Monitoring Smartphone Users' Security Behaviour

UROP Progress Presentation

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JMC1

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Motivation

- Previous research with University of Illinois at Urbana-Champaign suggests correlation between certain **smartphone security behaviours** and **mental health**

- Research in this area can help employers ensure employees are keeping **sensitive information** on their smartphones **secure**

Related work

- Edelman et al: **SeBIS** (Security Behavior Intentions Scale)
- Lots of research into links between smartphone behaviours and mental health conditions:

  A. Smartphone usage patterns & bipolar disorder (*Alvarez-Lorano*)

  B. Internet usage & depression (*Kotikalapudi*)

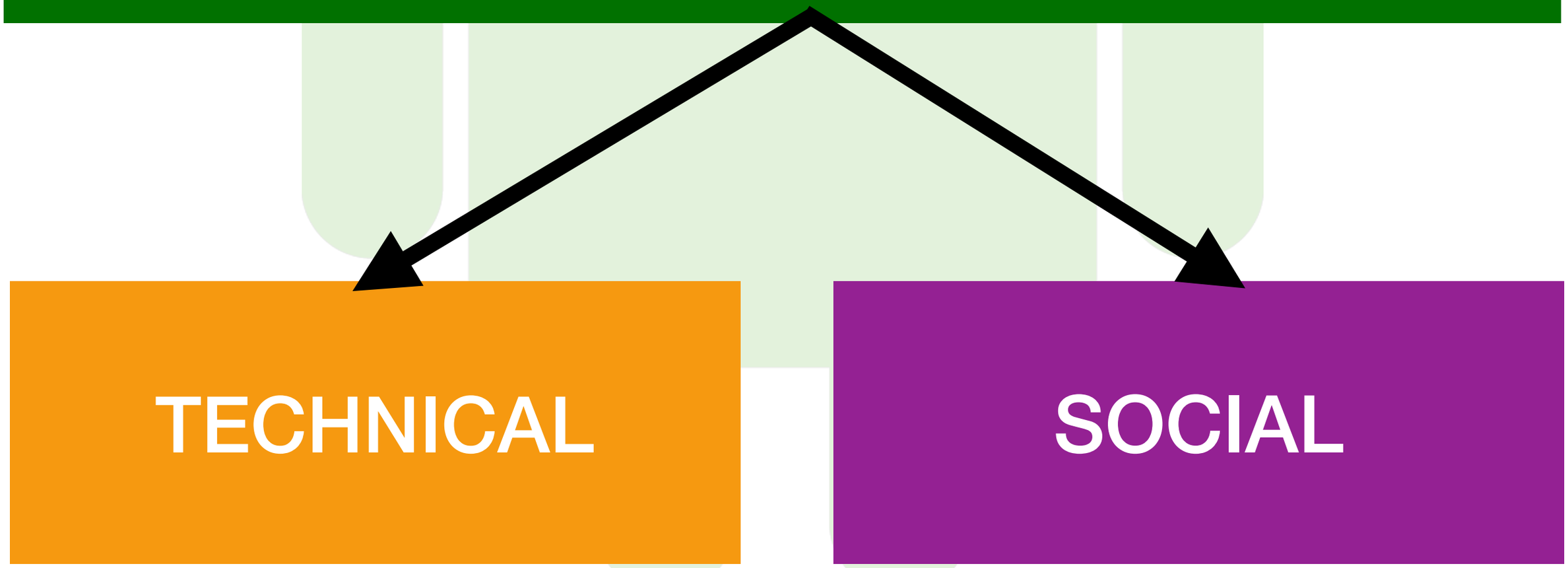
Problem

MY TASK:

Develop an Android application that tracks specific smartphone security behaviours, so that the Urbana-Champaign correlation can be tested in the real world.

