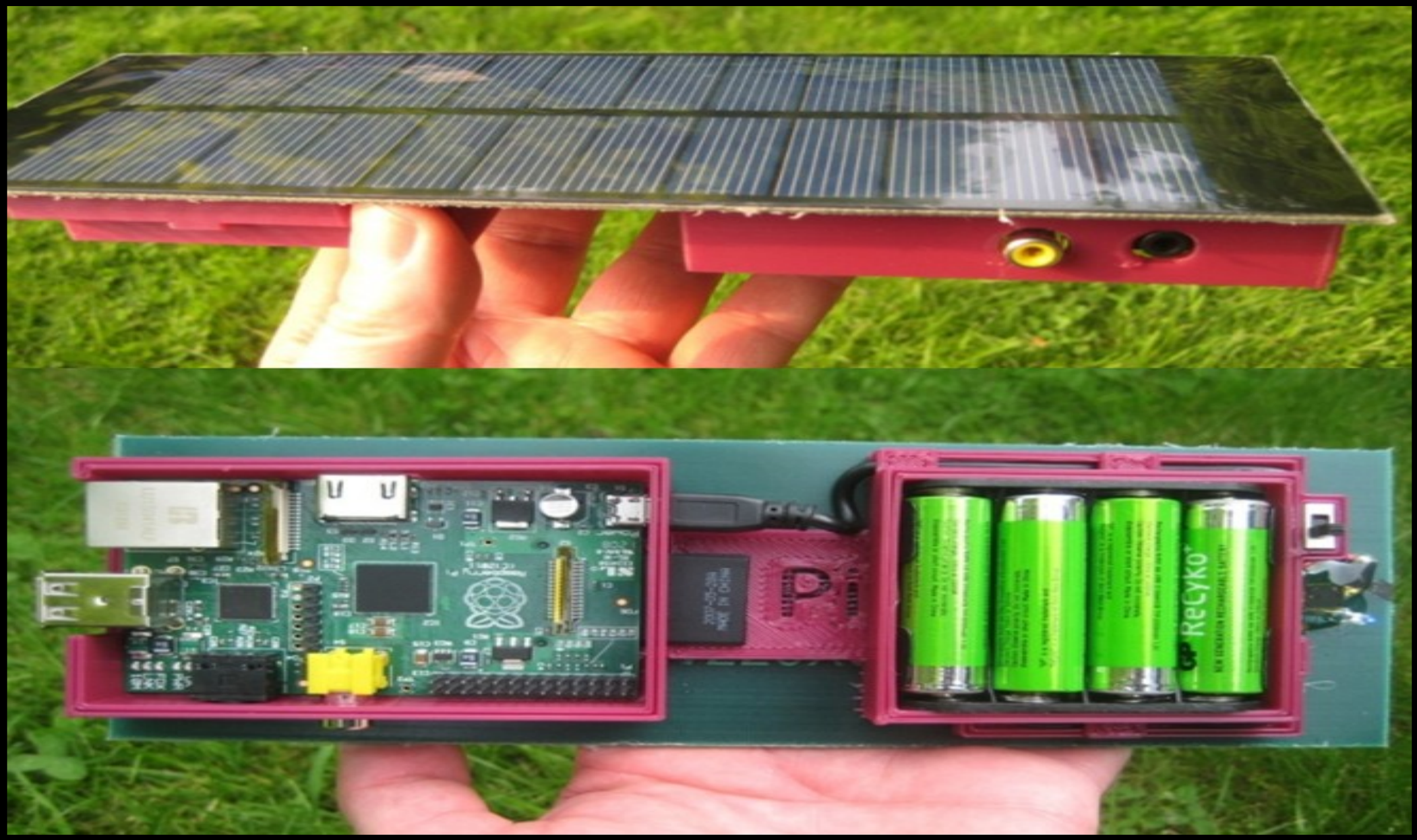


Applications

Raspberry Pi Medical Device Input Shield

Applications

- Solar Raspberry Pi Power Pack



Applications

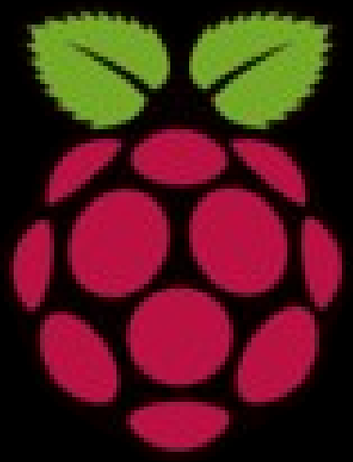
- Voice-Activated Coffee Machine
- Raspberry Pi Dynamic Bike Headlight Prototype

