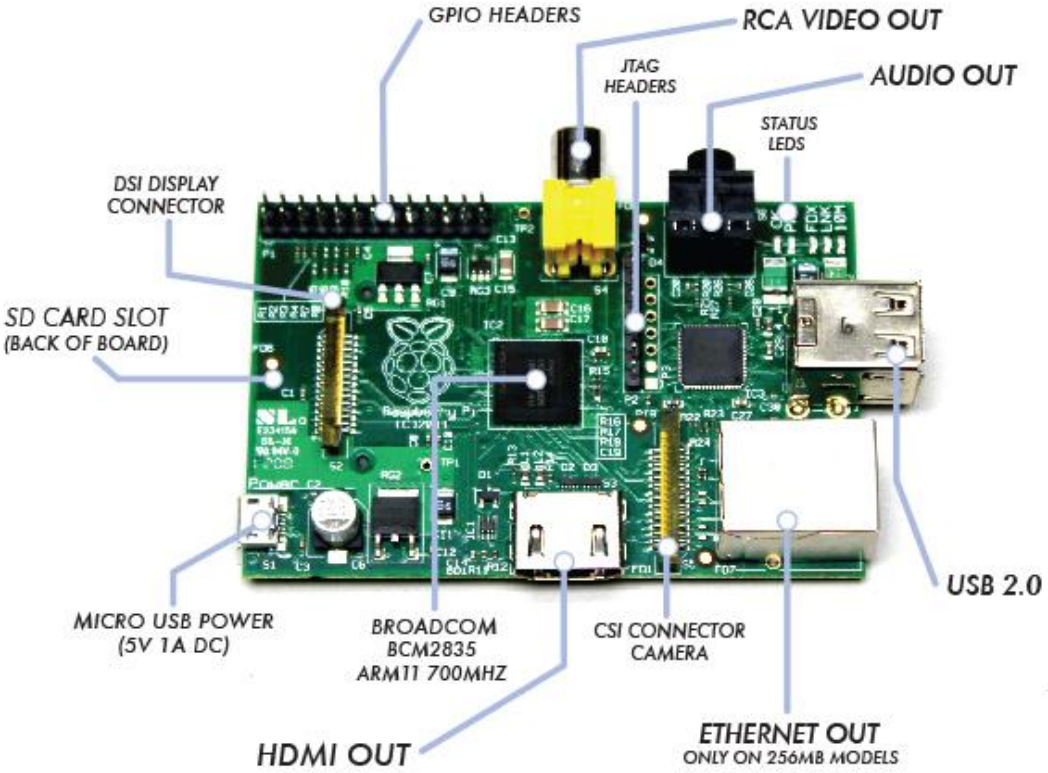
Python on Raspberry Pi

Setup * Camera * GPIO * Sensors



Raspberry Pi B

Basic Raspberry Pi Setup

1. Start with standard Raspbian image
2. Login/Pw: pi/raspberry
3. `sudo rpi-update`
4. `sudo shutdown -r now`
5. `sudo apt-get update`
6. `sudo apt-get dist-upgrade`
7. `sudo raspi-config`
8. Set Internationalization Options
9. `sudo shutdown -r now`

SimpleCV

- Pythonic wrapper for machine vision libs
- Makes webcam access very simple
- Works with many USB/built-in webcams
- Works on Linux, Windows, and OSX
- http://tutorial.simplecv.org/en/latest/

Install SimpleCV on Raspberry Pi

- http://simplecv.org/download
- SimpleCV Version 1.3 Superpack
- `$ sudo dpkg -i SimpleCV-1.3.deb`
- `$ sudo apt-get install -f`
- `$ fix_simplecv_missing_png.sh`