Problem

SMARTPHONE SECURITY BEHAVIOURS



Problem

TECHNICAL CONFIGURATIONS

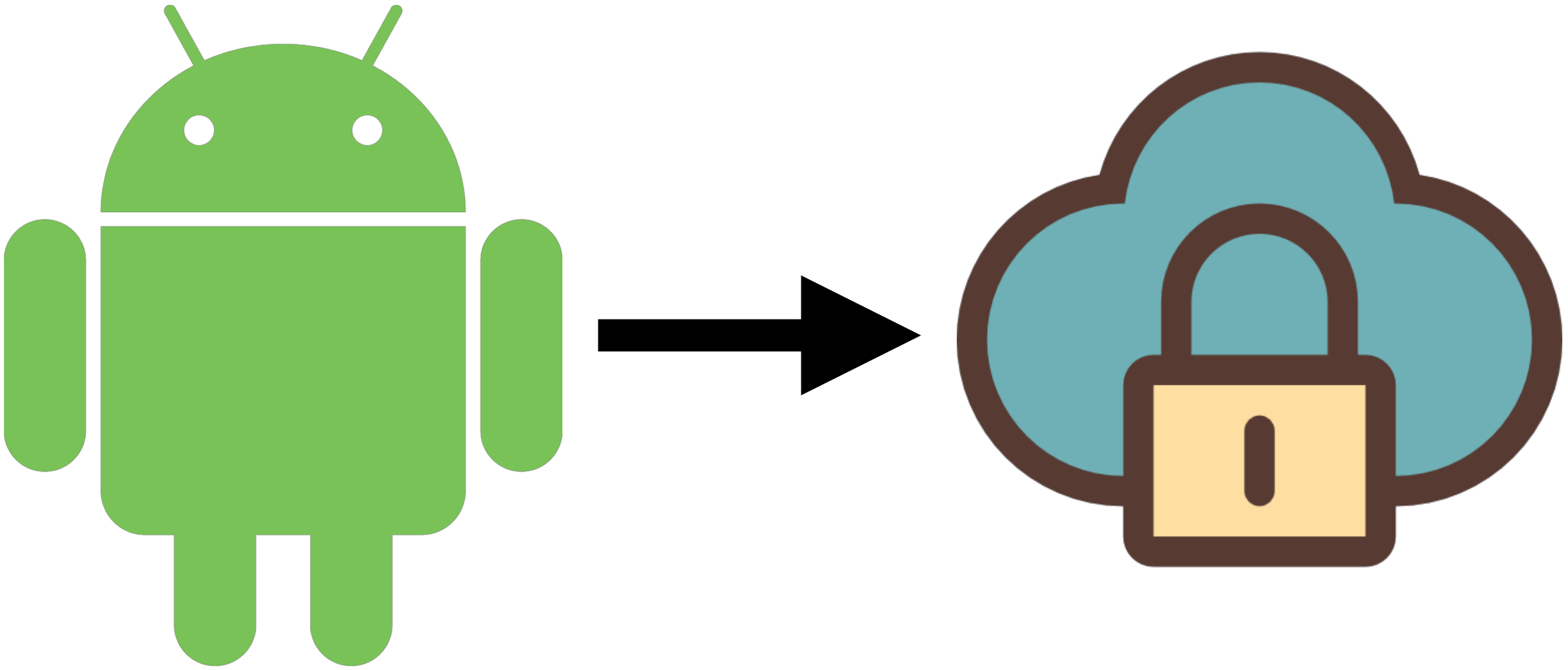
- Personalised ads
- Bluetooth and WiFi changes
- Password changes
- Adblocking and antivirus apps
- Covering phone screen

Problem

SOCIAL CONFIGURATIONS

- Usage of “sensitive” apps (e.g., banking)
- Checking information about newly downloaded apps
- Dealing with suspicious text messages and emails

My Approach



TECHNICAL CONFIGURATIONS

- Personalised ads → **1.1** Track changes in the configuration of Advertising ID
- Bluetooth on/off → **1.2** Track changes in the configuration of hide device in Bluetooth settings
- Password changes → **1.3** Track changes of passcode/PIN for the smartphones screen lock
- Covering phone screen → **1.4** Detect if the user physically/ manually covers their smartphone's screen when in public spaces

TECHNICAL CONFIGURATIONS

- Adblocking apps → **1.5** Detect if the user uses adblocker(s)
- Antivirus apps → **1.6** Detect if the user uses anti-virus app(s)
- VPN when connected to public network → **1.7** Detect if the user uses VPN app(s) when connected to a public network
- Switching off WiFi when not actively using Internet → **1.8** Detect if the user turns off WiFi when not actively being used.

SOCIAL CONFIGURATIONS

- Financial and Shopping apps usage
- Checking information about newly downloaded apps

2.1 Track the source of the app when the user performs financial and/or shopping tasks

2.2 Determine when downloading an app, if the user checks (or not) that the app is from the official/expected source (e.g. developer name)

2.3 Determine when downloading an app, if the user checks the source of apps (e.g. if they come from Google Play, Amazon Appstore or other third party stores)

SOCIAL CONFIGURATIONS

- Dealing with suspicious text messages and emails

2.4 Determine if the user verifies the recipient/sender before sharing text messages or other information using smartphone apps

2.5 Determine if the user deletes any online communications (i.e., texts, emails, social media posts) that look suspicious

- Taking care when connecting smartphone to any other device

2.6 Determine if the user pays attention to the pop-ups on her smartphone when connecting it to another device (e.g. laptop, desktop).

