Honey, There is a Python in My Android Phone

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About the Title:

- It was taken from:
  
  *Honey, I have shrunk the kids!*
  
  (1989)

Source:
https://en.wikipedia.org/wiki/Honey,_I_Shrunk_the_Kids
## Android Phone vs 486-DX4

<table>
<thead>
<tr>
<th>486-DX4</th>
<th>Android Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>● CPU: 100 MHz</td>
<td>● CPU: ARM based</td>
</tr>
<tr>
<td>● RAM: 8MB</td>
<td>● RAM: 2GB</td>
</tr>
<tr>
<td>● HDD: 1GB</td>
<td>● HDD: 8GB</td>
</tr>
<tr>
<td>● Size: 0.5m x 0.5m</td>
<td>● Size: Pocket Size</td>
</tr>
<tr>
<td>● OS: DOS 6.22</td>
<td>● OS: Android</td>
</tr>
</tbody>
</table>
Your (Android) Phone

- Is a phone
- Is a computer
- Is a tracker
- You change your android phone every 2 years on average
Old Android Phone

- Few possibilities of EOL (End of Life) Android phone:
  - Throw it away
  - Keep it in the darkest corner
  - Use it again
  - Give it to your parents
  - Program it?
Can We Program an Android Phone?

- Currently available programming lang: Java/Kotlin.
- High learning curve for Java/Kotlin for certain people (I am the one of them).
- Challenging to install other Oses into Android Phone.
Python in an Android Phone?

- These are the comments that I got:
  1. Are you serious?
  2. Can you do that?
  3. This is funny.
whoami

- Chair for PyCon MY 2019
- Co-chair for PyCon MY 2018
- Senior Automation Engineer
The present state of Python

- We can do different things on the OS level
- We can build a webapp
- I/O manipulation, read system information
- For RPI, we can even read/write GPIO pins via Python libraries.
- We can code embedded system through Micropython
Python On Android?

- There are actually some python apps written
- But most of them can execute the python interpreter
- Notable app: Search python on Google Play store
Python On Android

- Most android phones come with rich sensors
- Do we have access to the sensors via Python?
  - Yes. There is
- How?
Once upon a time...

- During Christmas week 2016, I began to think of how to cataloguing my books.
- So I wrote a python library that can return book metadata using ISBN numbers.
- But I need a ISBN barcode scanner.
Google is Your Best Friend

Google search results for "python scan barcode android"

You might want to check: python scan qrcode android

Android barcode scanner in 6 lines of Python code - Matt Cutts
https://www.mattcutts.com/blog/android-barcode-scanner/ 翻譯這個網頁
2009年6月9日 - Android barcode scanner in 6 lines of Python code ..... was working for me, and I figured it was the result of the scanBarcode function call, and I ...

Videos

Build a Mobile App with Barcode Scanner in 5 Minutes
BarcodeScanner with Python
Enaml Native - Android apps in python - Scanning barcodes and
Result from Further Googling

- Android Scripting Environment (ASE)
- Scripting Language for Android (SL4A)

“These scripts have access to many of the APIs available to normal Java Android applications, but with a simplified interface. Scripts can be run interactively in a terminal, or in the background using the Android services architecture...” (Wikipedia)
import android

#https://www.mattcutts.com/blog/android-barcode-scanner/

droid = android.Android()
code = droid.scanBarcode()
isbn = int(code['result']['SCAN_RESULT'])
url = "http://books.google.com?q=%d" % isbn
droid.startActivity('android.intent.action.VIEW', url)
Building the App

- My student (Vincent Liew) and I eventually built a script to scan the book’s ISBN based on that code.
- The script is named “SnapBook”

Note: Feel free to chat with me if you would like to know crazy stories about “SnapBook”.
def get_gravity():
    """ This function generates gravitation acceleration for 2 minutes """
    current_time = int(time.time())
    end_time = current_time + 120

    droid = androidhelper.Android()
    droid.startSensingTimed(2, 25)

    while int(time.time()) < end_time:
        time.sleep(.5)
        s3 = droid.sensorsReadAccelerometer().result
        g_result = math.sqrt(sum([s**2 for s in s3]))
        print("The gravitation acceleration is %.4f" % g_result)

    droid.stopSensing()
Digging Deeper

- How does Python access Android API?
- How accurate is the return data from the API?
- There are few files that worth our attentions:
  1. androidhelper.py
  2. android.py
How Python talks to Android API

#From androidhelper.py:

import android

class Android(android.Android):
    def scanBarcode(self):
        '''
        scanBarcode(self)
        Starts the barcode scanner.
        returns: (Intent) A Map representation of the result Intent.
        '''
        return self._rpc("scanBarcode")
# from android.py
class Android(object):
    def __init__(self, addr=None):
        if addr is None:
            addr = HOST, PORT
        self.conn = socket.create_connection(addr)
        self.client = self.conn.makefile()
        self.id = 0
        if HANDSHAKE is not None:
            self._authenticate(HANDSHAKE)

    def _rpc(self, method, *args):
        data = {'id': self.id,
                'method': method,
                'params': args}
        request = json.dumps(data)
        self.client.write(request+'
')
        self.client.flush()
        response = self.client.readline()
        self.id += 1
        result = json.loads(response)
        if result['error'] is not None:
            print result['error']
        return Result(id=result['id'],
                       result=result['result'],
                       error=result['error'])
How Python talks to Android API

- On Android:

```java
@Rpc(description = "Starts the barcode scanner.", returns = "A Map representation of the result Intent.")
public Intent scanBarcode() throws JSONException {
    return mAndroidFacade.startActivityForResult("com.google.zxing.client.android.SCAN", null, null, null, null, null);
}
```

How Python talks to Android API

```
import androidhelper

your_python_script.py
```

- **androidhelper.py**
- **android.py**

Android intent reads the data from the sensors

Android intent received the request

Request

Response
APIs that Python can Access

- Accelerometer
- Gyroscope (Orientation)
- Location
- Wi-Fi
- Bluetooth
- SMS
- Phone-call
- etc

note: The version of App that you download from PlayStore has limited privileges.
Qpython and SL4A

SL4A Script Launcher
Ken Fehling  Tools

Contains ads
This app is compatible with your device.

QPython3 - Python3 for Android
River Yan  Education

Contains ads
This app is compatible with your device.
Starting Point: QPython

- 千里之行，始於足下
- QPython is an open source APK that allows running Python and accessing Android native APIs (a Python fork from SL4A)
- Currently 2.7 and 3.6
- SnapBook was built based on 2.5 or 2.6
- import androidhelper
QPython: Traffic Logger

Ingredient: androidhelper + flask + vue.js

This is my Leaflet Page

Current Location (lat, lon): 3.199881, 101.719749
Demo time:

- Read orientation from Android phone
- Ingredient: androidhelper + babylon JS + flask
Demo time:

- Send/Read SMS from phone via Web endpoint
- Ingredient: Bottle + androidhelper
Reference

- https://github.com/damonkohler/sl4a/blob/master/python/ase/android.py
Questions?
Thank you