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Project One: Investigation on Smart Phone App Permission

Ultimate Question: Do apps running on smartphones request too many permissions?
In our project we analyzed a variety of apps from the following categories:
-> Financial/Shopping
-> Social
-> Entertainment
-> Navigation/Travel
->Utility
->Reference/News

We observed that apps from categories such as social media ask for the most amount of permissions. Then the financial apps ask for the second most amount of permissions . Utility apps ask for the least amount of permissions.

The following chart summarizes the amount of permissions used in each app category:
https://docs.google.com/spreadsheets/d/1Fv3I-krYm-VlsDb_mVBF1HYKVX0cSZzTMiXrzHsqVs0/edit?usp=sharing
From our analysis we conclude that Apps ask for more permissions than are necessary for their functionality. We also learned that apps have the ability to access more permissions than the user knows about. In some instances the purposes of certain permissions are obvious. They are directly beneficial to the companies that make the apps, the user, or both. However, at other points it is not clear why certain app need a given permissions.

App Analysis:

App: Outlook. This is a utility app that serves as a personal information manager. It is often used mainly as an email application, but it also provides functions such as a calendar, task manager, contact manager and note-taking.

Category: Utility

Description: This app serves as a communication functionality on mobile devices. Users can use it to send and receive emails, organize events in a calendar, book meetings, message, and call other contacts, and take notes and keep track of their journals.

Permissions:

- **Identity:** The app should not need to be able to view, create, and delete accounts on the device. This is beneficial to the vendor to learn more about the user and their accounts.
- **Contacts:** The app will need to read contacts to know which emails to be sent to specific people, but it should not be able to modify contacts. This is beneficial for the vendor to learn about the user.
- **Location:** This app does not have anything to do with tracking location so this should not be needed. This would be a benefit for the vendor to learn more info about the user.
- **Media/Files:** The app will need access to read and write for its own app data, but it could also change data of other files which could be a benefit to the vendor.
- **Photos:** Needs access to photos because user may be sending pictures on their phone to the receiver.
- **Device ID:** This is not needed as outlook does not have anything to do with the phone app. It should not need permission to read a phone status or send emails without the user knowing, although this may happen through spams. This is a benefit to third parties and the vendor.
- **Calendar:** One of the features of this app is to add events to the calendar so should be allowed to see and read the user's calendar.
- **Network:** The app will only work if connected to the network so needs to be able to see available network connections to connect and run the app.
- **WIFI:** The app will only work if connected to the internet so needs to be able to see available wifi connections to connect and run the app.
- **SysTool:** Needed for the app to startup so the user can actually use it.
- **Battery:** Needed because if the user leaves the device idle in the middle of an email, the phone will not sleep so user can easily get back to where they were. Also, the app can control the vibration of emails which is beneficial to the user.

App: Instagram. A social media platform in which people share pictures and status' with their friends and family.

Category: Social

Description: The app lets the user upload pictures/video snippets along with a caption on their page, comment on/like other friend's posts, follow other users to be updated on their posts, and even message other contacts.

Permissions:

- **In-app Purchases:** Not needed because Instagram is a totally free social platform so there is no reason to be entering credit card information. This is beneficial to the vendor to monetize the app.
- **Identity:** The app should not need to be able to view accounts on the device. This is beneficial to the vendor to learn more about the user and their accounts.
- **Contacts:** The app may make suggestions to the user on who to follow based on the contacts on their phone so this is beneficial to the user.
- **SMS:** Needed to read text messages as the app offers a feature where users can message each other. This is a benefit to the user.
- **Location:** There is an ability to add the location of where one is on a picture the user posts so this is for the user's benefit to update their followers.
- **Media/Files:** The app will need access to read and write for its own app data, but it could also change data of other files which is a benefit to the vendor.
- **Camera:** The main feature behind instagram is to take pictures and post them, so this is definitely useful to the user.
- **Mic:** Not needed as instagram does not provide any features using a mic. This is a benefit to the vendor to learn more about the user.
- **Device ID:** This is not needed as instagram does not have anything to do with the phone app. It should not need permission to read a phone status and is beneficial to the vendor.
- **Network:** The app will only work if connected to the network so needs to be able to see available network connections to connect and run the app.
- **SysTool:** Needed for the app to startup so the user can actually use it.
- **Battery:** Needed because if the user leaves the device idle but on a page, the phone will not sleep so user can easily get back to where they were. Also, the app can control vibration of notifications which is beneficial to the user so they don't get too many alerts while looking at a video or picture.
- **Other:** Needed to uninstall/install shortcuts and can modify audio settings as it will be more convenient for the user to use the app.

