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CMSC436: Programming Handheld Systems
Handheld Systems & Their Applications
Some Statistics

More people own handheld devices than own toothbrushes

10x+ more phones than PCs sold each year

More people access Internet via phone than via PC
Are Handheld Devices Different – Viewpoint #1

Handheld Device == Small Computer
Computers keep getting faster, lighter, cheaper & more powerful
Handheld devices are just another stage in this evolution
1960’s : Mainframes
1970’s: Minicomputers
1980’s: PCs
Early-1990’s : Laptops
Mid-1990’s : PDA’s
Today: Smartphones & Tablets
Tomorrow?
Are Handheld Devices Different – Viewpoint #2

But...
Handheld Device Characteristics

Small, portable, battery-powered
Accept touch, audio, light & radio input
Sensor-enabled
  Location, direction, motion, light & proximity
Characteristics

Networked

WiFi, cellular telephony & Bluetooth

Truly personal

Rarely shared (even among family members)

One study reported that 7/10 people sleep with their phone within arm’s reach
Challenges

Limited resources
  CPU, memory, battery, I/O bandwidth
Limited screen space & varied form factors
Diverse context of use
Different activities & usage patterns
Limited user attention
Limited Screen Space

Traditional webpages are designed for large screens

- On mobile device displays operations are more difficult
- Hard to select small objects
- Typing is slow & difficult

May need to spread content over multiple screens

Summary Thumbnails
[Lam et al., 2005]
Varying Form Factors
Diverse Usage Context

Indoor vs. outdoor settings
Light & climate
Private vs. public settings
Different Usage Patterns

Handhelds do different things in different ways

- Highly context-dependent
- Sustained vs. bursty usage patterns – seconds to minutes
Limited Attention

Mobile usage implies multi-tasking
Apps compete for limited mental & physical resources
Summary

Handheld devices are small computers, but…

They are resource-challenged, portable, networked, sensor-enabled, & truly personal

Their apps must be designed for:

Limited resources, unreliable networks, less than ideal usage environments, privacy & security concerns
Next Time

Introduction to the Android Platform