The Impact of Mobile Computing on ICT Enhanced Interdisciplinary and Multidisciplinary Applications

ICT - Mobile

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Introduction

Mobile computing boosts the markets dramatically

- According to the Apple company, more than 40,000 apps can be downloaded from Apple Store. The company announced that the price has been set up for $25 billion in the application store from 2008 to 2012 [1].

- Hardware devices from PDA, tablets to iPod/iPad/iPhones, and other makers of Smartphone;

- Software applications from WAP/WML to J2ME, iPhone SDK/XCode, Google Android, Window phones, etc.

- Services from single device based to iCloud environment [2]. The files with large contents, such as photo streams, can be stored wirelessly free.
Academic publications on Smartphone technology have been increased significantly since 2001. (sciencedirect.com, accessed on 3 November 2013).
Mobile Computing vs. ICT

- Smartphone technology brings scientists together from a number of areas, e.g.
  - Information science,
  - Computer science,
  - Software engineering,
  - Physics,
  - Electronics,
  - Communication,
  - Etc.

- into the domain of mobile computing that is traditionally dominated by the electronic engineering with strong physics and communication background.

The Third International Conference on Advanced Communications and Computation,
Thereafter, with rapid growth of Smartphone technology, a number of topics are introduced and integrated into the mobile computing, e.g.

- Artificial Intelligence,
- Business workflow,
- Agent technology,
- Advanced graphic animation,
- Multimedia interactions,
- Games,
- Ubiquitous accessibility,
- Complex distributed systems, cloud computing,
- etc.

Mobile Computing vs. ICT

- The impact is not just revealed by the technology itself but also involved by a huge number of users from all over the world.

- A typical example, game apps that are developed in the following major operating systems:
  - Microsoft Windows phone,
  - Google based Android phone,
  - iOS based iPhone, iPad/iPod touch, etc.

- Especially, the serious games have been used in a large number of educational markets for the purposes of learning and training [3], i.e. learning for fun, inspiration with a touch on the screen.
The platform of Smartphone technology is so easy to be adopted by the developers, especially for those who have a background in computing science and software engineering, e.g.

- Use a language, Objective C with Xcode,
- Apply XML looking lineout,
- Integrate with advanced adobe development packages,
- Deploy advanced graphic features,
- Embed Database programming,
- Enable network connections,
- Equip location navigations,
- Reduce the time of learning, in comparison with traditional development platform, e.g. Java, C++, and a set of Microsoft development environment, etc.

Thus, there is a great potential to integrate almost all the ICT required facilities for the users, e.g. WIFI network connections, Internet, Data management services for the local and remote access and retrieval, and security measures.
Mobile Computing vs. ICT

Considering:

- **Context awareness:**
  - when you are using Smartphone

- **Environment awareness:**
  - when you are using less natural materials

- **Security:**
  - be aware the data integrity, confidentiality and authentication, especially for an online banking.
Mobile Computing vs. ICT

Information resources

Service Providers

Network

Internet or HTTPs

3G, 4G, 5G, ...

WLAN

Wireless Router

Clients

3G, 4G, 5G, ...

iPhone

Android

Windows Mobile

iPad/iPods or tablets, etc.

PDA

Consumer Electronics

Laptop

XML, Database and Information Retrieval
Mobile Devices
Response Technology

Global data management system
XML, Database and Information Retrieval

Subtopics

S – subject

i, j, k – subject index

\[ D = \sum_{j=1}^{m} \left[ T_j \supset \sum_{i=1}^{n} \left( S_i \supset \sum_{k=1}^{l} P_k \right) \right] \] [3]
Response Technology in the Framework

Trigger <-> Receiver systems

Response technology is one of the key components in ICT enhanced mobile applications. It links data/information to the communications between human and computers through the mobile devices. It collaborates the network and services with users. It performs instructions from users to the machine/devices and sends the feedback from machines to the users, e.g. between:

- Customers and Business,
- Patients and Doctor,
- Employees and Employer,
- Clients and Solicitor,
- Learners and trainer,
- Residence and police,
- Passengers and airport
- Etc. for any other communication channels.

It follows that the “response” produces the data, as the foundation of information that could be analysed to discover the new knowledge to the subjects or events involved.
Response Technology in the Framework

It has a simple security measure, e.g. authentication for accessing the systems.
Response Systems embedded in the cloud environment

Global Architecture for the response systems

Three major components:

- Business services
- Database architecture
- Information management

(Drawn by Wei Guo)
The workflow for the response system

(Drawn by Wei Guo)
The first generation of mobile response system that has been used in some universities and industrial training courses.
Response Technology in the Framework

Current mobile response system

Response Technology in the Framework

Example in learning physics

Reference to UK GCSE past paper (http://www.wjec.co.uk/) (tested by Z. Meng)

Response Technology in the Framework

✨ Example in learning mathematics

Reference to UK GCSE past paper ([http://www.wjec.co.uk/](http://www.wjec.co.uk/))

(Tested by Z. Meng)
Response Technology in the Framework

Internationalization

Currently Arabic language has been implemented, Italian, Romania, Malaysian and other languages are on the way.

(Tested by Z. Meng)
Response Technology in the Framework

The system is implemented for the native Arabic speakers.

Reference to UK GCSE past paper ([http://www.wjec.co.uk/](http://www.wjec.co.uk/)) (Tested by Z. Meng)
The impact on the real world

“the possibilities for using mobiles to engage learners are endless”. (Emma Drury, Guardian Professional, Monday 10 September 2012 16.00 BST)
The impact on the real world

Examples of Mobile related applications

The areas of the apps involved

- Web-based Apps Number
- iOS-based Apps Number
- Android-based Apps Number

The impact on the real world

Engineers were using the response system.

(Provided by EU Edumecca project consortium)

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.
The feedback from young users (Provided by EU Edumecca project consortium) [4]
The impact on the real world

Classroom in the University of Huddersfield
(provided by XDIR research group)

More projects on the response technology

- **Mobile Exam System** – MES
  - with EU lifelong learning project
- **Wireless Response System**
  - SRS 2G with Social science
- **Mobile Lab Mate** - MLM
  - with Bioscience
- **Mobile Occupational Therapy** – MOT
  - with Healthcare
- Etc.

More on the response technology

Mobile Exam System
A mobile assessment tool – It is dedicated to the use that makes life easier for instructors in a wide range of subject areas.

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More on response technology

Mobile Occupational Therapy System

This system is designed to enable a conversation between the professional therapist and his/her patient at anywhere and anytime.
Challenges

- User oriented approach
  - Simple
  - Easy to use
  - Fast
- Login -> press -> go
Modern mobile computing cannot be isolated from complex network distributed systems, and information retrieval systems when the data are captured from devices or sensors.

THUS, there is an integrated corresponding relationship:

- Information retrieval,
- Mobile devices for communication
- Response technology

With the support of above knowledge, the research can be extended into a wide range of application areas e.g. business, logistics, engineering, healthcare, social science, e.g. psychology, behaviour science, etc. and other research interests, e.g. information/knowledge mining, complex distributed systems/cloud computing, Internet of things, etc.
Thanks.

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References


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