CS 501 Mobile Application Development

Spring 2023

Assignment 1 – Getting setup and your first apps

**Due:** Night of lecture 2, before class.

Do not email homework, please submit on Blackboard. You should also take screenshots or recording of your assignment and submit. Post the code on GitHub and submit the link and the videos in a zip file. Portions of this assignment must be done and submitted individually, other parts are to be done as a group.

**Assignments:**

1. **(Individually)** Read all of chapters 1, 2, 3, and 4 before the next class.
2. **(Individually)** Setup and install Android Studio on your computer. Send a screenshot of the installed IDE on your machine. Please be sure to install the latest version, Electric Eel. You can download Android Studio from <https://developer.android.com/studio>. Since every system is configured differently you may need to do some research to get it to work on your machine. Submit a screen shot from your system with a virtual device up (see #2 below)
3. **(Individually)** Setup a virtual device and/or connect your physical device. Once again, depending on your system/hardware this will differ. Please do the necessary research to achieve this. Videos on YouTube abound on how to do this as well. Submit a screenshot with the virtual device running.

Here are some examples on setting up a virtual device: <https://www.youtube.com/results?search_query=android+studio+setup+a+virtual+device>.

Here are some examples on connecting a physical device and setting it up for debugging: <https://www.youtube.com/results?search_query=android+studio+connect+a+physical+device>

1. **(Group)** Take the Hello World app we went over in class, build and run it, and upload the project to GitHub. Take a screenshot and submit on Blackboard.
2. **(Group)** Using the GeoQuiz example from class as a starting point, customize the toast by using a Snackbar instead of a Toast. While using a Toast is a convenient way to display UI, we recommend using a Snackbar in your applications because they are more configurable in both their appearance and behavior. Refer to the developer documentation at developer.android.com/​reference/​com/​google/​android/​material/​snackbar/​Snackbar for more details. (Hint: Look at the make and show functions.) Submit a video recording of this app running.
3. **(Group)** As a group, complete the Worksheet below and submit to Blackboard.

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Worksheet 1

Date: 1/31/2023

Team name: Android Lovers

Team members: *U56142417 Tingyuan Cui U44904866 Junru He U12975231 Chen Yang*

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The purpose of this worksheet is to initiate some collaboration that will get you thinking creatively about the functions and features of your mobile device. Please try to get to know the people you are collaborating with. They may become your team members for the final project.

Assignment is due via Blackboard by next class. Do not email homework. Please submit via Blackboard.

Please write your answers clearly or type them.

1. List the various sensor and devices on typical mobile phones.
   1. **Devices:** Camera; Micro phone; Player; Screen
   2. **Sensor:**

**Ambient Light Sensor:** It allows the phone to sense ambient light intensity and adjust the brightness of the screen;

**Proximity Sensor:** Infrared is emitted through the infrared LED lamp, which is reflected by the object and accepted by the infrared detector, so as to judge the intensity of the infrared received to judge the distance, the effective distance is about 10 meters. It can sense if the phone is being pressed to your ear and turn off the screen to save power if it is;

**G-Sensor:** Can be used to switch landscape and straight screen orientation.

**Accelerometer Sensor:** Used in the mobile phone can be used to count the steps, judge the direction of the phone.

**Magnetism Sensor:** It is used in compass and map navigation.

**Gyroscope:** The "shake" feature in the phone (i.e. shake the phone to draw lots...) Motion sensing technology, as well as VR perspective adjustment and detection, are all used in the role of gyroscopes.

**GPS:** It can be used in positioning, speed measurement, distance measurement and navigation.

**Fingerprint sensor:** The current mainstream technology is capacitive fingerprint sensors, but ultrasonic fingerprint sensors are becoming increasingly popular. The distance between the peaks and troughs of the fingerprint and the sensor forms the capacitance difference to depict the pattern of the fingerprint. The principle of ultrasonic fingerprint sensor is similar, but it will not be disturbed by sweat and oil, and the identification speed is faster. It can be used in mobile phones to unlock, encrypt, make payments and more.

