Saturday at Stevens:
The magic of Computing

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Ye Yang

Rough Schedule

- 0900 - Programming in the world, throwies and the Rasbpi IDE environment
- 1030 Break
- 1040 Help I need somebody in python and LEDs
- 1200 lunch
- 1300 Python Excursions
- 1400 Break
- 1410 Temperature Rising
- 1520 Break
- 1530 Wrapping Up – Continuous Learning
- 1600 Adjourn

Gregg Vesonder
about me

Stevens for 12 years

Penn for 10 years

at&t labs for 35 years

Software Engineering,
Artificial Intelligence,
Human Computer Interaction
Software Design and Architecture

my first dog,
my first computer

Tell me about yourself and your interaction with computers

What is a computer?

What is Computer Science?

Wikipedia

Computer science is the scientific and practical approach to computation and its applications. It is the systematic study of the feasibility, structure, expression, and mechanization of the methodical procedures (or algorithms) that underlie the acquisition, representation, processing, storage, communication of, and access to information, whether such information is encoded as bits in a computer memory or transcribed in genes and protein structures in a biological cell.

wetware

Do you have a smart phone?

What apps do you use?

Japan's Tsunami

blog.salvationarmyusa.org

Fukushima

3 of 6 nuclear reactors melted down

money.cnn.com

Radiation Spread

- Government reported on the spread of radiation
- A 20 kilometer exclusion zone was established
- Citizens were skeptical about the government reports
- Radioactive water was leaking into the ocean