ANDROID SYSTEM

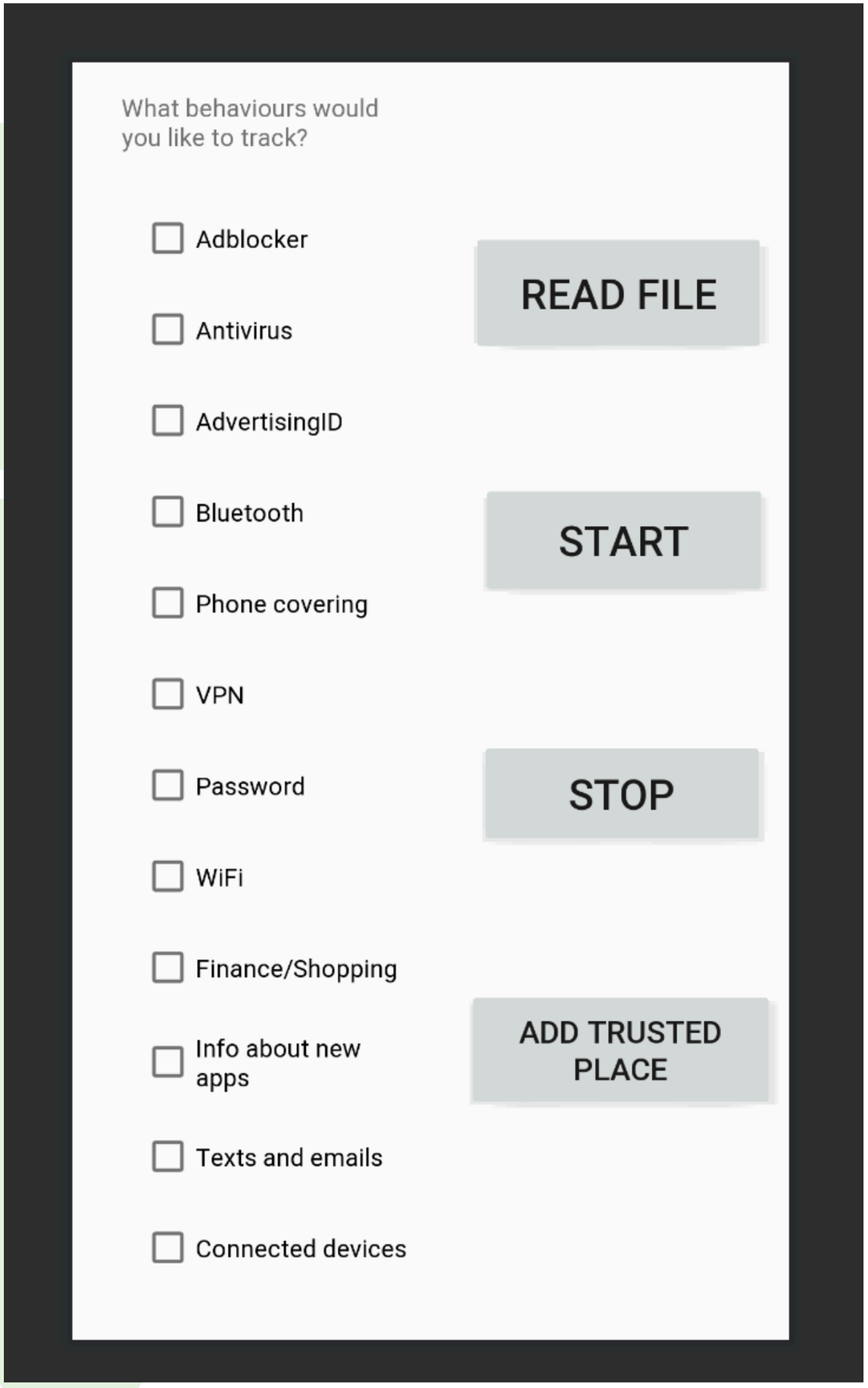
BROADCAST RECEIVERS

HANDLERS

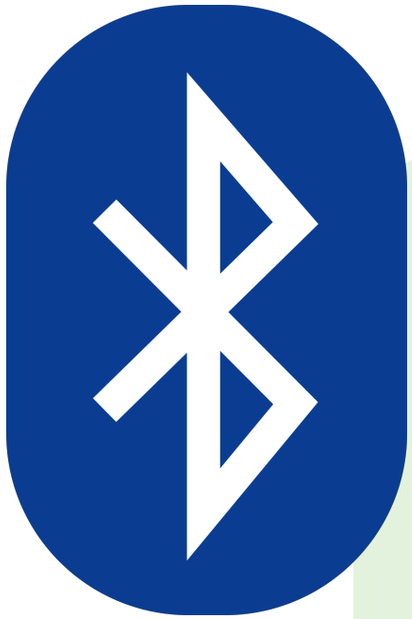
MAIN ACTIVITY

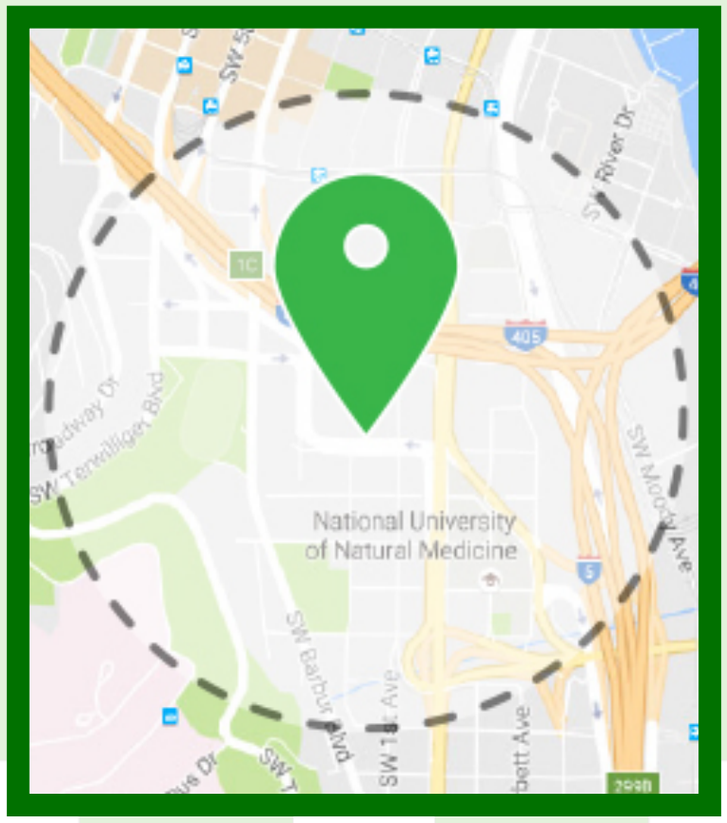
LISTENERS

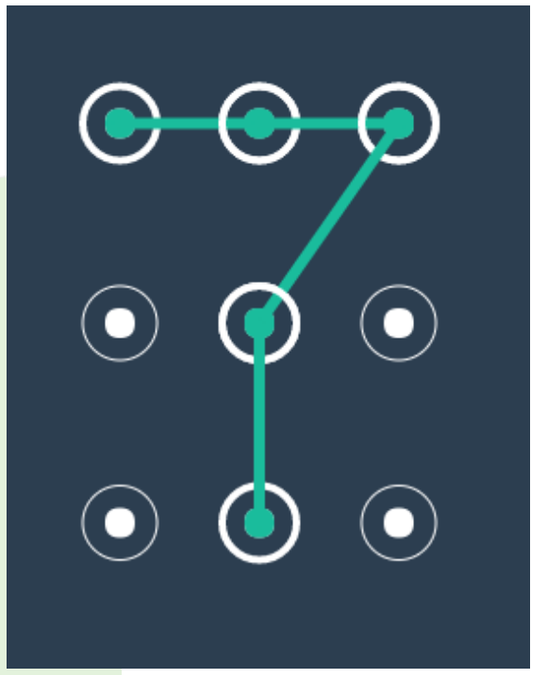
Main Activity UI



