

CSE 162 Mobile Computing
Midterm Exam 3

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Part A: True / False (2 pts each)

Mark each statement as True (T) or False (F).

1. The Android MediaRecorder class can be used to capture both audio and video. T
2. The SpeechRecognizer class performs all processing locally on the device. F
3. Face detection and face recognition are equivalent tasks. F
4. The Mel Frequency Cepstral Coefficient (MFCC) technique mimics the human ear's perception of sound. T
5. The MediaPlayer class is only capable of playing local files. F
6. Adaptive streaming adjusts video quality based on network conditions. T
7. Android's "wake locks" are used to prevent devices from sleeping when critical tasks are active. T
8. Participatory sensing requires active user involvement, unlike opportunistic sensing. F
9. Piezoelectricity converts mechanical stress into electric potential. T
10. Doze mode is activated when a device is plugged into power and actively in use. F
11. The ACCESS_FINE_LOCATION permission is needed for audio recording. F

Part B: Multiple Choice (3 pts each)

Circle the best answer for each question.

1. Which permission is needed to record audio in Android? (a) ACCESS_NETWORK_STATE
 (b) RECORD_AUDIO (c) WRITE_EXTERNAL_STORAGE (d) INTERNET
2. The MediaRecorder requires which of the following to start recording? (a) prepare()
 (b) start() (c) stop() (d) Both (a) and (b)

~~3.~~ The Coriolis effect is used in: (a) Gyroscopes (b) Microphones (c) Thermoelectric generators (d) Wearable displays

~~4.~~ Adaptive video streaming (DASH) helps by: (a) Choosing random bitrates (b) Adjusting video quality dynamically to network bandwidth (c) Fixing bitrate to 4 Mbps (d) Removing buffering completely

~~5.~~ What is the function of a "wake lock" in Android? (a) Locks the device screen (b) Prevents CPU or screen from sleeping (c) Reduces app priority (d) Enables debugging

~~6.~~ "Soft surveillance" refers to: (a) Voluntary yet unavoidable data collection (b) Passive encryption (c) Anonymous crowdsensing (d) Random data sampling

~~7.~~ Which of the following is a privacy-preserving approach? (a) Obfuscation (b) Monetization (c) Tracking (d) Fingerprinting

~~8.~~ Piezoelectric generators produce: (a) High voltage, low current (b) Low voltage, high current (c) Stable DC voltage (d) Alternating current only

~~9.~~ Battery Historian is a tool used to: (a) Visualize app battery use (b) Record media activity (c) Track GPS routes (d) Detect malware

Part C: Short Answer (5 pts each)

Answer each question in 2-4 sentences.

1. Explain the difference between **face detection** and **face recognition**. Provide an example use case of each.

Facial detection finds all the faces (in a picture for example)

Facial recognition actually recognizes which person is which (example: recognizing the same person in two photos)

2. Briefly explain the concept of the Right to be Forgotten.

(5)

When your data is deleted and you are given a clean slate,

3. Define adaptive bitrate streaming. Why is it important for mobile devices?

(5)

The bitrate of videos changes (and the resolution) based on the connection speed, and latency of your internet is unstable. Important to watching videos smoothly, but the tradeoff is quality

4. What is a wake lock? Describe its role and one example when it is required.

(5)

It keeps your CPU on but turns off other things like screen and keyboard. If I want to record audio, I want to do this with the screen and keyboard off to save battery and resources while still completing the task I assigned to the phone.

5. Explain how energy harvesting (e.g., thermal or piezoelectric) can help wearable devices.

(5)

As tech. advances, batteries are one thing that is still as much. For wearables, batteries are a set back and need as much power as possible. Energy harvesting helps the battery recharge a little or stay online. Thermal uses heat and piezo electric uses vibration to help the battery last longer.

6. Describe two software techniques for battery conservation in Android.

(5)

Running 10 tasks back to back instead of turning up the CPU 10 different times. (Forgot name of this)

Turning off resources to an app that hasn't been used in a long time.

Turning off CPU background, net work, etc. and only allowing high alerts like alarm, (DOZE), activities when not plugged in and not in use

Part E: Long Answer (10 pts)

- a. Describe how **Battery Historian** can help detect abnormal app power usage. Give one example of suspicious behavior.

Because it keeps track of all data related to the battery, it can find if a strange app is eating the battery, a service, etc.

(10)

Ex. is finding that candy crush is using up the battery in the background or any app you've never heard of / downloaded

- b. Explain the tradeoff between privacy and functionality in mobile sensing apps.

Losing complete privacy is the tradeoff to lots of functionalities. Example, your GPS is used to know where you are, but you get to know the air quality in your area and you contribute to that too. You need to trade your privacy to have access to apps.

(10)

Similar to soft surveillance, where you are "volunteering" your data when it's mandatory. Example is accepting terms of service to an app.