wikipedia

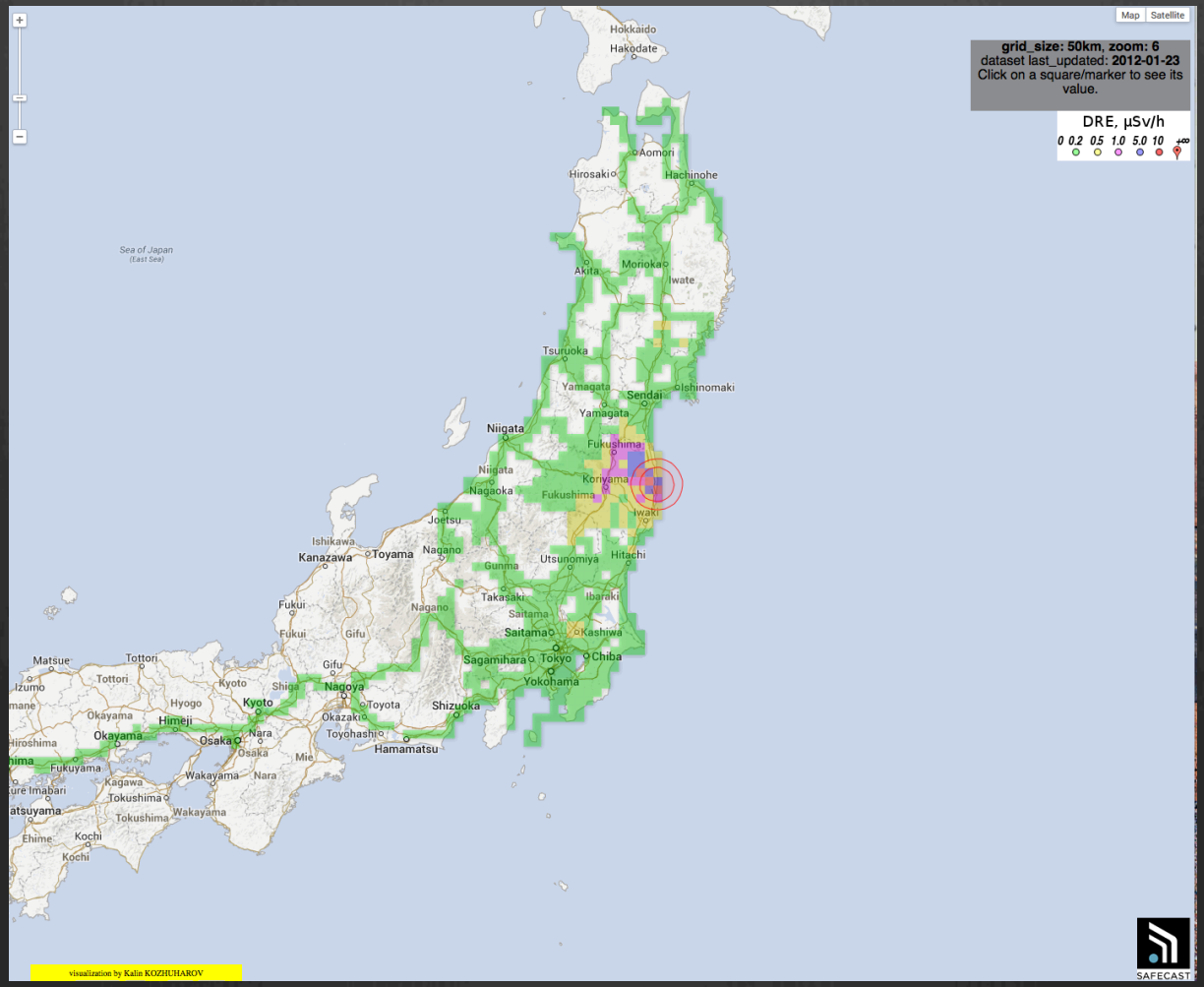
Personal Radiation Detectors

- Citizens needed another way to assess the threat
- Personal radiation detectors emerged built on microprocessor technology
- iPhone Safecast app
- Data placed in repository
- APIs to access data
- Soon citizens were posting their own data

amazon.com

Medcom.com

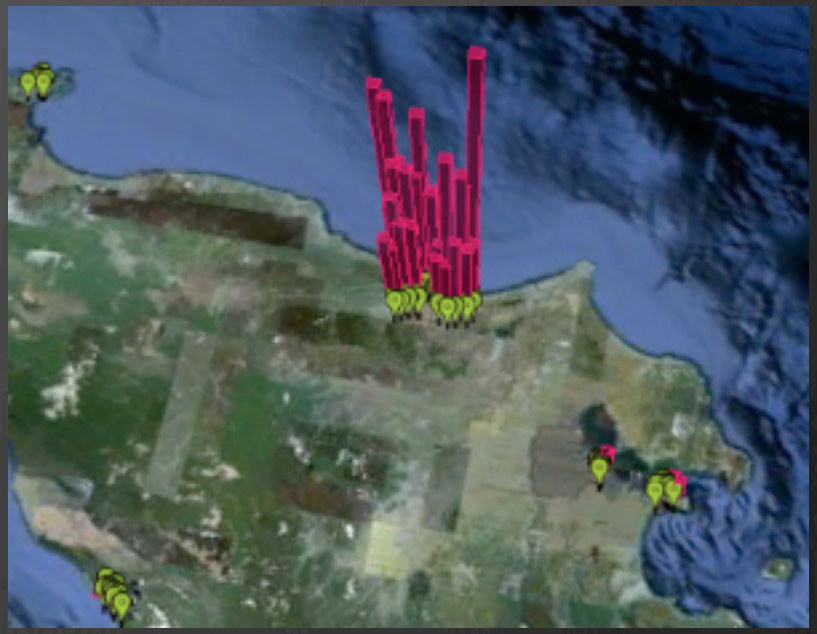
SafeCast Map



http://gamma.tar.bz/maps/main/

Other Maps

- Large number of readings invaluable
- Compared against government produced data
- Compared against their data – calibration is an issue
- Real-time data
- Multiple visualizations