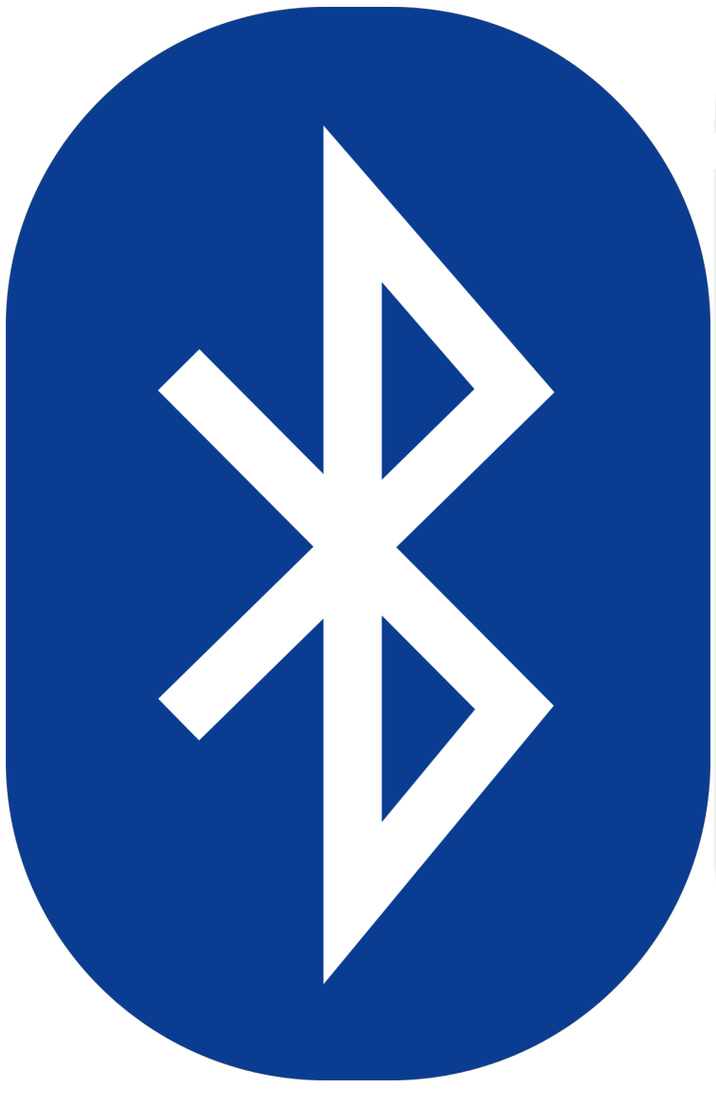
BROADCAST RECEIVERS







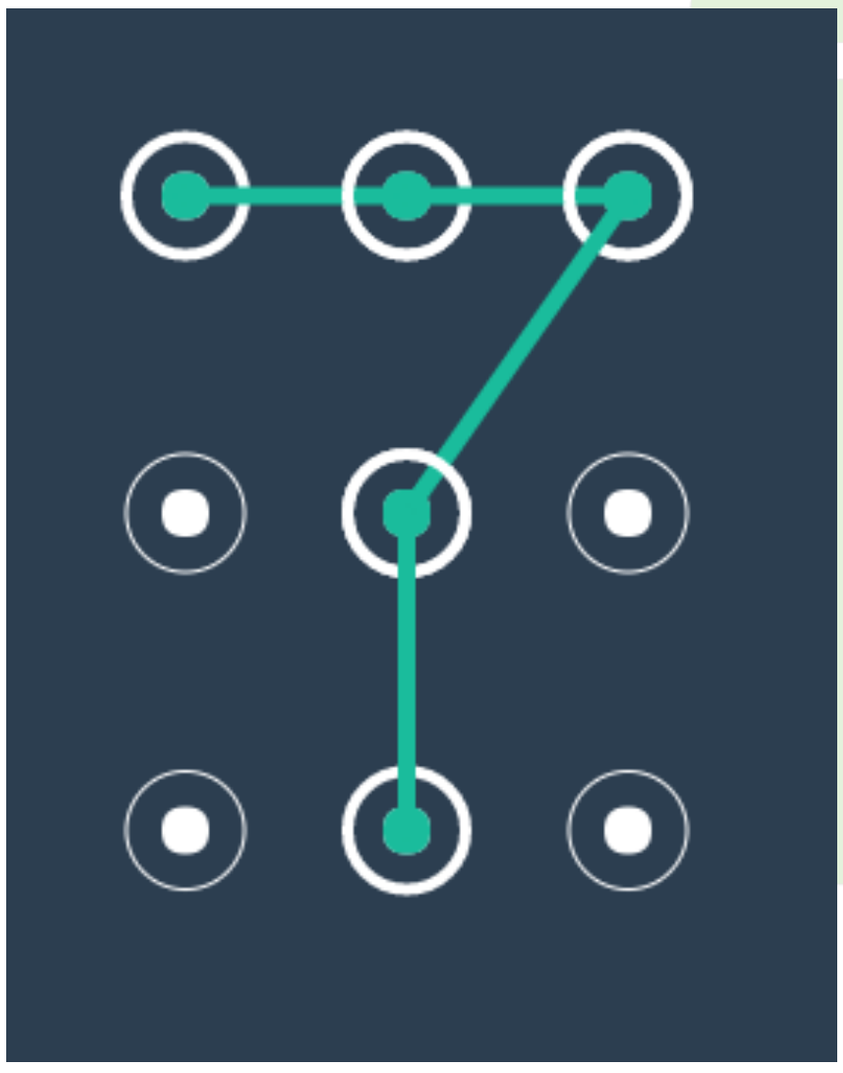
BROADCAST RECEIVERS



**BluetoothAdapter.
ACTION_STATE_CHANGED**

- STATE_OFF
- STATE_TURNING_OFF
- STATE_ON
- STATE_TURNING_ON

