

# CSCE 4623 - Mobile Programming

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## Answer the following four questions:

- What is your preferred name?
- What is your UARK username?
- What does mobile programming mean to you?
- What do you hope to get from this course?

# Introduction

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# Why Mobile Programming?

1.88 Billion Mobile phones sold in 2015<sup>1</sup>

82% of mobile phones are smartphones

Android smartphone market Share = 88%<sup>2</sup>

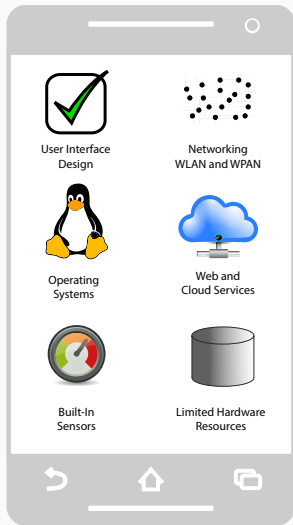
**Put simply, they are everywhere**

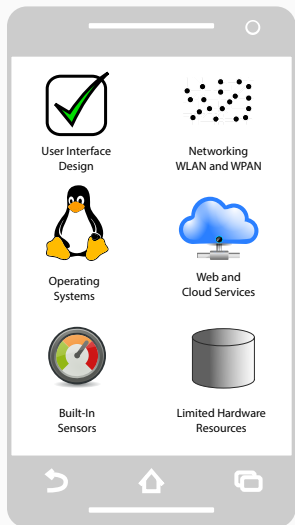
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<sup>1</sup>Gartner

<sup>2</sup>Strategy Analytics

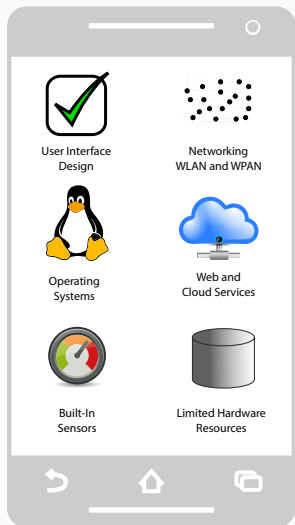
# Why is Mobile Programming Challenging?





## What are the challenges?

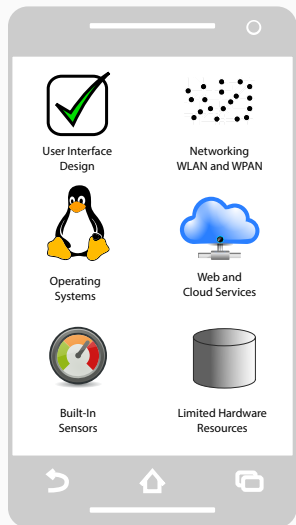
- How do you build the interface?  
(Android: XML and Event Driven)
- How do you interact with the user?
- What about accessibility?



## What are networking options?

- Wide area networks (WAN) e.g. Cellular, Wi-Fi
- Wireless Local Area Networks (WLAN) e.g. Wi-Fi
- Wireless Personal Area Networks (WPAN) e.g. Bluetooth, ZigBee