App: Youtube. This is an entertainment app where users can watch videos from many different categories.

Category: Entertainment

Description: Users of this app are able to watch videos, listen to music, comment/like/subscribe to other people's posts, and of course make their own posts.

Permissions:

- **In-app Purchases:** Needed because a new feature called Youtube Red was recently introduced. Users can get access to additional components by paying some extra money and the vendors benefit from the money.
- **Identity:** The app should not need to be able to view/modify accounts on the device. This is beneficial to the vendor to learn more about the user and their accounts.
- **Contacts:** Not needed because this app does not have any purpose with contacts and this is for the benefit to the vendor to learn more info about the user.
- **SMS:** Not needed as the app does not have to do with SMS texts at all and thus, does not need to read and send texts from the user's device. This is beneficial to the vendor to learn more about the user.
- **Location:** Not needed as the app does not offer any features to the user based on location and using the GPS. This is a benefit of the vendor to learn more about the user.
- **Media/Files:** The app will need access to read and write for its own app data, but it could also change data of other files which is a benefit to the vendor.
- **Camera:** Not needed as the app does not have anything to do with taking pictures and does not need to access the photos stored in the device. This is beneficial to the vendor to learn more about the user.
- **Mic:** Needed as user has the ability to say what they want to watch through the mic icon in the search bar.
- **Device ID:** This is not needed as youtube does not have anything to do with the phone app. It should not need permission to read a phone status and is beneficial to the vendor for tracking.
- **Network:** The app will only work if connected to the network so needs to be able to see available network connections to connect and run the app. It is also beneficial to the user for the app to control NFC functions.
- **WIFI:** The app will only work if connected to the internet so needs to be able to see available wifi connections to connect and run the app.
- **SysTool:** Needed for the app to startup so the user can actually use it. Measuring storage space is needed to notify the user about how much storage the app os taking up and how much they have left.
- **UI:** Not needed as the app should not allow other windows to pop up on the user's device. This is beneficial to third party advertisers.
- **Battery:** Needed because if the user plays a video and leaves the device idle, the phone will not sleep so the user can keep listening to it. Also, the app can control vibration of notifications which is beneficial to the user so they don't get too many alerts while a video is playing.
- **Google Play Service:** Needed because it gives users better controls and provides developers with a simple, standard system to continue to monetize their apps.

App: Snapchat. This is a social platform where users can take pictures of their daily doings and share it with friends.

Category: Social

Description: On this app, users can share what they are up to through pictures and short videos with friends. Another feature is to text and video chat with friends.It is also a way to learn about celebrity news and get updates.

Permissions:

- **In-app purchases:** Not needed as all the features that Snapchat provides if free of cost to the user. This is beneficial to the vendor to try to monetize the app.
- **Identity:** The app should not need to be able to view accounts on the device. This is beneficial to the vendor to learn more about the user and their accounts.
- **Contacts:** Needed so that the user can view other friends who are using the app in their contact list to easily add them as friends. This is beneficial to the user.
- **SMS:** The app offers a feature in which users can text other friends so this permission is needed for the user's benefit.
- **Location:** There is a feature where users can the app can know where the user is and mark it on a map for their friends to see. Beneficial to user if they want the feature.
- **Media/Files:** The app will need access to read for its own app data, but it could also change data of other files which is a benefit to the vendor.
- **Camera:** Needed as the main purpose of this app is to take pictures and post it as a status on one's page. Users have the ability to save pictures to their device and send pictures they already have in their camera roll.
- **Mic:** Needed because users have the ability to facetime other friends.
- **Device ID:** Needed to read the phone status as the app offers the ability to facetime and talk to other friends over the phone.
- **Network:** The app will only work if connected to the network so needs to be able to see available network connections to connect and run the app.
- **WIFI:** The app will only work if connected to the internet so needs to be able to see available wifi connections to connect and run the app.
- **Bluetooth:** The app introduced a new feature in which bluetooth would be the technology that connects a headset or google glasses with Snapchat on the user's mobile phone.
- **Battery:** Needed because if the user is facetiming a friend and leaves the device idle, the phone will not sleep so the user can keep continuing. Also, the app can control vibration of notifications which is beneficial to the user so they don't get too many alerts while they are talking.
- **Other:** While access to the flashlight is not needed, the app may control audio settings to be more convenient to the user.