BROADCAST RECEIVERS

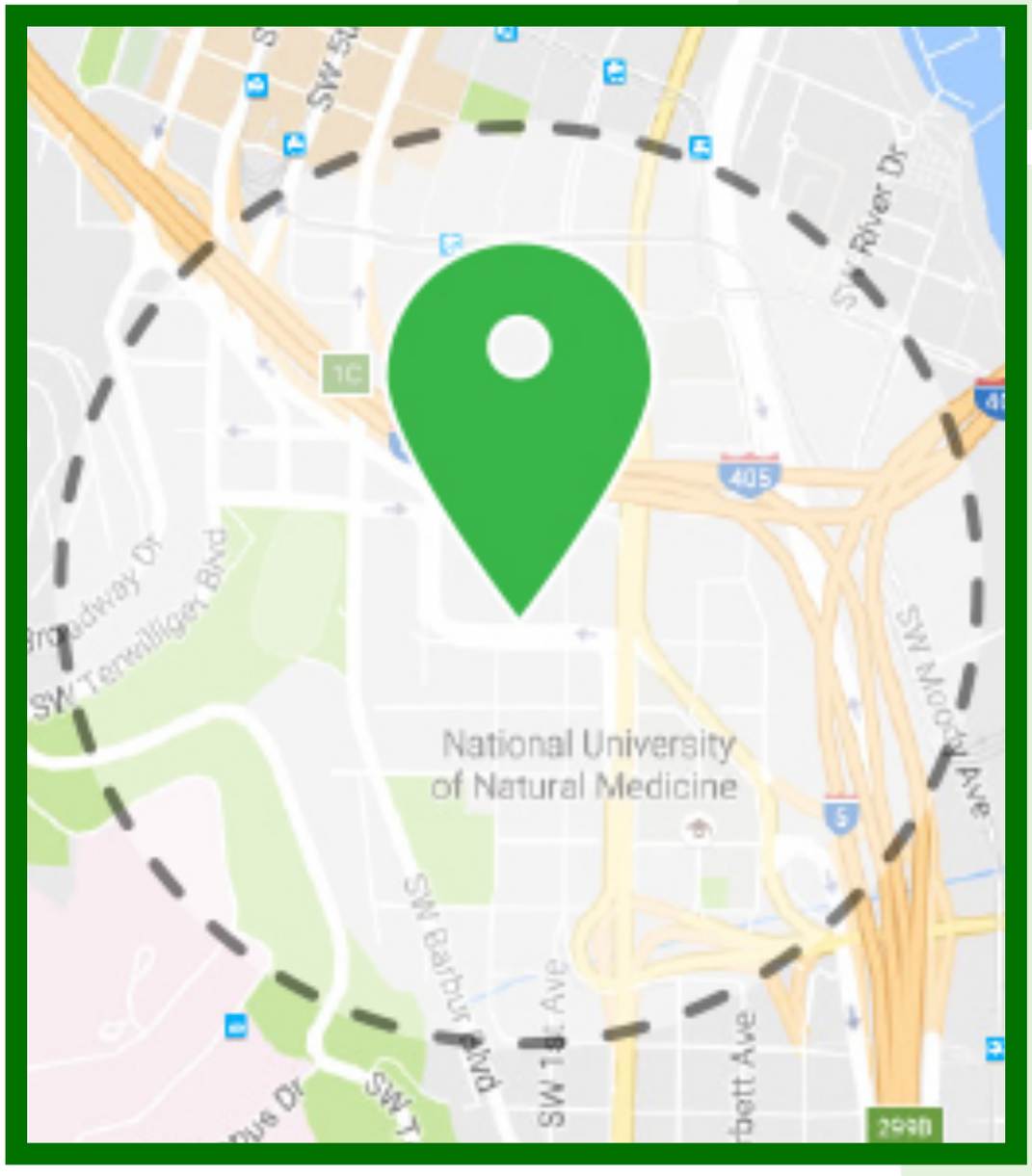


BroadcastReceiver

DeviceAdminReceiver

```
@Override
onPasswordChanged()
```

BROADCAST RECEIVERS



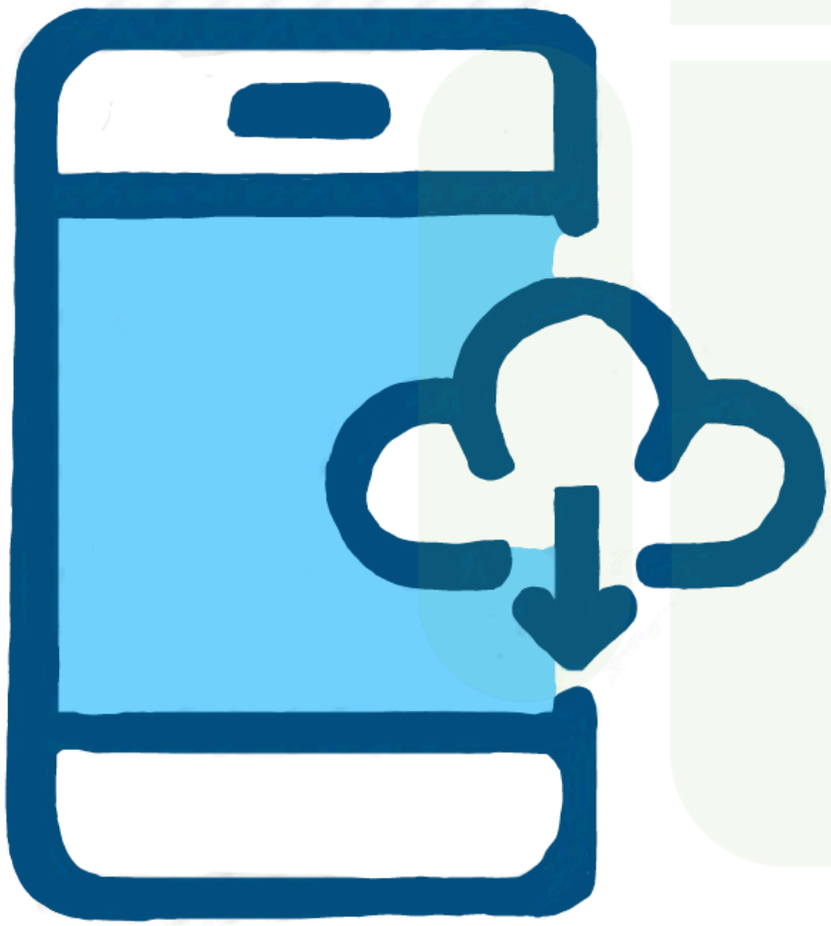
- GEOFENCE_TRANSITION_DWELL
- GEOFENCE_TRANSITION_EXIT