spectrum.ieee.org

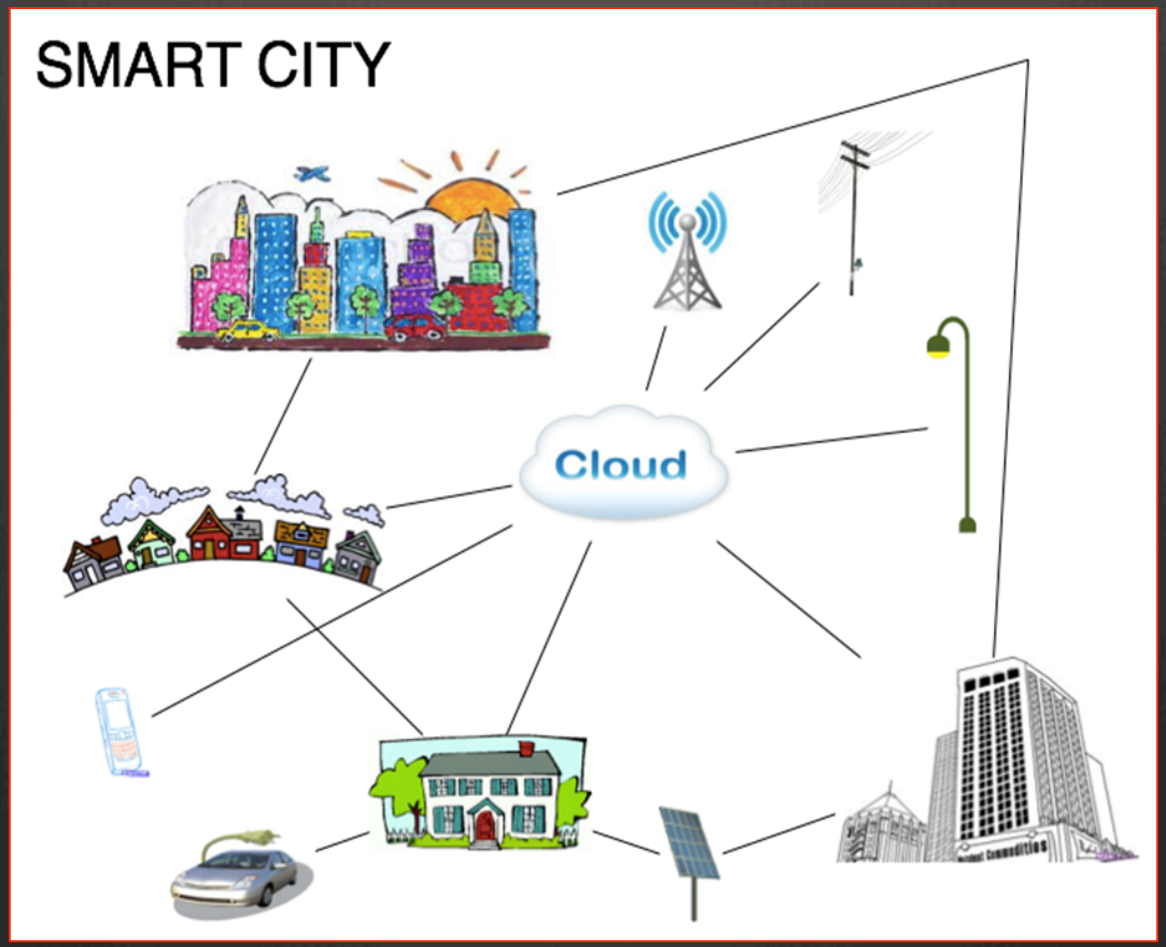
How it works

- People or machines generate data
  - PAN
- Data is transferred to a collecting point
- Data is ordered in some way
  - Database
- Code is written to access the data -> APIs
- Developers use APIs to access data

IoT

- Tagging Things
- Sensing Things
- Shrinking Things
- Thinking Things

Leads to Smart Cities



Cities serving Citizens

- What do you think of when you think of cities?

Issues

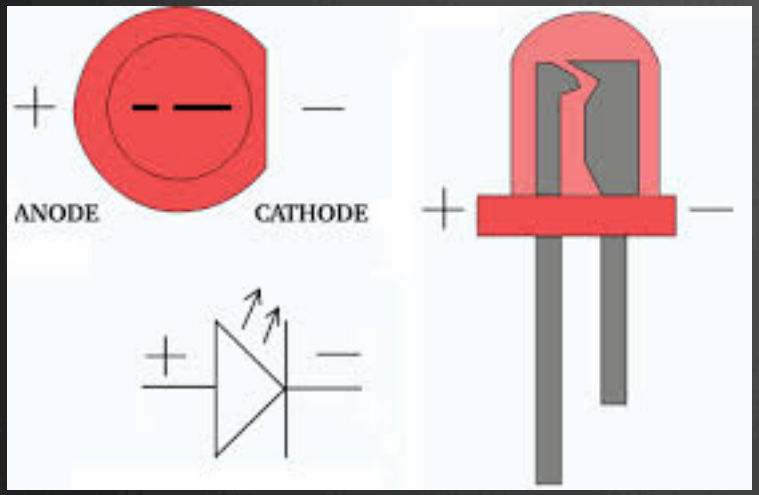
- Power
- Communication
- Calibration
- Security
- Analysis
  - Big Data