**Hall Sensor:** Mainly used in functions such as clamshell unlocking and closing the cover to lock the screen, the technology is used in Apple's Smart cover as well as official phone accessories of several brands.

**Heart Rate Sensor:** Shining a bright LED light on the finger periodically changes in brightness (the depth of red light) as the heart presses blood to the capillaries. Then the camera captures these regular changes, and sends the data to the mobile phone for calculation, and then judges the frequency of the heart contraction, to get the number of beats per minute.

1. List five of your favorite apps. Briefly describe what they do and what makes them so great.
2. **Wechat:** Wechat is a chatting app which provide a lot of convenience for us. Comparing with sending messages, we can send more things such as photos, videos, locations and even money. In addition, we can also use it to scan most of the QR code to use more functions. For example, in China, one of the most popular methods to make a payment is using wechat to scan the paying QR code, which is much more convenient than using bank card or cash.
3. **Grubhub:** This app is used by people to order food online. In the rush hour, there is a long queue to buy food in some restaurants, which wastes a lot of time. Buy using Grubhub, we can select and order our food just online and get them directly.
4. **Citizen:** Citizen can show up the “danger” nearby. People can know what dangerous thing is happening and they can hedge in advance. It is a great app because it can make our life safer.
5. **Amazon:** We can by things online using Amazon, we can get more choice of items when shopping online and speed of shipping is also very fast. We can also purchase thing that can not be found in local stores.
6. **Uber:** People use Uber to get a ride online. In many cases, stopping for a taxi on the street means you may have to stand on the street for more than 10 minutes in winter. With Uber, people can take a taxi at home in advance and have the driver come directly to your downstairs to wait.
7. Identify an App you use often, but you wish were better, (eg., - Uber, Lyft, Venmo, Indeed, FishBrain, etc.) Identify the pros and cons of each, and what features are great, but could be improved, what features are missing. For the latter two items, describe with some detail how you would implement these features and what technology might be used to implement these missing features. Be ready to present to the class.

Amazon is a very classic and easy to use shopping App, users can use it to search and buy almost anything they want. A big advantage of Amazon is that its products are comprehensive. Many products that are hard to find in local physical stores can be found on Amazon. In addition, Amazon's products are generally cheaper than the same products in physical stores, and people don't need to go to the physical stores in person, but just need to sit at home and wait for the goods to be delivered.

Amazon also has some shortcomings and lack of features. In our group's opinion, the representative thing is that Amazon does not make detailed product description. For example, the interface of most products contains only a few text descriptions and a few pictures, making it difficult for users to judge the quality of the product and discourage them from making a purchase. We believe that Amazon can add more video presentations to the products, and it is better to add live streaming function, so that the sellers can demonstrate the use method or the quality of the products in the form of live streaming, so that the buyers can more intuitively understand the situation of the products. Livestreaming features or TikTok-like mini-videos could also boost Amazon's revenue by increasing its popularity.

1. **App design challenges.** For each of the scenarios below, design an app that might be helpful. Consider all of the resources and tools available to you (or that you might implement or get from a 3rd party) on a typical Android cellular phone. Eg., voice recorder, call blocker, databases, crowdsourcing, caller ID, SMS, Camera, gyroscope, GPS, etc. Storyboard your idea on a separate sheet of paper, that is describe the application and sketch what the app might look like.

You will work in teams on this, be prepared to present your designs to the class next week.

* 1. **Emergency response app**. Every year at BU incoming freshman are overwhelmed by the city and occasionally get themselves into dangerous situations. What are some of your ideas for an App that would enable someone to know where it is safe to go and, if in trouble, quickly and easily notify others.
* Consider the different sensors on an Android Handset.
* Also consider the possibility of crowdsourcing real-time and archived data

Users of the app would have access to a map of the city with various neighborhoods color-coded according to their level of safety. Both crowdsourcing and third-party safety data providers may be used to get this data.

Additionally, the app would contain a "Panic Button" feature that, when activated, would notify the user's emergency contacts of their current location (GPS) and a message requesting assistance.