Applications

- It can make your Old TV in to a smart TV. (You can play Videos, 3D Games, Music, Browse Internet and much more.
- Raspberry Pi can Act as Full HD 1080p Media Player.
- Its a Mini Computer which just cost Rs.2,350/-
- You can connect a Monitor, Keyboard and Mouse and use it as a normal computer.
- Its Graphics Capabilities is better than Apple Products.

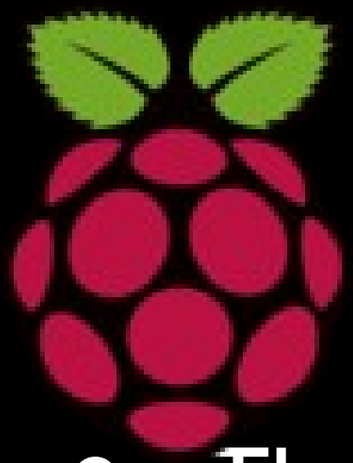
Raspberry Pi Vs Akash

- Aakash is a low-cost tablet, and Raspberry Pi is an ultra-cheap, customizable computer.
- Both tech innovations have education and economy as their central goals.
- Aakash could fundamentally change the way Indian students and most of rural India connects with the Internet.



Raspberry Pi Vs Akash

- The Raspberry Pi, directed at budding computer engineers in the U.K., could alter the way the next generation thinks about coding and building in the computer universe.
- Both the Aakash and Raspberry Pi run on ARM-based processors, the British processor that runs the vast majority of the world's mobile phones, smartphones and tablets.



Raspberry Pi Vs Akash

- The first generation Aakash is said to run an ARM 11-based processor from Conexant running at 366Mhz.
- The Raspberry Pi uses an ARM 11-based processor from Broadcom running at 700Mhz plus a separate graphics processing unit.
- The processor in the Raspberry Pi has about twice the graphics performance of the iPhone 4S and even bests Nvidia's Tegra 2.

Raspberry Pi Vs Akash

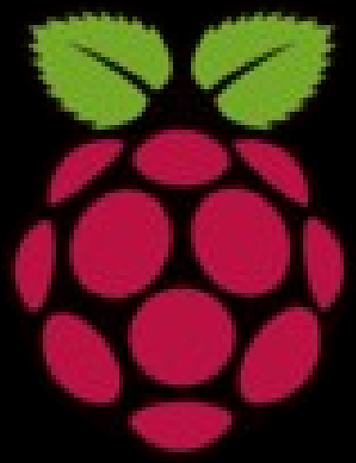
- The Raspberry Pi can connect to a television or a computer monitor via the commonly used composite RCA and HDMI video interfaces.
- Akash tablet runs on an Android 2.2 OS.
- The Raspberry Pi computer will run a number of Linux-based operating systems including Red Hat's Fedora as well as Debian, the basis for the popular Ubuntu distribution, and Arch.

Disadvantages

- It does not have a Hard Disk associated with it for permanent storage pf files,we have to connect one externally or have to use SD card for the purpose.
- The RAM is a POP package on top of the SoC, so it's not removable or swappable.
- There is no Real time clock associated with the board.Adding an RTC is expensive. You can add one yourself using the GPIO pins.

