

Honey, There is a Python in My Android Phone

Ing Wei, Tang (James)

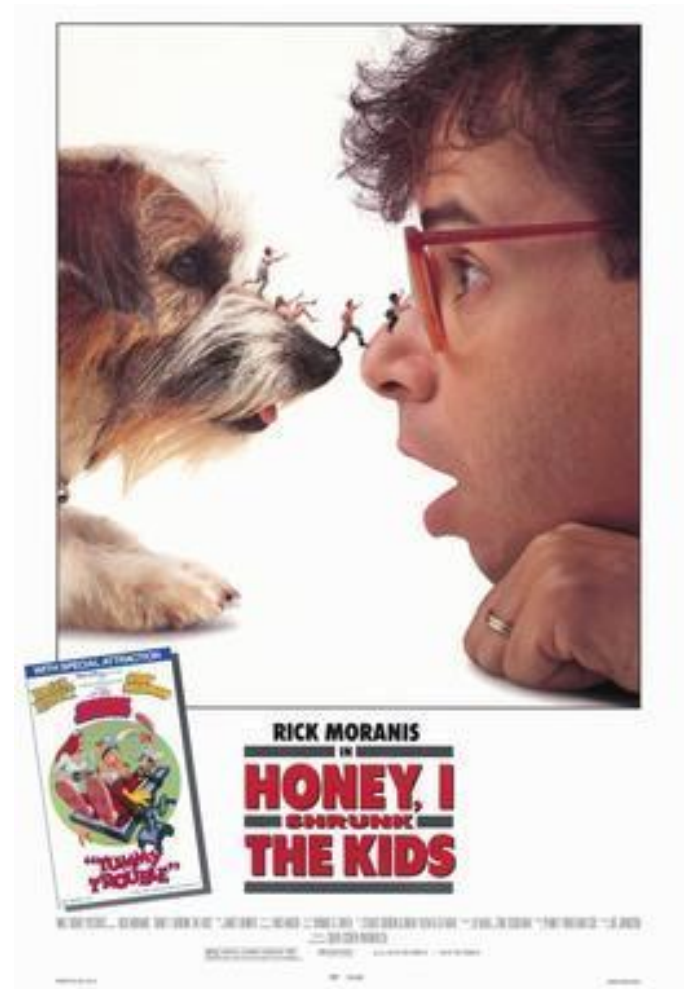


PYCON
TW19

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

486-DX4

- CPU: 100 MHz
- RAM: 8MB
- HDD: 1GB
- Size: 0.5m x 0.5m
- OS: DOS 6.22

Android Phone

- CPU: ARM based
- RAM: 2GB
- HDD: 8GB
- Size: Pocket Size
- OS: Android

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 comes 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



約有 8,890 項結果 (搜尋時間：0.52 秒)

您是不是要查：[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 ...

影片



[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)

Copy and Paste

```
import android
```

```
#https://www.matcutts.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".

How do we get started?

```
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")
```



self._rpc???

How Python talks to Android API

```
#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+'\n')
        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