Live Demos

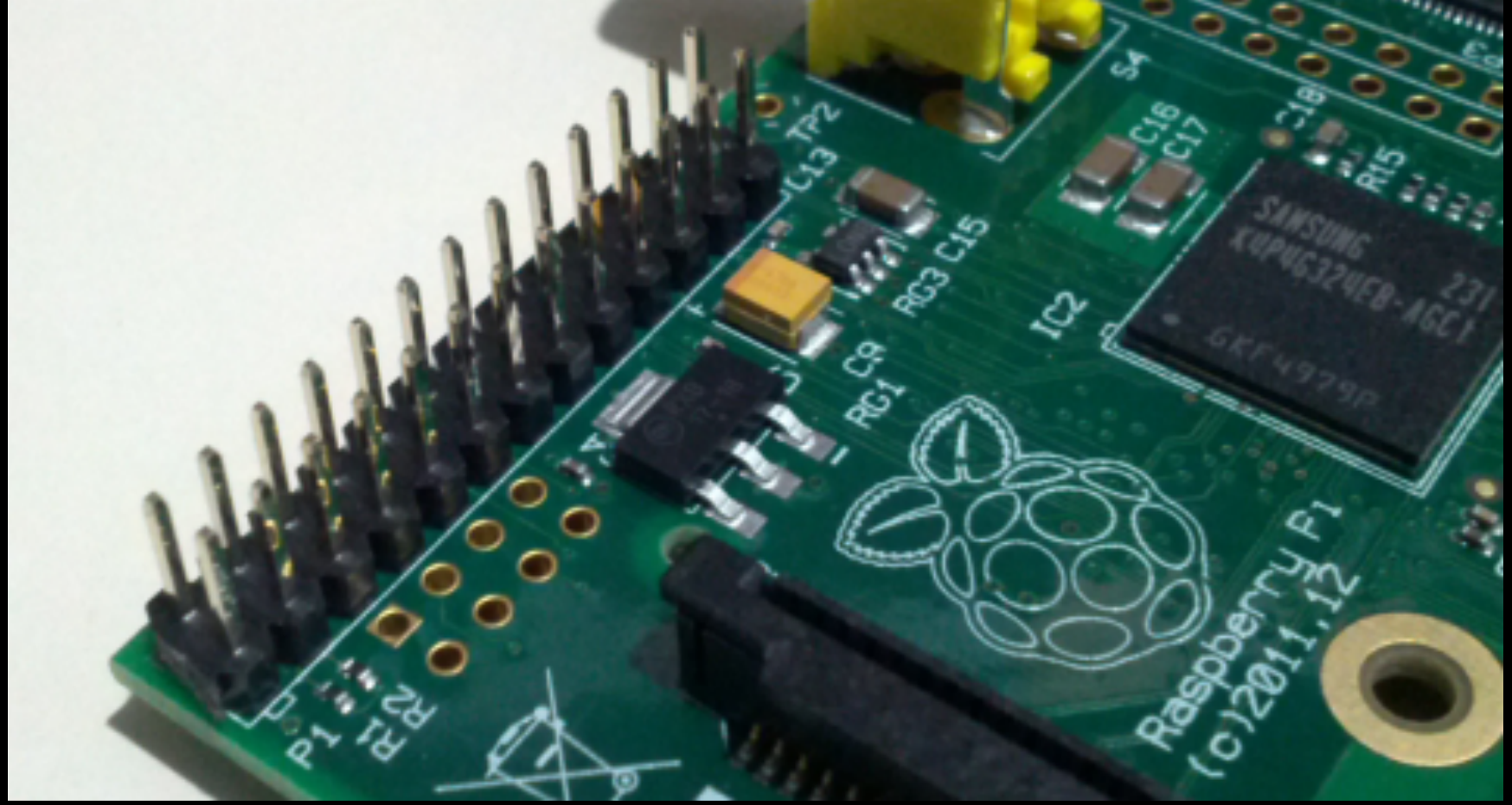
- live_view.py
- live_stream.py
- save_photo.py
- save_gif.py
- save_video.py

Moar on SimpleCV

- Detailed image properties
- Image manipulation
- Image markup
- Feature detection
- Tools for building a CV application

What is GPIO?

- **GPIO**: General Purpose Input/Output
- Pins providing digital and analog I/O
- Pins providing power to circuits
- **Input**: Get signals from sensors, devices
- **Output**: Control motors, servos



Raspberry Pi GPIO Header

GPIO Numbers

Raspberry Pi B
Rev 1 P1 GPIO Header

	Pin No.		
3.3V	1	2	5V
GPIO0	3	4	5V
GPIO1	5	6	GND
GPIO4	7	8	GPIO14
GND	9	10	GPIO15
GPIO17	11	12	GPIO18
GPIO21	13	14	GND
GPIO22	15	16	GPIO23
3.3V	17	18	GPIO24
GPIO10	19	20	GND
GPIO9	21	22	GPIO25
GPIO11	23	24	GPIO8
GND	25	26	GPIO7

Raspberry Pi A/B
Rev 2 P1 GPIO Header

	Pin No.		
3.3V	1	2	5V
GPIO2	3	4	5V
GPIO3	5	6	GND
GPIO4	7	8	GPIO14
GND	9	10	GPIO15
GPIO17	11	12	GPIO18
GPIO27	13	14	GND
GPIO22	15	16	GPIO23
3.3V	17	18	GPIO24
GPIO10	19	20	GND
GPIO9	21	22	GPIO25
GPIO11	23	24	GPIO8
GND	25	26	GPIO7