The software might also have a function that enables users to alert other users in real-time to suspicious behavior or potential dangers, which would then be displayed on the map.

A directory of emergency services (police, hospitals, etc.) with their contact details and locations (GPS) might also be included in the app.

The app might also have a function that lets users set a timer for a certain period of time. The software will immediately inform the user's emergency contacts with their last known location if they don't check in before the countdown runs out.

When the Panic Button is touched, the app might also contain a feature that lets users record audio or capture photos, which would then be transmitted to their emergency contacts along with their location.

In order to be quickly monitored and located in an emergency, the app might also have a function that lets users communicate their position with a trusted contact in real-time.

A feature that enables users to dial emergency services from the app with a single button push could also be included.

The main screen of the app's visual design might be a map view with different regions color-coded according to their level of safety. The Panic Button feature's button could also be clearly placed on the screen. The app might also have a navigation drawer or bottom navigation bar that users can use to access other functions including reporting suspicious activity, calling for help in an emergency, and setting a timer.

* 1. **Contractor for you.** This is an app that connects professional contractors with individuals who need work done on their home. If someone were to pay you to design this app, what are some of the things you would need to consider? What would some of the requirements be in terms of device hardware/software/back-end storage, etc?

Users of the app should be able to record videos and photos of contractors to show them what work has to be done properly and how much it costs.

Users should be able to examine different contractor information through the application.

Users of the app will be able to assess the performance of contractors.

Users of the app will be able to browse the quotations and reviews of several contractors before making their choice.

Users will be able to set up appointments with contractors using the app and get reminders.

The software would allow consumers and contractors to interact to discuss specifics.

Users will be able to use the app's secure payment system to pay for services.

The app will give contractors the ability to schedule appointments, see future jobs, and get alerts when new work requests come in.

-To implement the application, we need to consider the following:

A reliable backend database for storing user and contractor information, job requests, quotes and appointments.

A secure payment system for processing in-app payments.

A way to verify a contractor's qualifications and credentials before using the app.

A way to collect and display contractor reviews and ratings.

-The app requires the use of the device's GPS to allow users to find contractors in their area and to let contractors know where their clients are.

Push notification system notifies users and contractors of new job requests and appointments.

In terms of device hardware/software, the application requires at least:

Android 4.1 or later

GPS-enabled devices

A photographic device with a camera

A device with an internet connection to access backend storage and payment systems.

* 1. **Don’t fleece me dude.** Quite a few users of credit cards do not regularly check their statements. Or, when they do, they check them long after making a charge. Unscrupulous vendors might take advantage of this laxness. Let's focus on one specific area, tipping at restaurants.

Design an app that would enable a restaurant patron to validate that the tip they left is the same as the tip that was charged. For example, when you go to a restaurant, a hold is placed on your credit card and a tip is added after you leave. What if an unscrupulous waiter charged you a different amount then you had written in? How could you automatically be notified that this occurred?

App description (be detailed):

The purpose of the app is to assist diners in confirming that the tip they left at the restaurant matches the amount that was charged to their credit card. The program tracks and compares the amount of the tip left with the amount charged on the credit card statement using the GPS and credit card scanner on the user's Android handset.

Users of the app would be able to input their tip amount, along with the name and location of the restaurant where they left it, through a straightforward and user-friendly interface. The software would then verify the user's location and compare it to the restaurant's location using GPS.

The app would then use the credit card scanner to check the user's credit card statement for the corresponding charge after the user has confirmed the tip amount. The software would send the user a notification informing them of the mismatch if the tip amount on the statement differs from the tip amount they entered.

The app's database would also enable users to report any questionable behavior, and the app's creators would keep an eye on it to look for patterns of fraud. To aid in preventing fraud and safeguarding customers, this information would be given to the appropriate authorities.

To take advantage of all of the app's functions, the user would need an Android handset with a GPS, credit card reader, and internet access built in. The app would be able to store user data securely and access it from many devices thanks to the cloud-based back-end storage.

Graphical user interface, diagram

Description automatically generated