App: Facebook. This app is a social network platform used for connecting with friends and family.

Category: Social

Description: Users can post pictures and statuses on their own page, send messages and call other friends, follow contacts and celebrities to be updated on their status, and look at current news.

Permissions:

- **Device and App History:** Not needed as the app doesn't have to do with the other apps on the user's phone. It is useful to retrieve its own running app, but not needed for other apps which is beneficial to the vendor.
- **Identity:** The app should not need to be able to view accounts on the device. This is beneficial to the vendor to learn more about the user and their accounts.
- **Contacts:** Reading contacts is needed so that users get recommendations on who is available on facebook to add as a friend from their contacts list. However, it is not needed to modify the user's contact list or read their call log. This is beneficial to the vendor to learn more about the user.
- **SMS:** Needed to read text messages as the app offers a feature where users can message each other. This is a benefit to the user.
- **Location:** Users have the ability to post a picture along with the location they are at so the app needs to have access to their location. This is beneficial to the user.
- **Phone:** It is not needed to call other phone numbers through the app and this is a benefit to the vendor.
- **Media/Files:** The app will need access to read for its own app data, but it could also change data of other files which is a benefit to the vendor.
- **Camera:** Users have the ability to take pictures to update their status and also post pictures that are already stored on camera roll on their device.
- **Mic:** Needed because users have the ability to facetime/call other friends.
- **Device ID:** Needed to read the phone status as the app offers the ability to facetime and call other friends over the phone. However, not needed to send emails without the owners knowledge because the app does not have to do with emails. This is a benefit to the vendor.
- **Calendar:** Facebook updates users about their friends going to some events. Users can notify the page whether they will be going or not and can add it to their calendar so access to read and add calendar events is needed.
- **Network:** The app will only work if connected to the network so needs to be able to see/change to available network connections to connect and run the app. However, downloading files without notice is not needed and is a benefit to the vendor.

- **WIFI:** The app will only work if connected to the internet so needs to be able to see available wifi connections to connect and run the app.
- **SysTool:** Needed for the app to startup so the user can actually use it. Measuring storage space is needed to notify the user about how much storage the app os taking up and how much they have left. However, the app does not need to modify system settings which is a benefit to the vendor.
- **UI:** Not needed as the app should not allow other windows to pop up on the user's device. This is beneficial to third party advertisers.
- **Battery:** Needed because if the user plays a video or texts/calls a friend and leaves the device idle, the phone will not sleep so the user can keep continuing listening. Also, the app can control vibration of notifications which is beneficial to the user so they don't get too many alerts while watching a video or texting/calling.
- **Other:** Needed to uninstall/install shortcuts and can modify audio settings as it will be more convenient for the user to use the app. However, it is not needed to disable the lock screen.
- **Google Play Service:** Needed because it gives users better controls and provides developers with a simple, standard system to continue to monetize their apps.
- **Settings:** Needed as adjusting the wall paper size can make it compatible with the user's phone and be more convenient.

App: Google Maps. This app is a mapping mobile app. It provides GPS directions for users trying to get from one place to another.

Category: Navigation/Travel

Description: The app includes turn-by-turn navigation, street view, and public transit information, and details on the nearest restaurant and gas stations.

Permissions:

- **Identity:** Needed to find accounts to learn more about user so that the app can provide recommendations on where the user can eat for example. However, not needed to create/remove accounts and this is beneficial to the vendor.
- **Contacts:** Not needed as the app does not offer any features regarding contacts. This is beneficial to the vendor to learn more about the user.
- **Location:** Needed because the sole purpose of this app is to act as a GPS for users who need directions to get from one place to another. The location of the user is tracked to provide the best possible directions to the user's benefit.
- **Media/Files:** The app will need access to read for its own app data, but it could also change data of other files which is a benefit to the vendor.