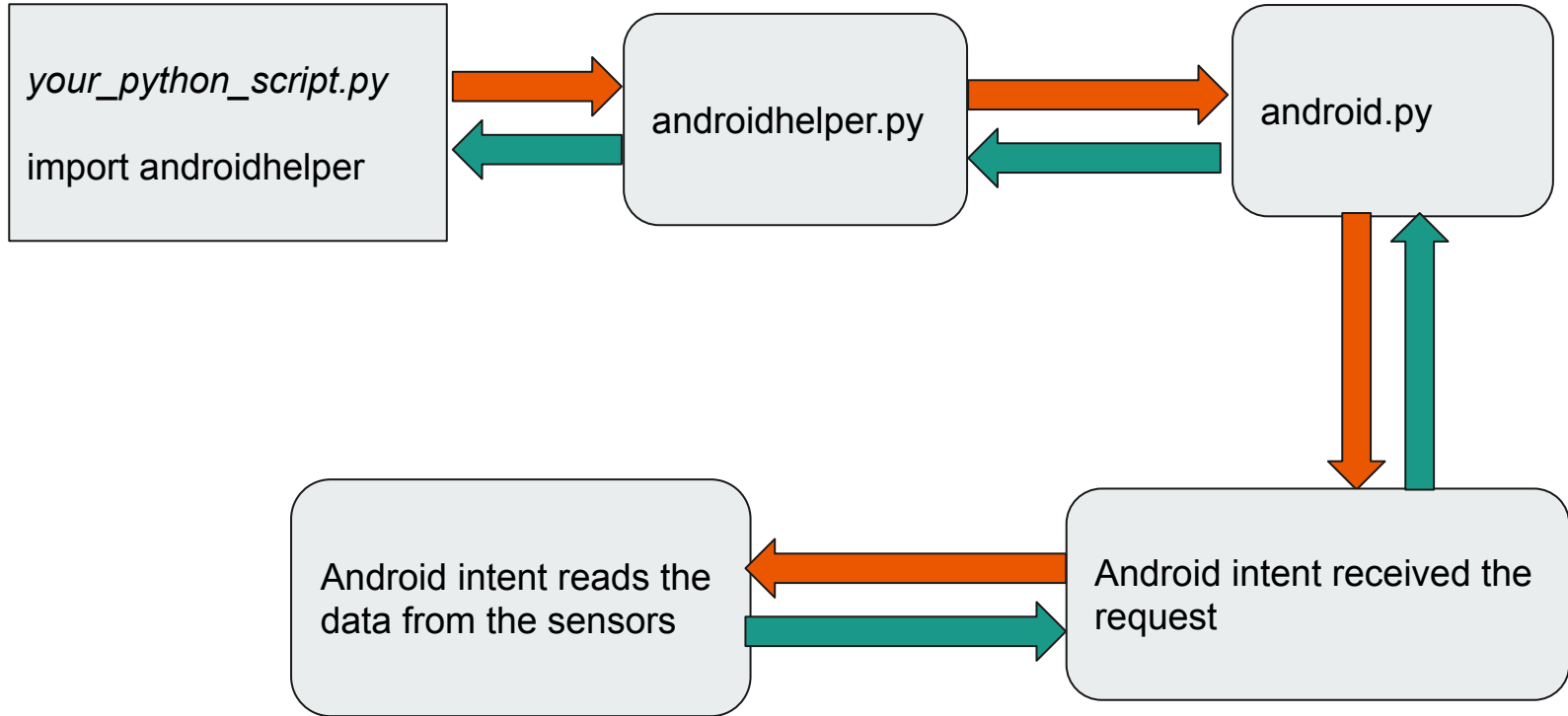
- On Android:

```
@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);  
}
```

(source:

<https://github.com/qpython-android/qpython/blob/master/qpysl4a/src/main/java/org/qpython/qs14a/qs14a/facade/CommonIntentsFacade.java>)

How Python talks to Android API



➡ 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

3+

Contains ads

 This app is compatible with your device.



QPython3 - Python3 for Android

River Yan Education

★★★★☆ 3,842

3+

Contains ads

 This app is compatible with your device.