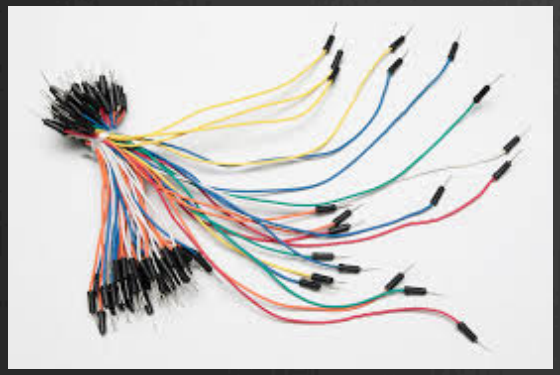
About the LAB

Morse Code

- Long history
- http://www.youtube.com/watch?v=BgeImcOdS38

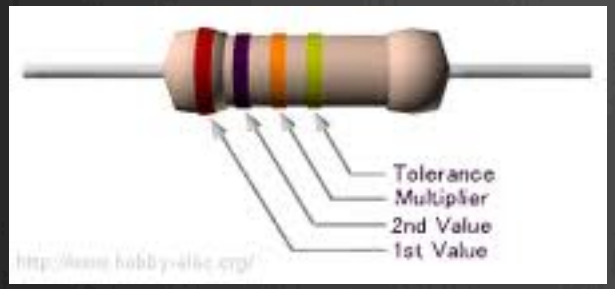
Hardware components

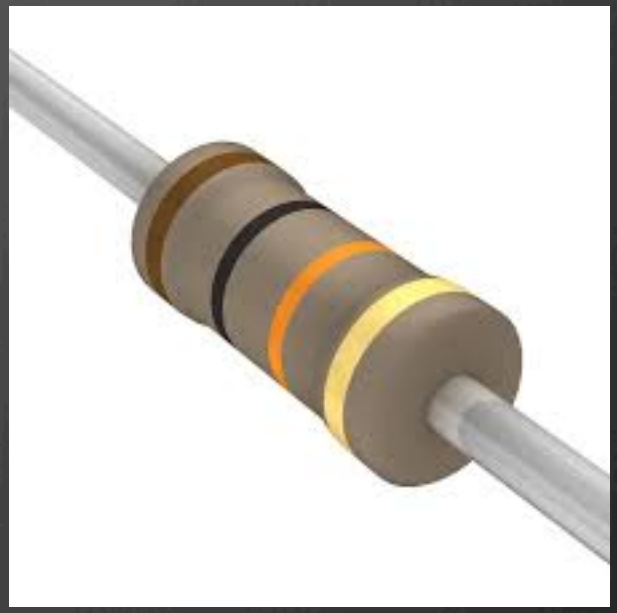


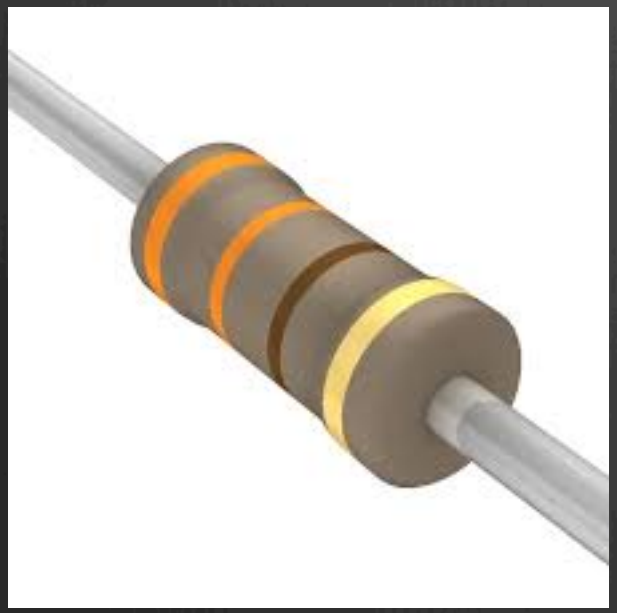


+resistors

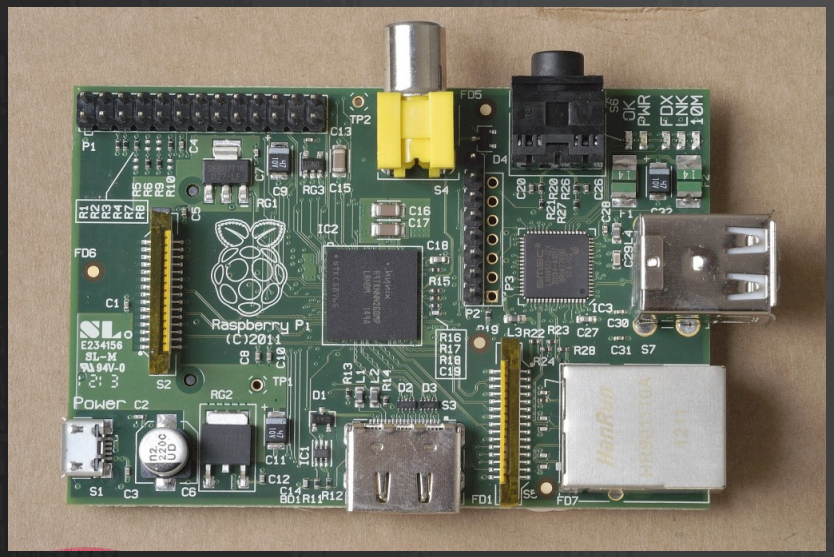
Resistors

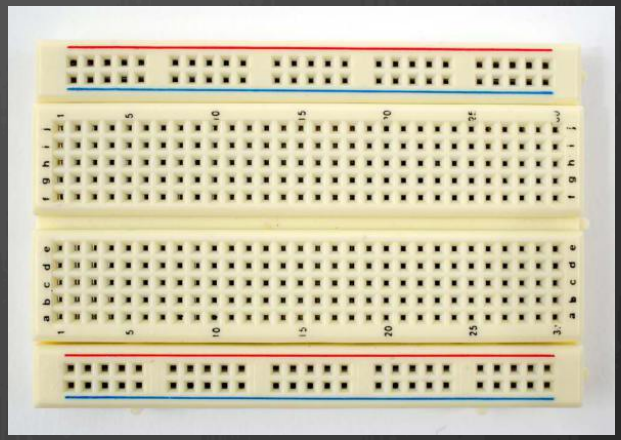


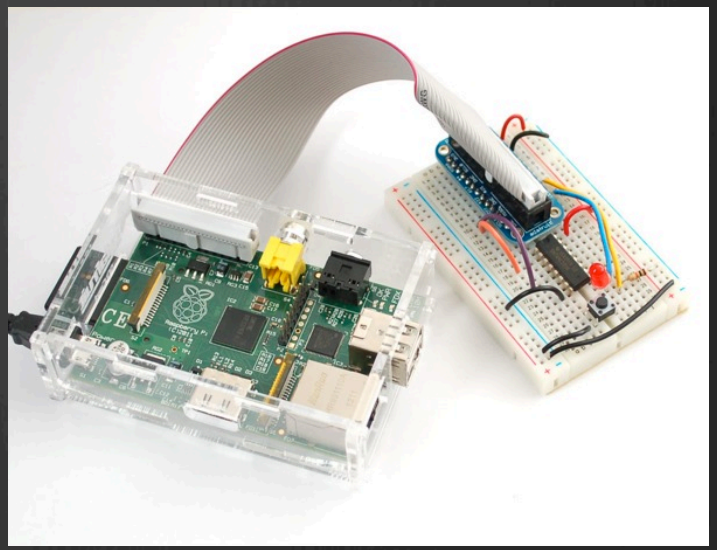




Hardware Platform

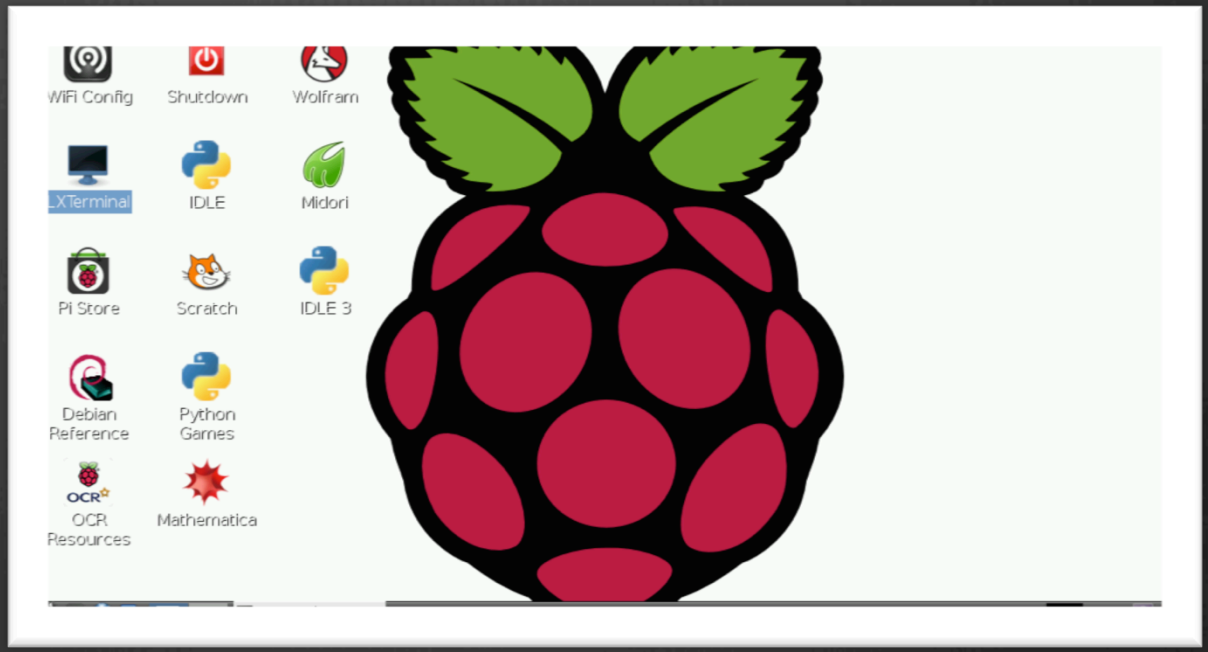






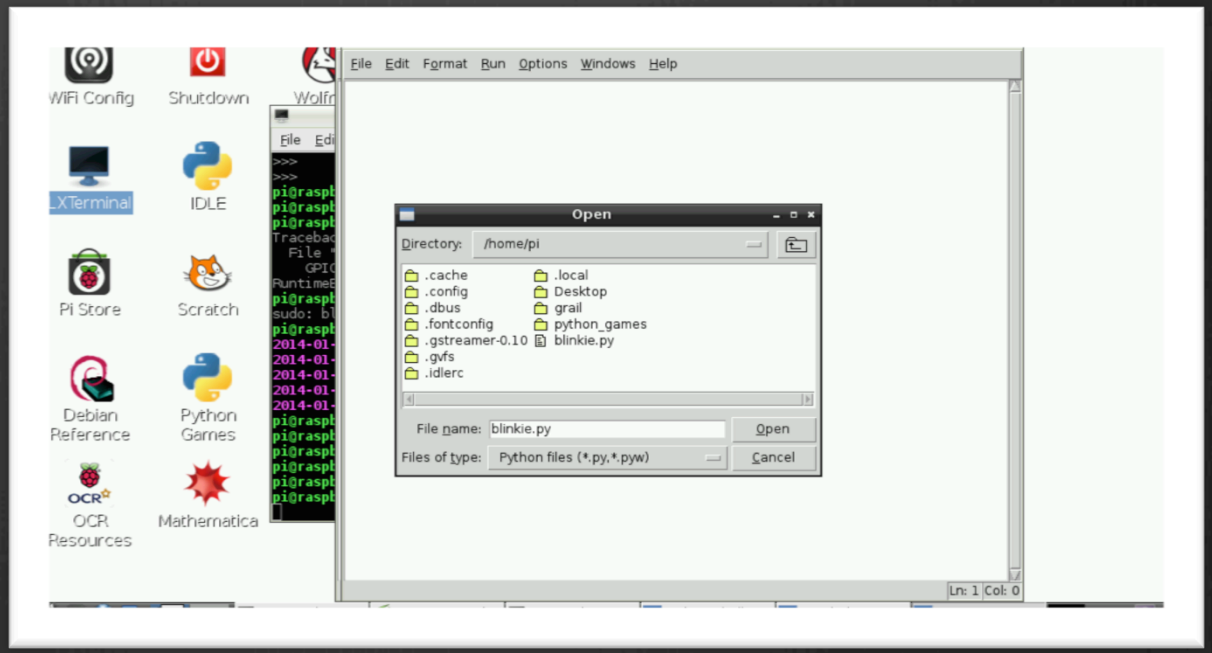
Software Platform - 1

- Linux
- X Windows



Software Platform - 2

- python
- idle (IDE)



Code

- Variables
- Iterators:
  - while (condition):
  - for <var> in :
- Def myFunctionName (myArgs):
- If (condition) :
- True and False
- # is comment indicator

Variables

- Represents a value
- Value can be a string, number(integer, real), boolean (True, False), *pointer*, and more