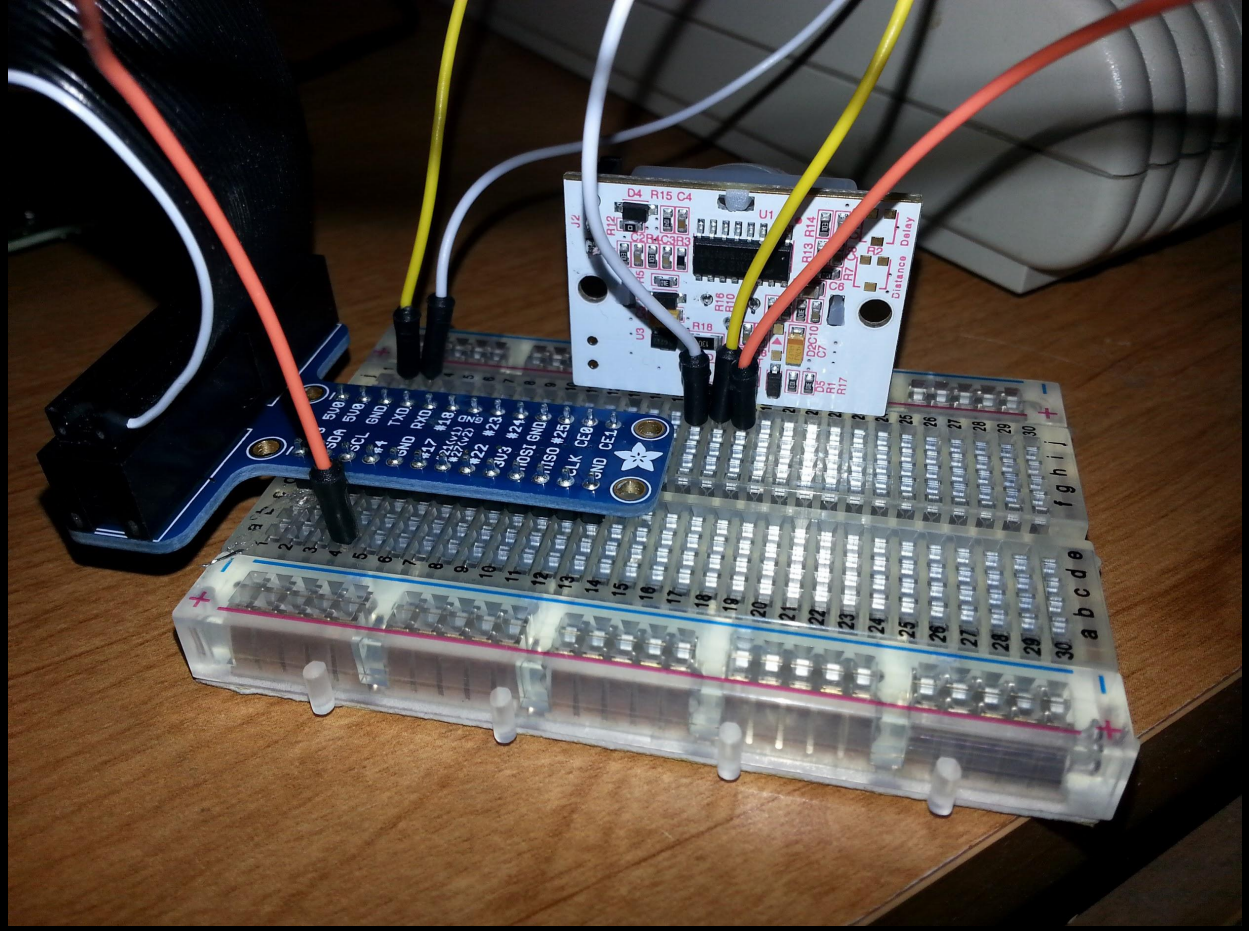
Raspberry Pi B+
B+ J8 GPIO Header

	Pin No.		
3.3V	1	2	5V
GPIO2	3	4	5V
GPIO3	5	6	GND
GPIO4	7	8	GPIO14
GND	9	10	GPIO15
GPIO17	11	12	GPIO18
GPIO27	13	14	GND
GPIO22	15	16	GPIO23
3.3V	17	18	GPIO24
GPIO10	19	20	GND
GPIO9	21	22	GPIO25
GPIO11	23	24	GPIO8
GND	25	26	GPIO7
DNC	27	28	DNC
GPIO5	29	30	GND
GPIO6	31	32	GPIO12
GPIO13	33	34	GND
GPIO19	35	36	GPIO16
GPIO26	37	38	GPIO20
GND	39	40	GPIO21

Key

Power +	UART
GND	SPI
I²C	GPIO

Raspberry Pi GPIO Pin Functions



Breadboard with Pi T-Cobbler and Passive InfraRed Sensor

RPi.GPIO Python Module

- Provides access to GPIO ports on RPi
- http://sourceforge.net/p/raspberry-gpio-python/wiki/Examples/
- Requires sudo to use

Live Demos

- pir_test.py
- pir_cam.py
- security_cam.py

Python and Arduino

“If you are after true real-time performance and predictability, buy yourself an Arduino!”

- Connect Arduino to RPi via GPIO
- Control Arduino via Python over USB
  - PyFirmata - https://github.com/tino/pyFirmata
  - BreakfastSerial - https://github.com/theycallmeswift/BreakfastSerial

For more information (Hardware)

Raspberry Pi

http://www.raspberrypi.org/

Passive Infrared Sensor

http://www.radioshack.com/product/index.jsp?productId=28386046

Pi T-Cobbler Breakout

https://www.adafruit.com/products/1754

Getting Started with Sensors

http://shop.oreilly.com/product/0636920030119.do

For more information (Python)

SimpleCV

http://simplecv.org/

Practical Computer Vision with SimpleCV

http://shop.oreilly.com/product/0636920024057.do

RPi.GPIO module

http://sourceforge.net/projects/raspberry-gpio-python/

My code from this talk

https://github.com/brousch/rpi_python_demo