# Why do we need to know OS?

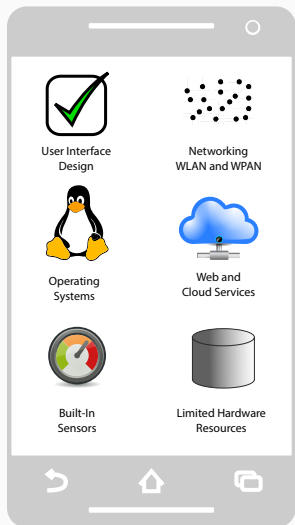


## Example OS Calls

- Reading/writing files
- Interprocess Communication
- Threading



# Accessing the Internet

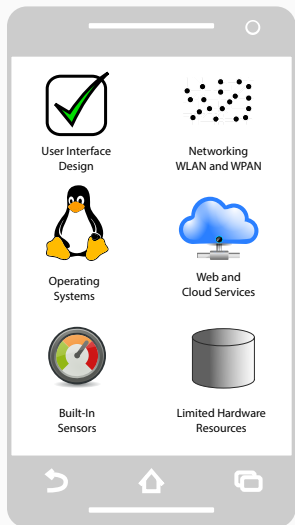


## Vast majority of applications need access to the Internet

These communications are typically standard interfaces

- Webservices (i.e. REST)
- Interfaces (e.g. HTML for webpages)
- Other services (e.g. SSH, IMAP, RDP)

# Sensors enable new technological interaction

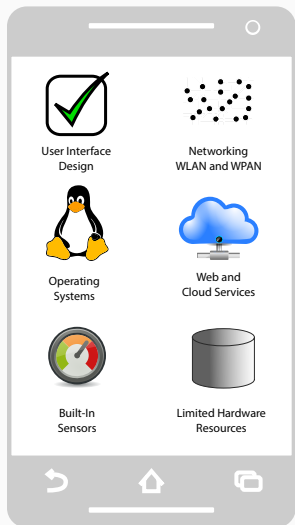


## Enables pervasive computing at personal scale

You are carrying these sensors in your pocket:

- Cameras
- GPS
- Accelerometers
- Microphone

# Phones are still computationally limited



## Example Limitations

- Storage ( $\approx 64\text{GB}$ )
- CPU<sup>†</sup> (67% SC / 36% MC vs. i5)
- RAM<sup>†</sup> (3 GB)

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<sup>†</sup>Comparisons for iPhone 7

# Phones are still computationally limited



## Example Limitations

- Storage ( $\approx$  64GB)
- CPU<sup>†</sup> (67% SC / 36% MC vs. i5)
- RAM<sup>†</sup> (3 GB)
- **Battery**

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<sup>†</sup>Comparisons for iPhone 7