- **Network:** The app will only work if connected to the network so needs to be able to see available network connections to connect and run the app. However, downloading files without notice is not needed and is a benefit to the vendor.
- **WIFI:** The app will only work if connected to the internet so needs to be able to see available wifi connections to connect and run the app.
- **SysTools:** Needed for the app to startup so the user can actually use it.
- **Battery:** Needed because if user is listening to directions and leaves the device idle, the phone will not sleep so the user can keep continuing. Also, the app can control vibration of notifications which is beneficial to the user so they don't get too many alerts while they are driving.
- **Other:** Needed to uninstall/install shortcuts as it will be more convenient for the user to use the app. However, not needed to disable to lock screen.

App: Coinbase.

Category:Financial/Shopping

Description: Coinbase is a "secure" online platform for buying, selling, transferring, and storing digital currency. This app is a bitcoin broker that provides a platform for traders to buy and sell bitcoin with fiat money. In addition to its primary operation as a broker, Coinbase is also a bitcoin exchange and wallet provider.

Permissions:

- **In App Purchases**: Being an app for tracking and buying cryptocurrencies, it is expected for capabilities to use a credit card on the app. Though through the method used in the code, the Play Store is not required to tell you that the app has this functionality. Which may potentially be used to steal/sell credit information.
- **Identity:** This app is able to retrieve accounts set by other apps linked to ones phone, which it has no business doing. But may be used to verify proxy accounts.
- **Contacts:** Coinbase also keeps tabs on user's contacts, which it has no reason to do so other than to keep a database of connections per user.
- **SMS:** Having no business snooping around users text messages, this app does so anyway and has permissions to read and receive text messages.
- **Camera:** The app has an ability to take pictures of users' drivers in order to validate their identity prior to purchase of any cryptocurrency.
- **Device ID:** Coinbase also tracks the device ID on the users phone to again, attempt to verify their identity.
- **Network:** Used most likely for tracking purposes in which the app has access to Near field communication, Full network access, and track network connections for location tracking.

- **Battery:** This app also is able to set vibrations and prevent sleep, most likely used for notifications.

App: Jet Set Radio Live.

Category: Entertainment

Description: Jet Set Radio Live is a radio station that was released in 2016. The station can enable you to give shoutouts, message DJ Professor K. The station has music that is from Jet Set Radio.

Permissions:

- **Device ID:** The app includes a feature in which the chat room can auto detect your username by the device ID. This could also be used to track users.
- **Network:** The app uses internet to obtain the music so it must have network access.
- **Battery:** In use the app prevents the phone from sleeping and can affect battery life.

App: Steam.

Category:Financial/Shopping

Description: The Steam client includes a digital storefront called the Steam Store through which users can purchase computer games. Once the game is bought, a software license is permanently attached to the user's Steam account, allowing him or her to download the software on any compatible device.

Permissions:

- **In App Purchases**: Being an app for buying video games, it is expected for capabilities to use a credit card on the app. Though through the method used in the code, the Play Store is not required to tell you that the app has this functionality. Which may potentially be used to steal/sell credit information.
- **Media:** This app has the ability to read the contents of a users SD card. There is no real use for this permission and may be used to track users.
- **Device ID:** The app includes a feature in which the chat room can auto detect your username by the device ID. This could also be used to track users.
- **Network:** Used most likely for tracking purposes in which the app has access to Near field communication, Full network access, and track network connections for location tracking.
- **Battery:** This app also is able to set vibrations and prevent sleep, most likely used for notifications.

App: IR Remote.

Category: Utility

Description: An app used to operate audio, video and other electronic equipment within a room using light signals in the infrared (IR) range. Infrared light requires line of sight to its destination. This app uses Infrared light to mimic a tv remote. This app also connects to a database of opcodes that work with specific popular tvs and satellite boxes.

Permissions:

- **Media:** This app has the ability to read the contents of a users SD card. There is a feature in which from a database of IR codes, the codes can be saved locally if need be.
- **Network:** As mentioned above, this app needs connection to a database of IR codes that users can download from.
- **UI:** This app has the ability to draw over other apps which is moreso a useless feature.
- **Other:** As the name of the app implies, this app requires permissions to use the IR transmission device on the phone.

App: Vibrate by Force.

Category:Utility

Description: An app that disables ringtones and enforces vibration mode

Permissions:

- **Network:** This app for no reason requires access to the network the user is on and a list of connections.
- **Other:** Instead of having control over the vibration directly, this app controls the phone's audio.

