

Mobile Phone Programming for Multimedia

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ABSTRACT

This paper presents an overview of a compact hands-on tutorial, which introduces a novel way of creative mobile phone programming for multi-media that is easy to learn and fun to do. Pedagogically fine-tuned, it teaches the programming of a large set of mobile phone features including camera, accelerometer sensor for gesture based interfaces, sound, video, messaging, telephony, location, Bluetooth, graphics, Wi-fi, GPS and networking. Developing applications on the mobile platform was time consuming in the past and required a steep learning curve. Also, mobile platforms have often been closed or were too restricted. Mobile Python, also known as ‘Python for S60’ - in short PyS60 - offers a crucial turning point here. It provides a Python execution environment on the mobile phone. Nokia Research developed PyS60 as an Open Source Project [9] starting from 2004. It allows developing mobile applications even by novice programmers, artists and people from the creative communities. In a matter of days, people can build powerful applications based on their own ideas and contribute them to the mobile space.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education - *Computer science education, Curriculum, Self-assessment.*

General Terms

Design, Experimentation, Human Factors.

Keywords

Mobile Python, Tutorial, Python for S60.

1. INTRODUCTION

The mobile space and the internet are rapidly converging and are turning into a rich source of opportunities. There exists a need for research and innovation in this field. Whether you want to create new types of mobile applications including novel interfaces, innovative interaction concepts and client-server solutions, many

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MM’08, October 26–31, 2008, Vancouver, British Columbia, Canada.
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of such applications can be created in a fast and efficient manner using Mobile Python. See video demos at <http://www.mobilenin.com>. Some projects have been reported also to the Research community such as e.g. ‘MobiToss [4], ‘Manhattan Story Mashup’ [5] or ‘MobiLenin’ [2].

2. TUTORIAL OUTLINE

The tutorial is tailored for MM ’08 and is based on the book Mobile Python [3], its website example code snippets [10], as well as on a Python for S60 online tutorial created by Scheible [6]. During the tutorial participants get an introduction and practical hands-on experience on how to program powerful mobile applications in an easy and fun way with PyS60.

- Introduction to PyS60
 - A trigger for innovation and a toolkit for rapid prototyping
 - Feature overview and demo examples
- Hands-on session
 - GUI programming, SMS sending/receiving
 - Text to speech, Sound recording/playing, Midi
 - Camera (taking photo & video), 2D Graphics, OpenGL ES
 - Bluetooth, Keyboard key programming, Video playing
 - GPS location reader
 - Networking, HTTP, HTTPS, Socket communication, WLAN
 - Motion sensor (e.g. for gesture based UI’s)
 - Client-server applications

Prerequisites. Participants need some basic programming or scripting knowledge (like JavaScript, Lingo, Flash AS, ...). No Python or mobile platform knowledge is needed.

Teaching approach. Through a hands-on approach, participants are first introduced to some code snippets, and then use their computer to write the Python code in form of a script. The script is then moved to the phone for instant testing. This provides strong feedback and high motivation for learning.

3. WHAT IS PYTHON FOR S60

Python for S60 (PyS60) brings the Python programming language [7] to the S60 Platform, which is Nokia’s smartphone platform based on Symbian OS [8]. By installing a freely available Python interpreter to the phone, Python scripts can be executed, providing access to many API’s of the smartphone. The PyS60 interpreter

software can be downloaded at <http://sourceforge.net/projects/pys60>.

PyS60 is easy to learn and makes development of mobile applications fast with completely free and open tools and by reusing open source code modules. It makes rapid prototyping efficient by wrapping complex low-level technical details behind simple interfaces. And above all - it makes programming on the mobile platform fun. Many Universities, research projects and companies around the globe have adopted PyS60.

Simple code example. The following four lines of code build a fully working script that continuously reads the accelerometer sensor data and prints the x, y and z axis values (range -50 to +50) to the screen while you move or turn the phone (figure 1):

```
import xyz
def read_xyz(x, y, z):
    print x,y,z
xyz.connect(read_xyz)
```

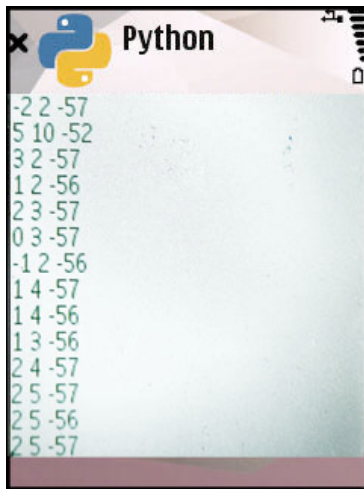


Figure 1. Screenshot of accelerometer sensor data printout

User driven innovation. When running workshops in many places and countries using this tutorial, it was observed that many people innovate instantly, they create unique and novel applications based on their own ideas fulfilling their own needs and they want to share their innovation. This observation matches well with Eric von Hippel's theory of user driven innovation [6]. He talks in his book about Democratizing Innovation and the phenomena that users can generate innovation if a toolkit is given into their hands. He calls this distributed innovation by so called Lead users. This raises the question whether Mobile Python as a toolkit could lead into an era of 'democratizing innovation on the mobile platform'?

The vision. Wouldn't it be great to see a big garden full of beautiful flowers, each representing a novel mobile application created by a lead user, fitting her own needs? The Message to all the creative and innovative people out there is: Use your talent, skills, ideas and energy to inspire the world!

Further readings. For those interested in boosting their knowledge on mobile phone programming for multi-media, based on the approach of this tutorial, there is a book available with the title 'Mobile Python – Rapid prototyping on the Mobile platform' [3]. There are many books available that teach the programming language Python [1].

4. SPEAKER'S BIOGRAPHY

Jürgen Scheible is a music and media artist. He is a doctoral student at the Media Lab, University of Art and Design, Helsinki where he runs the Mobile Hub, a prototype development environment for mobile client/server applications with a strong focus on artistic approaches and creative design. He spent several months in 2006 as a visiting scientist at MIT, CSAIL, Boston and worked previously for Nokia for 8 years. In 2006, 2007 and 2008 Jürgen was recognized as a Forum Nokia Champion for his driving vision to be a bridge builder between art, engineering and research. He is internationally active in teaching innovation workshops on rapid mobile application prototyping in academic but also professional settings e.g. at Stanford University, MIT, NTU Taiwan, Yahoo Research Berkeley, Nokia. He was one of the ACM Computers in Entertainment Scholarship Award winners in 2006 and Best Arts Paper Award winner at ACM Multimedia 2005 conference. His research focuses on designing multi-modal user interfaces for creating and sharing interactive artistic experiences.

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