BROADCAST RECEIVERS

**WifiManager.
WIFI_STATE_CHANGED
_ACTION**

**WifiManager.WIFI_
STATE_DISABLING**

BROADCAST RECEIVERS



Intent.ACTION_PACKAGE_ADDED

HANDLERS

Google Ads

HANDLERS

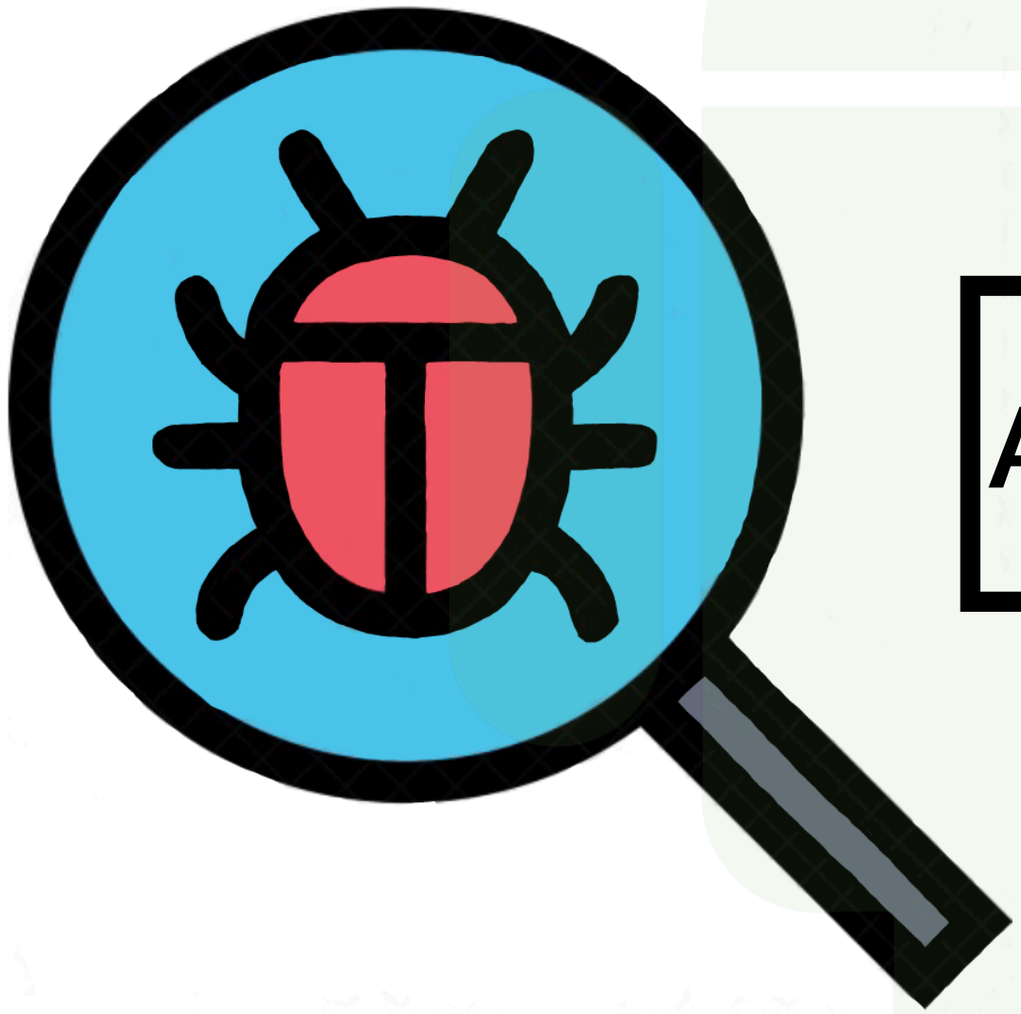
Google Ads