App: TD Bank

Category:Financial/Shopping

Description: TD Bank is a member of TD Bank Group and a subsidiary of The Toronto-Dominion Bank of Toronto, Canada, a top 10 financial services company in North America. This app functions as a portal to send receive and track money from an account.

Permissions:

- **In App Purchases**: Being an app for banking, it is expected for capabilities to use a credit card on the app. Though through the method used in the code, the Play Store is not required to tell you that the app has this functionality. Which may potentially be used to steal/sell credit information.
- **Location:** This app does but has no real purpose for tracking users by GPS or networked based tracking
- **Phone:** This app is able to call phone numbers. It is not completely sure how this "feature" is implemented and may be used for malicious purposes.
- **Media:** The TD bank app is for no purpose other than tracking users, is able to look in users' SD cards and modify the contents of them. This may also be used for security purposes.
- **Camera:** Used for facial recognition, the app is able to take pictures of users.
- **Device ID:** The app most likely used to identify users to track track login information for security purposes.
- **Network:** As all the information must be secure as possible for being an electronic banking app, it requires full network access and a list of all connections the phone is connected to. This could also be used to track the user.
- **Wifi:** This app requires access to list all nearby and past wifi connections.
- **Battery:** This app also is able to set vibrations and prevent sleep, most likely used for notifications.

App: Groupon. This app allows users to shop for deals on a variety of items including vacation and fitness training experiences.

Category: Financial/ Shopping

Description: Groupon is a shopping app that allows customers to buy discounted items by buying these items in bulk. It is also a platform for businesses to promote themselves by displaying deals.

Permissions:

- **Identity**: This app is able to find your google accounts on the device. It should not be able to do so as it is not beneficial to the user. Instead, this permission allows Groupon to gather information about the user.
- **Contacts**: Groupon has the ability to view a users contacts. This can be beneficial to both Groupon and the user, as the user might want to know what their contacts are purchasing from the app. This also helps Groupon optimize the deals that it shows the user.
- **Location**: Groupon uses GPS and Network location in order to optimize search results for the user. For example, it allows the user to see the closest gym that is providing discounts. This location service creates a better user experience and is beneficial to the user.

- **Purchases**: Groupon allows the user to perform in app purchases by entering their credit/ debit card information. This is beneficial to the user
- **Retrieve Running Apps**: (It can see device and app history)
- **Network**: The app has full network access and can view network connections. The app needs network connection to function
- **Sys Tool**: This is needed for the app to startup so it can be used.
- **Battery**: The app can controls vibrations and prevents the phone from sleeping. Vibrations allow the user stay notified of deals. Battery is necessary for the app to function.

App: Bank of America. This is an online banking app.

Category: Financial/ Shopping

Description: An app to manage all your accounts affiliated with Bank of America. It allows you to transfer money, pay bills, deposit checks, and review monthly billing statements.

Permissions:

- **In App Purchases**: As a banking app, it allows users to transfer and deposit money as well as pay their bills. This makes banking convenient for the user.
- **Location**: This app can track locations. However, it does not need to do so for any of its essential functions.
- **Contacts**: This app is able to access contacts, although it has no obvious reason to do so.
- **Camera**: This app accesses the camera in order to deposit money from checks (by taking a picture from the front and back of the check and entering the amount.) This helps the user get money from their checks in a quick and convenient manner.
- **Battery**: This app uses vibrations I order to notify the user that it has signed out of the bank account (for security purposes.) I can also prevent the phone from sleeping
- **Sys Tool**: This is needed for the app to startup so it can be used.
- **Wifi and network:** same as above
- **Calendar:** add and read events
- **Device ID**: For security reasons, it is important that this app is able to see what device is using it. The app can send emails without owners knowledge and can read the phone's status.
- **Identity**: This app is able to find google accounts on the device. This is not necessary, as all the account information that is important to access your bank account is already provided by the user.
- **Device and app history**: Maintaining the device and app history is essential for security of the user's bank accounts.

App: Air BNB

Category: Travel and Experience

Description: Air BnB is an app used to book vacation home rentals and apartment for those who are planning to go on vacations. There are two users: the hosts that put their apartment up for rent and guests, who use the app to book home rentals and travel experiences. The app allows the travelers to add their travel experience to their itinerary. Hosts can update the listing and availability (for the rental homes.) It also allows for messaging between the traveler and the host.