Mobile developers **must consider hardware limitations**

Or the usability of applications will suffer

# Typical phone specification (Galaxy S6)

|                 |             |  |                         |                 |               |   |
|-----------------|-------------|--|-------------------------|-----------------|---------------|---|
| <b>NETWORK</b>  | Technology  | GSM / HSPA / LTE   | <small>EXPAND ▼</small> | <b>COMMS</b>    | WLAN          | Wi-Fi 802.11 a/b/g/n/ac, dual-band, Wi-Fi Direct, hotspot   |
| <b>LAUNCH</b>   | Announced   | 2015, March  |                         |                 | Bluetooth     | 4.1, A2DP, LE, aptX   |
|                 | Status      | Available, Released 2015, April  |                         |                 | GPS           | Yes, with A-GPS, GLONASS, BDS   |
| <b>BODY</b>     | Dimensions  | 143.4 x 70.5 x 6.8 mm (5.65 x 2.78 x 0.27 in)  |                         |                 | NFC           | Yes   |
|                 | Weight      | 138 g (4.87 oz)  |                         |                 | Infrared port | Yes   |
|                 | Build       | Corning Gorilla Glass 4 back panel   |                         |                 | Radio         | No  |
|                 | SIM         | Nano-SIM   |                         | <b>FEATURES</b> | USB           | microUSB 2.0, USB Host  |
|                 |             | - Samsung Pay (Visa, MasterCard certified)   |                         |                 | Sensors       | Fingerprint (front-mounted), accelerometer, gyro, proximity, compass, barometer, heart rate, SpO2 |
| <b>DISPLAY</b>  | Type        | Super AMOLED capacitive touchscreen, 16M colors  |                         |                 | Messaging     | SMS(threaded view), MMS, Email, Push Mail, IM   |
|                 | Size        | 5.1 inches (~70.7% screen-to-body ratio)   |                         |                 | Browser       | HTML5   |
|                 | Resolution  | 1440 x 2560 pixels (~577 ppi pixel density)  |                         |                 | Java          | No  |
|                 | Multitouch  | Yes  |                         |                 |               | - Qi/PMA wireless charging (market dependent)   |
|                 | Protection  | Corning Gorilla Glass 4  |                         |                 |               | - ANT+ support  |
|                 |             | - TouchWiz UI  |                         |                 |               | - S-Voice natural language commands and dictation   |
| <b>PLATFORM</b> | OS          | Android 5.0.2 (Lollipop), upgradable to 7.0 (Nougat)   |                         |                 |               | - OneDrive (115 GB cloud storage)   |
|                 | Chipset     | Exynos 7420 Octa   |                         |                 |               | - MP4/DivX/XviD/WMV/H.264 player  |
|                 | CPU         | Octa-core (4x2.1 GHz Cortex-A57 & 4x1.5 GHz Cortex-A53)  |                         |                 |               | - MP3/WAV/WMA/eAAC+/FLAC player   |
|                 | GPU         | Mali-T760MP8   |                         |                 |               | - Photo/video editor  |
|                 |             |  |                         |                 |               | - Document editor   |
| <b>MEMORY</b>   | Card slot   | No   |                         | <b>BATTERY</b>  |               | Non-removable Li-Ion 2550 mAh battery   |
|                 | Internal    | 32/64/128 GB, 3 GB RAM   |                         |                 | Talk time     | Up to 17 h (3G)   |
|                 |             |  |                         |                 | Music play    | Up to 49 h  |
| <b>CAMERA</b>   | Primary     | 16 MP, f/1.9, 28mm, OIS, autofocus, LED flash, <a href="#">check quality</a>                         |                         | <b>MISC</b>     | Colors        | White Pearl, Black Sapphire, Gold Platinum, Blue Topaz  |
|                 | Features    | 1/2.6" sensor size, 1.12 µm pixel size, geo-tagging, touch focus, face detection, Auto HDR, panorama |                         |                 | SAR           | 1.15 W/kg (head) 1.16 W/kg (body)   |
|                 | Video       | 2160p@30fps, 1080p@60fps, 720p@120fps, HDR, dual-video rec., <a href="#">check quality</a>           |                         |                 | SAR EU        | 0.38 W/kg (head) 0.50 W/kg (body)   |
|                 | Secondary   | 5 MP, 1/4.1" sensor size, 1.34 µm pixel size, f/1.9, 22mm, 1440p@30fps, dual video call, Auto HDR    |                         |                 | Price         | About 400 EUR   |
| <b>SOUND</b>    | Alert types | Vibration; MP3, WAV ringtones  |                         | <b>TESTS</b>    | Performance   | Basemark OS II: 1663 / Basemark OS II 2.0: 1641<br>Basemark X: 22752                              |
|                 | Loudspeaker | Yes  |                         |                 | Display       | Contrast ratio: Infinite (nominal), 4,124 (sunlight)  |
|                 | 3.5mm jack  | Yes  |                         |                 | Camera        | Photo / Video   |
|                 |             | - 24-bit/192kHz audio  |                         |                 | Loudspeaker   | Voice 68dB / Noise 66dB / Ring 73dB   |
|                 |             | - Active noise cancellation with dedicated mic   |                         |                 | Audio quality | Noise -95.6dB / Crosstalk -94.5dB   |
|                 |             |  |                         |                 | Battery life  | <a href="#">Endurance rating 73h</a>  |

# Course Administration

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## **Course Webpage:**

`you.uark.edu/ahnelson/cmpe-4623-mobile-programming/`  
Syllabus is on the website.

## **Course Communication:**

`https://csce4623-uark.slack.com/`

This slack channel is to be the primary mode of communication



## Homework - Due Friday by Midnight

### **Sign up on the Slack website**

Use your UARK username as the slack username. **Download Android Studio**

<https://developer.android.com/studio/index.html>

Video will be on the website by end of day today. Send screenshot of android studio in direct message to my slack user (ahnelson)

5% of the first project grade.