AdvertisingIdClient

- *getAdvertisingIdInfo()*
- *getId()*

AdBlockerAppWhitelist

HANDLERS



AntivirusAppWhitelist

HANDLERS

WifiManager:
isWifiEnabled()

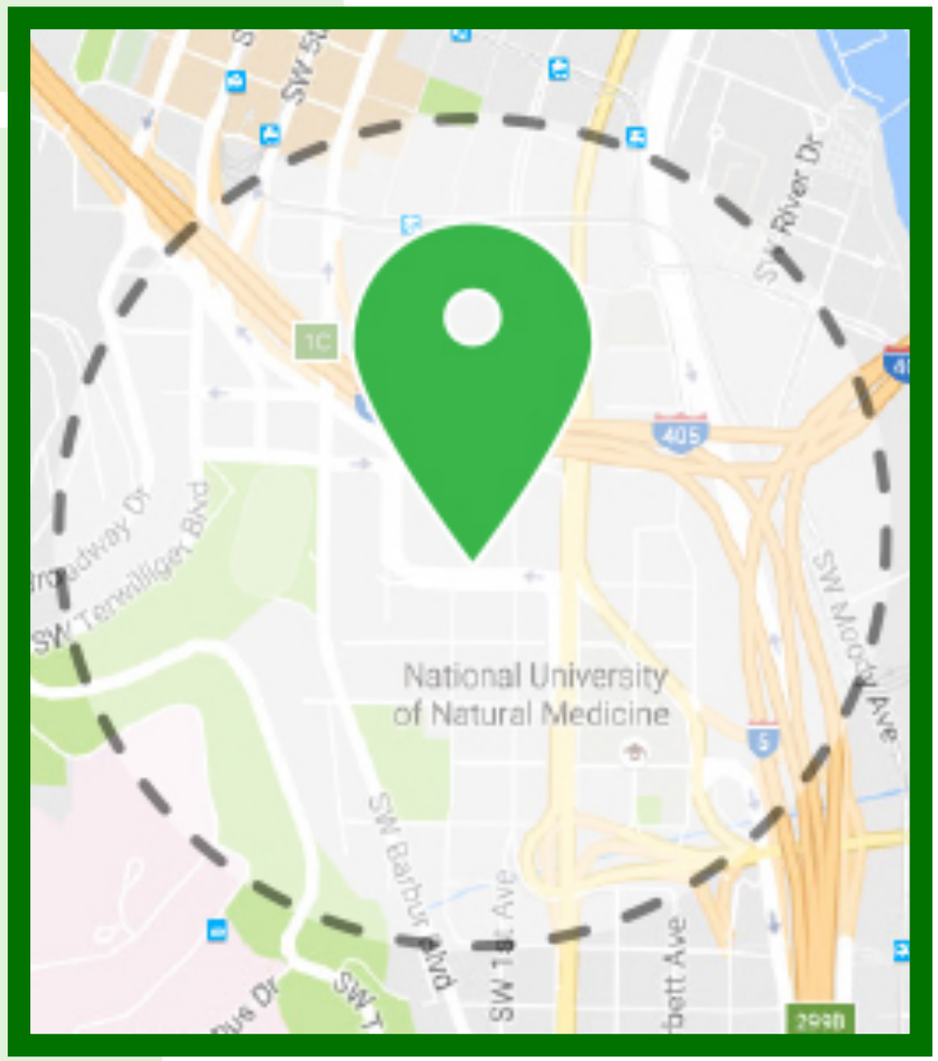
NetworkCapabilities.NET_CAPABILITY_CAPTIVE_PORTAL