Installed



Starting Point: QPython

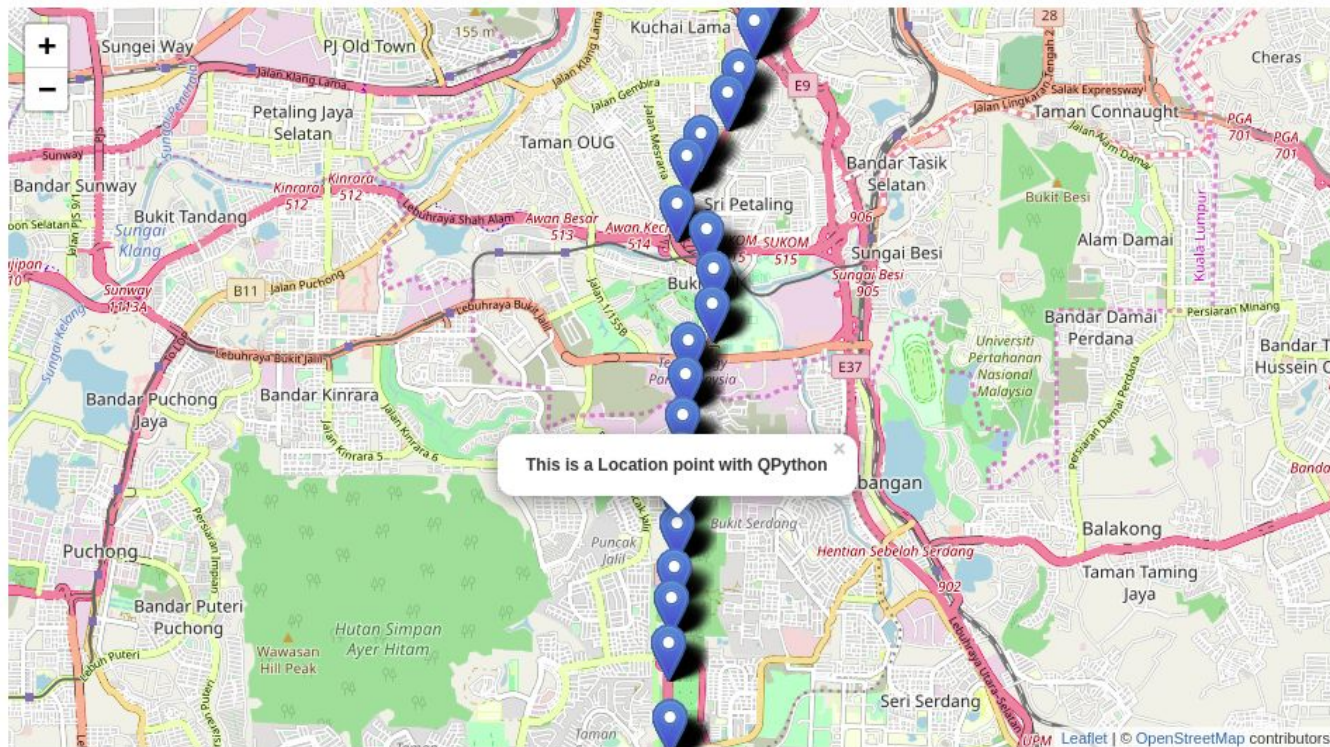
- 千里之行，始於足下
- QPython is an open source APK that allows running Python and accessing Android native APIs (a Python fork from SL4A)
- Currently 2.7 and 3.6
- SnapBook was built based on 2.5 or 2.6
- `import androidhelper`

QPython: Traffic Logger

Ingredient: androidhelper + flask + vue.js

This is my Leaflet Page

Current Location (lat, lon): 3.199881, 101.719749



Get Location

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

- [http://www.qpython.org/en/guide_libraries.html#android helper-apis](http://www.qpython.org/en/guide_libraries.html#android_helper-apis)
- [https://github.com/isislovecruft/android-locale-hack/blob /master/androidhelper.py](https://github.com/isislovecruft/android-locale-hack/blob/master/androidhelper.py)
- [https://github.com/damonkohler/sl4a/blob/master/pytho n/ase/android.py](https://github.com/damonkohler/sl4a/blob/master/python/ase/android.py)
- [https://github.com/qpython-android/qpython/blob/maste r/qpysl4a/src/main/java/org/qpython/qs4a/qs4a/facade /CommonIntentsFacade.java](https://github.com/qpython-android/qpython/blob/master/qpysl4a/src/main/java/org/qpython/qs4a/qs4a/facade /CommonIntentsFacade.java)

Questions?

Thank you