Mobile Applications Overview

21W.780 – Class 1
February 6, 2007
Frank Bentley

Overview

Why Mobile?
Mobile Devices
- Operating systems
- Mobile Technologies
- Motorola v3x

Mobile Programming
- WAP/HTML
- J2ME
- Native Development

Mobile Applications
- Location/Context Aware
- Ambient Communications
- Media Consumption
- Games

Why Mobile?

World becoming mobile

Need for information on the go

Access to rich context (e.g. location, contact list, etc.)

Mobile devices are becoming people's:

- **Cameras**
- **MP3 Players**
- **E-Mail apps**
- **Web browsers**

Rich networked computer always with you

In developing world, often the only computer people have access to

Mobile Devices – what's out there?

Series 60
- Mostly Nokia phones
- Mostly in Europe
- Rich, open SDK in C++

Windows Mobile
- HTC, Motorola, etc.
- Small market share
- Visual Studio based development in C++/C#

Linux
- Motorola EzX and Linux-Java phones
- Mostly in Asia
- Linux/C++ development and J2ME platform

J2ME
- Almost all GSM phones in the world
- Java based development

GSM vs. CDMA

GSM

- **Global standard**
- **Phones contain removable SIM cards**
- **Can switch phones just by moving your SIM**
- **In US: T-Mobile and AT&T (Cingular)**

CDMA

- **Mostly US and some networks in India and China**
- **Phone number is tied to physical phone, no removable identity card**
- **In US: Verizon, Sprint-Nextel, US Cellular, Alltel**

MIT M MOTOROLA

Mobile Devices – what can they do?

Cameras – up to 5 MP, stills and full video

Storage – Micro SD cards up to 2GB

Networking:

- EDGE (236kb/s) T-Mobile and AT&T (Cingular) in US
- EVDO (3.1 Mb/s) for CDMA phones - Verizon in US
- HSDPA (6.2Mb/s) AT&T (select cities) in US

Messaging – SMS/MMS/e-mail/IM

Bluetooth – Short-range p2p communication (~10m)

WiFi – Mid-range communication (p2p or infrastructure)

Location – GPS or Cell-ID to determine location

MIT M MOTOROLA

MotoRAZR v3x

GSM Phone

2.0 MP camera

Large Internal Screen (320x240)

Bluetooth

J2ME programming environment

Location via Cell ID

Removable MicroSD card (256MB, up to 2GB)

AAC+, MPEG4, WMV, WMA, MP3 and Real Video/Audio support

3D Graphics

A mobile networked computer…

Mobile Programming

Many ways to create applications that can be accessed from a phone…

Server based

- **WAP**

Client based

- **J2ME**
- **Native windows/symbian/etc.**

WAP/HTML

Phone has full HTML browser so you can just make a "standard" web application

Pros:

- Most commonly programmed in java servlets, perl, etc.
- Requires no special software on the phone/less complicated development
- Can debug logic (not layout) on a desktop web browser

Cons:

- Cannot interact with phone functionality (e.g. take a picture, send something to another phone over bluetooth, get location, etc.)
- UI very limited by HTML spec compared to native programming

MIT **MOTOROLA**

J2ME

Java Programming on mobile devices

Subset of the Java language

Develop stand alone applications in java, installed onto the phone

Pros:

- Can develop and emulate on any Windows box
- Can make rich user interfaces
- Can interface to most phone functionality

Cons:

- Must sign applications to get all useful APIs
- Applications suspended when interacting with other phone functionality

MIT **MOTOROLA**

Linux/Symbian Development

Creating stand alone phone applications in C++ that can be installed on the phone

Pros:
- Have much more control over all phone functionality, system events, etc.
- Can make very rich UIs using QT/Symbian APIs
- Can leverage existing Linux/C++ code
- Increased battery life

Cons:
- Emulation and documentation scarce
- Debugging difficult
- Much lower level abstractions (cell ID example)
- For Motorola Linux, need to sign more restrictive NDAs
- Smaller install base of users

MIT   **MOTOROLA**

Challenges in Mobile Applications

Designing applications for a small screen with minimal interaction inputs that are different on every phone
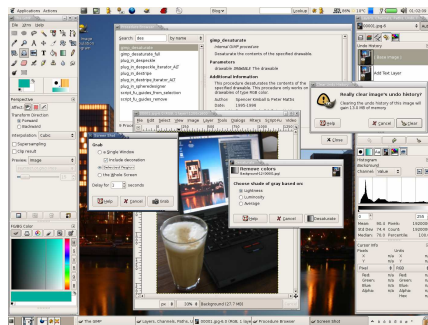
VS.

Data is expensive – different plans

Battery Life (~8 hrs when running applications)

MIT   **MOTOROLA**

Open Research Areas

Many areas of active research in mobile space…

Location/Context Aware
Exercise/Healthcare
Emerging Markets
Ambient Communications
Mobile Gaming
Accessibility

and many, many more…

MIT **MOTOROLA**

Location/Context Aware Mobile Apps

Reno (Intel) – explicit location requests to social network

Place Its (UCSD) – putting virtual post-it style notes in places, reminders when you enter or leave that place

ComMotion (Media Lab) – location-based info services and reminders

Motion Presence (Motorola) – augmented phone book that shows when your close friends/family are moving or stationary
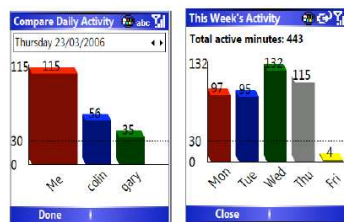
MIT **MOTOROLA**

Exercise/Healthcare

Houston (Intel) – Pedomoter-based application to inform others of your physical activity/motivate exercise

Shakra (Glasgow) – Informing others of how long you have been active on a given day using GSM Cell ID to determine motion

---

Emerging Markets

CAM – used to help automate micro-finance in India

Ambient Communications Applications

Watch Me (Media Lab) – watch based mobile phone interface for close social group location/activity awareness

Vetere (Melboune) – "intimate" interfaces, sending emotions through mobile technology

Perceptive Presence Lamp (AI lab) – activity/location awareness through color

Monkey Business (Media Lab) – activity awareness through animatronic motion

 Ruug (CMU) – lightweight communication/awareness through a living room rug
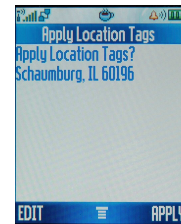
MIT ⓜ *MOTOROLA*

Mobile Imaging

ZoneTag (Yahoo!, Motorola Client) – upload photos to Flickr with tags for your current location and things around you

Push to View (Motorola Labs) – sharing and discussing photos while in a conversations

Mobile Multimedia Metadata (UC Berkeley) – annotating photos based on location (shared annotations from other's tags from that place)

Music and photo use studies (HP, Motorola, Stanford, etc.) – ethnographic studies into how people use music and photos today; what are the key tasks that people wish to perform; etc.

MIT ⓜ *MOTOROLA*

Mobile Gaming

Networked, location-aware in world gaming

Picking Pockets (Glasgow) – augmented reality game with
WiFi hotspots used as goals

Next Steps…

Think about applications you'd like to implement

Share Ideas with class

Form groups

Fill out forms for selection process

**We'll let you know by tomorrow if you are in the class. You
can pick up phones from Ed's office.**

**If selected, please get a SIM/data plan immediately (info on
class web site)**   **http://web.mit.edu/21w.780/www/spring2007**