Permissions:

- **In app purchases**: This is essential for one of the main functions of the app: to rent out places to stay for vacation. It is convenient for the users to make a direct purchase on the app.
- **Identity**: This app is able to find google account on the device. This is useful to the user, for using your google account is one way that you can create an account for Air BNB.
- **Contacts**: This app can read your contacts. This allows the user to invite friends to review their AirBnb profile
- **Media/File**: The app will need access to read and write for its own app data, but it could also change data of other files which could be a benefit to the vendor.
- **Location**: This app would need to access your location if you are a host and are renting out a place to stay.
- **Device ID**: The app needs to be able to read the phone status in order to see if a user is available to chat. (chatting is an important function between the traveler and the host)
- **Camera**: Used to deposit money when you have a check
- **Network**: control NFC, view network connections and full network access
- **WIFI**: The app needs internet connection to work. It should be able view whether a WIFI connection is available or not in order to let the user know why the app is not working.
- **Battery**: Vibration control is important in order to send the user notification.
- **UI**: Not needed as the app should not allow other windows to pop up on the user's device. This is beneficial to third party advertisers.

App: Messenger. This is a text and video chat app.

Category: Social

Description: This app allows the user to message, share photos, and video chat with their friends in one to one or group settings. Users can search up people who have a facebook account and connect to them via messenger. It also allows users to play fames and compete with their friends. Using messenger, users can also chat with users and get real time customer service.

Permissions:

- **Identity**: This app can find and remove google accounts on the device. This is not needed as the user already provides the necessary information to login to messenger,

- **Contacts**: The app can read and modify contacts, and read the call log. This is beneficial to the user as they can see what contacts are available on messenger and if they find someone on messenger, they can check add people they find on messenger to their contacts.
- **SMS**: An essential function of messenger is to send, receive, and edits texts. This is beneficial to users/
- **Location**: Messenger tracks location so the user can share their location with their friends. This can be beneficial to the users.
- **Phone**: One main functionality of messenger is that you can make phone calls with connection to a network. This is beneficial to the users. calls phone #s, reroutes phone calls
- **Media/files**: The app can read and edits contents of sd card and usb storage on the phone. This is necessary so that it can read its own data.
- **Camera**: Users can takes pictures and videos to send to their friends. They can also access the camera roll. This is beneficial to the user.
- **Microphone**: It needs to use the mic in order to make video calls. This is beneficial to the users.
- **Network**: This app needs network connections to work and therefore needs to be able to view network connections and have full network access Although, it is unnecessary for it to be able to control the NFC and download files.
- **WIFI**: The app needs internet connection to work. It should be able view whether a WIFI connection is available or not in order to let the user know why the app is not working.
- **Bluetooth**: The app is able to connect to Bluetooth devices, although there is no obvious purpose for it to do so/
- **Systool**: This is needed so that the app can start up for the user's use.
- **UI**: Not needed as the app should not allow other windows to pop up on the user's device. This is beneficial to third party advertisers.
- **Battery**: Vibration control is important for when the user is receiving a call or text in messenger. The permission to prevent the phone from sleeping is also important if the user is in the middle of a video call. Both components are beneficial to the user.
- **Modify audio setting**: This is important as the usear will be using the mic and speakers of their phones.

App: Weather

Category: Utility

Description: An app that lets users know the weather by hour and day in their current and saved locations.

Permissions:

- **Locations**: Using the location is beneficial to the user as it gives the most accurate weather forecast.
- **Media/Files**: The app will need access to read and write for its own app data.
- **Device ID**: It needs to be able to read the phone's status in order to update the user, if necessary for weather advisory.
- **Network**: The app needs access to the network in order to stay updated.
- **WIFI:** Access to WIFI allows the app to stay updated. This is beneficial to the users.
- **Sys tool:** The app can modify system settings

App: BBC New

Category: Reference/News

Description: This app allows users to check the world news. The user can personalize their news offering by adding news topics that interest them into the My News section. It also sends notifications for major events that place in real time.

Permissions:

- **Identity**: The app can find google accounts on device and create/ remove accounts. This is a benefit to the vendor.
- **Network and WIFI:** Access the network and wifi is important as the app is continuously updating is content for the benefit of the user.
- **Battery**: It can control vibration in order to send notifications. This benefits the user by keeping them updated on world new. It can also prevent the phone from sleeping if , for example, the user is watching a video.