- Variable names should contribute to understanding
- There is a lot going on behind the scene
  - ASCII for instance
- Examples of variable statements:
  - my_name = Gregg
  - my_age = 63

Fun With Variables

- `name = “Alice”`
- `name[0] in “AEIOU”`
- `name[3]`
- `name = “Gregg Vesonder”`

import

- import is used to add code and therefore capability to the python interpreter
- Two collections of code known as modules in python are:
  - random
  - `import RPi.GPIO as GPIO`
- Note python is case sensitive

loops

- The `for` loop used to do tasks a fixed number of times or to iterate (walk through) a list.
- The `while` loop continues so long as a condition is true
  - `break` can be used to escape from a while loop
- These two loops are very powerful
- Indentation delineates the body of the loop

Fun with Loops

```
while counter < 10:
    print ( str(counter))
    counter = counter + 1
while True:
    if counter >= 5:
        break
```

More Fun with Loops

```
dogs = [“spaniel”, “collie”, “pit bull”]
for dog in dogs:
    print(dog)
for j in range(0,4):
    print(j)

range(0,4)
```

LAB 2

Functions

- Critical part – a way of reusing code
- def name_of_function():

```
def greeting():
        print(“hello”)
def greeting(name):
    print(“hello “ + name)
```

Lists

- Lists are defined using square brackets
- They are addressable and have many uses

```
prices[1.50, 2.75, 56.82]

def add_it(numbers):
    total= 0
    for number in numbers:
        total = total + number
    return total

len(prices)

prices.append(3.39)

1.50 in prices #containment
```

LAB 3

import random

```
import random

random.randint(1,6) # lower and upper bound

cards = [“ace”, “king, “queen”, “jack”]

random.choice(cards)

random.shuffle(cards)

#lots of modules
```

LAB 4

Files

```
#open(file_name, mode - read, write, append)
data_file = open(“my_data.dat”, “r”)\
for line in data_file:
      print(line)
f.close()
attendance_file = open(“SaS.txt”, “w”)
```

Dictionaries

#provides a key value relationship e.g., name- age

person_age = { “gregg” : 63, “alice” : 28}

person_age[“gregg”]

#update

person_age[“gregg”] = 64

#keys have to be unique!

Classes

```
#important a way of representing  common things

#convention to capitalize name of class

Class Greeter(object):

    def hello(self):

        print(“hello”)

    def goodbye(self)

        print(“good bye”)

g = Greeter()

#instantiate an object

g.hello()

g.goodbye()

g2 - Greeter()
```

Classier

```
Class Greeter2(object):
    def __init__(self,name)

    def hello(self):
        print(“hello”)
    def goodbye(self)
        print(“good bye”)
```

Ongoing

- Jessica McKellar videos youtube
- Learn computer languages
- Program
- Learn from others
  - Stack overflow
- Build
- Be curious
- Be creative
- Find your Joy
- aarphacker.com
- vesonder@mac.com