HANDLERS

FinanceAppWhitelist

ShoppingAppWhitelist

LISTENERS


SW River Dr
National University
of Natural Medicine
SW Barbur Blvd
SW Moody Ave
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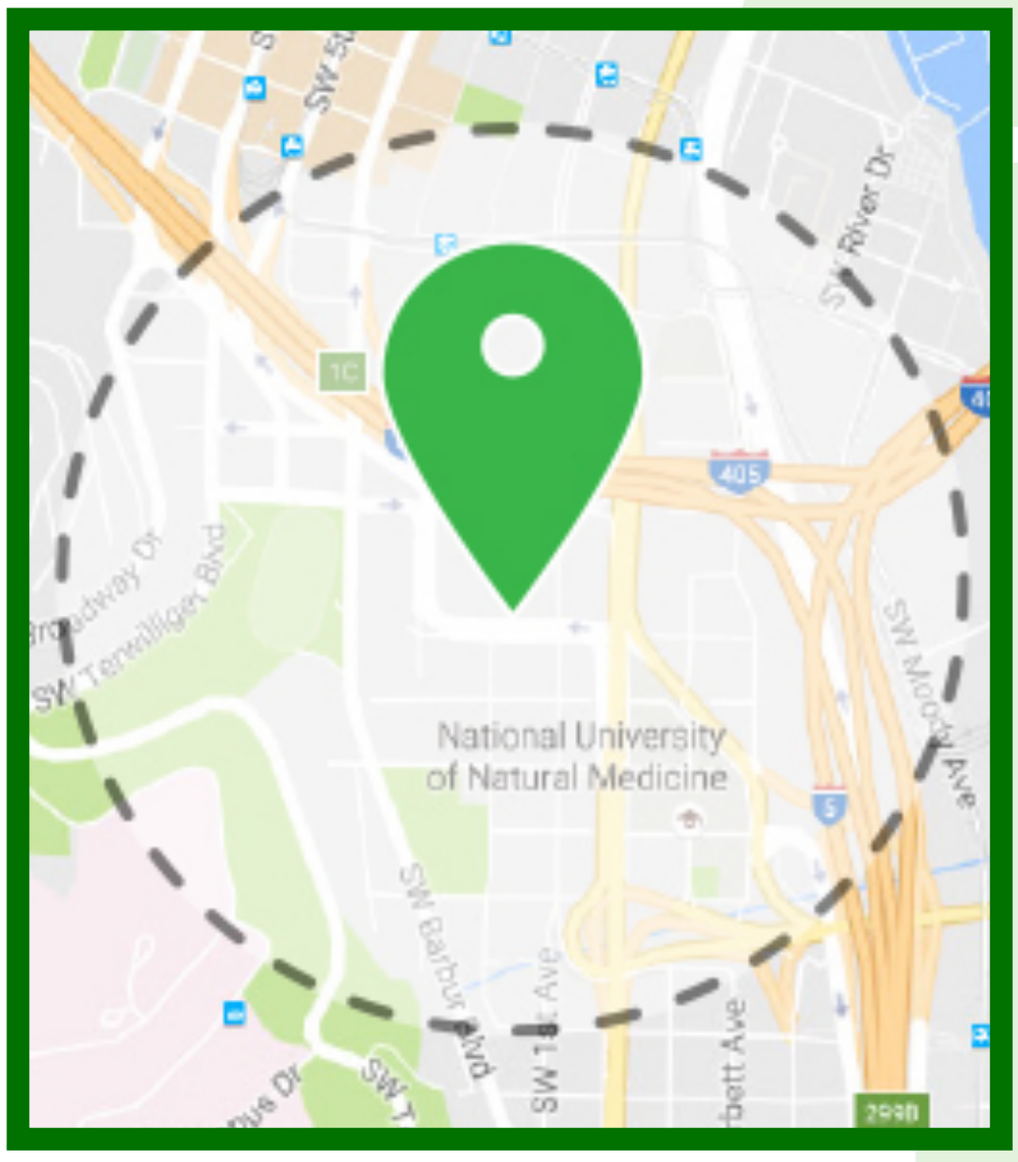
LISTENERS

SensorEventListener

```
@Override
onSensorChanged()
```

LISTENERS



GoogleMap.onMapClick Listener

@Override
onMapClick()

Evaluation

TECHNICAL CONFIGURATIONS

All but one!

SOCIAL CONFIGURATIONS

Problem 2.1 working, and have a clear plan on how best to implement the rest

Conclusion

- Aim of app is to strengthen Urbana-Champaign's claim
- Research could lead to improved workplace efficiency and security

Thank you for listening!

Any questions?

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