Future developments

- Tablet version
- Interesting low-cost screen technologies emerging
- Brambles! (Networks of Raspberries)



Raspberry Pi 2020

- Exploit process scaling and keep price constant:

– 8 cores, improved GPU, 8GB main memory

– WiFi, camera, matchbox sized case

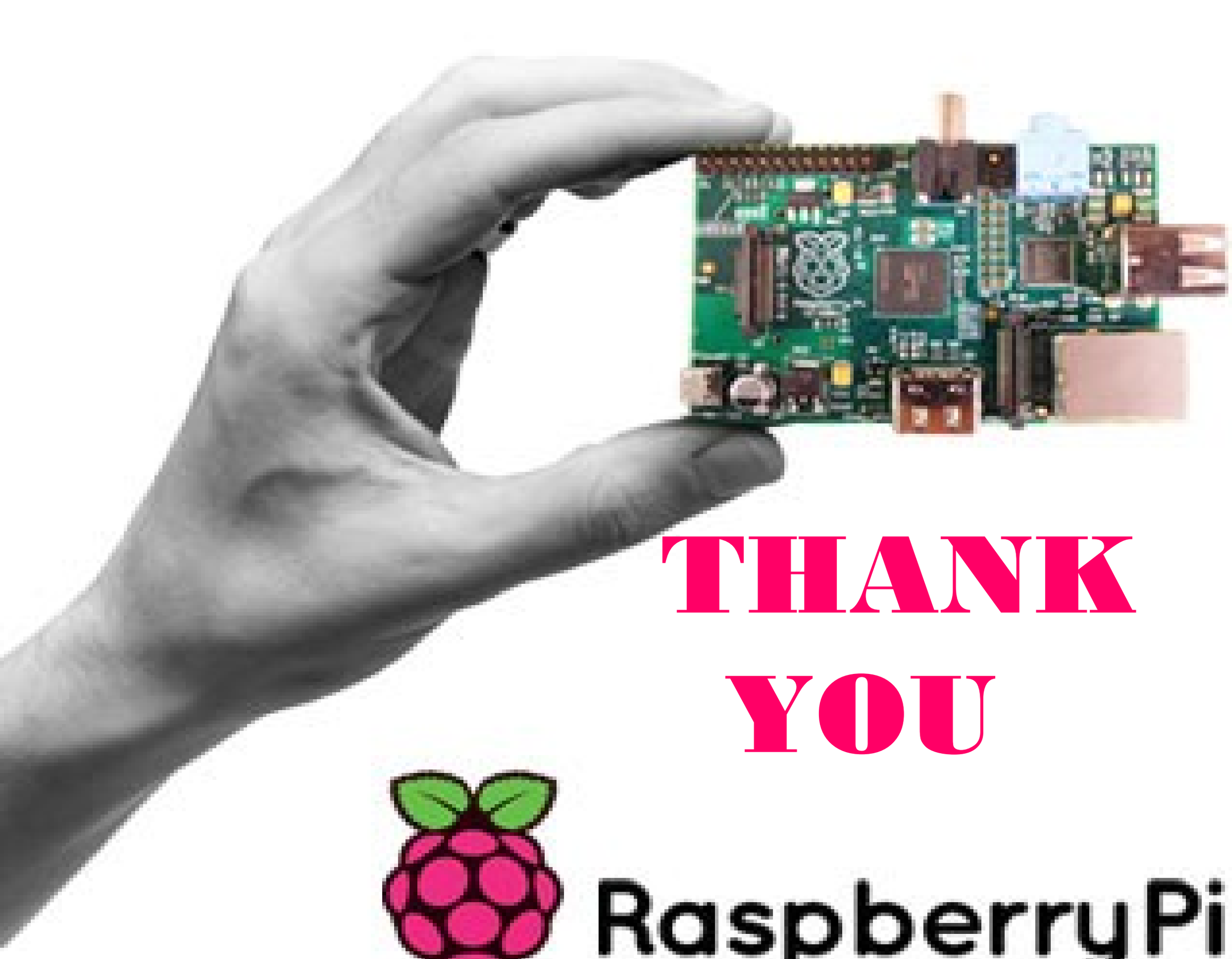
– holographic laser projector, virtual keyboard

– FPGA logic on main SoC, high speed links, ….

– < $25

REFERENCES

- Electronics For You, November 2012, Page 18
- http://en.wikipedia.org/wiki/Raspberry_Pi
- http://www.raspberrypi.org
- http://www.element14.com/community/groups/raspberry-pi



THANK YOU

Raspberry Pi