



Lecture 15: Location & Maps

IN721: Design and Development of Applications for Mobile Devices

Semester One, 2020

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Friday, 8 May

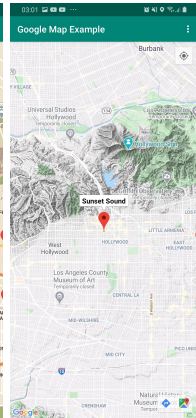
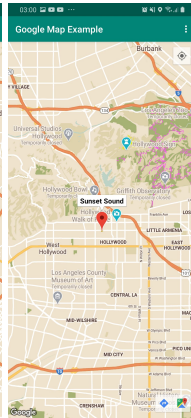
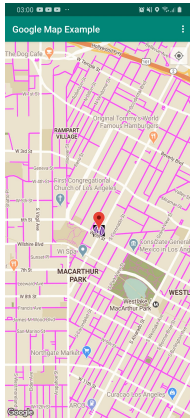
LECTURE 14: CAMERA TOPICS

- ▶ Camera API

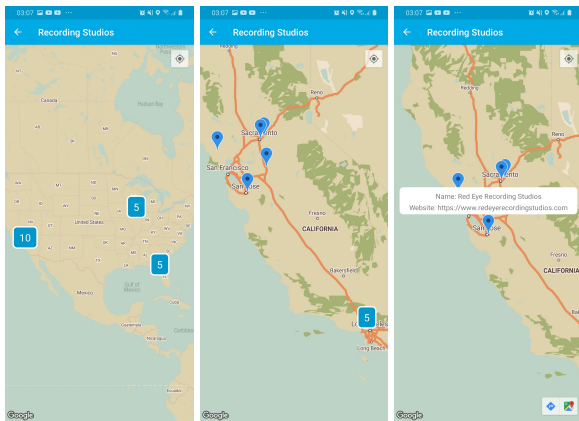
LECTURE 15: LOCATION & MAPS TOPICS

- ▶ Location
- ▶ Google Maps

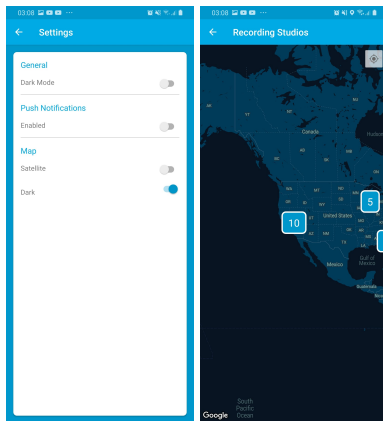
TODAY'S PRACTICAL - PART ONE



TODAY'S PRACTICAL - PART TWO (RESEARCH)



TODAY'S PRACTICAL - PART TWO (RESEARCH)



LOCATION - MAPSACTIVITY

- ▶ Create a new class called MapsActivity which extends AppCompatActivity or BaseActivity & OnMapReadyCallback
- ▶ getMapAsync - initialises the maps system & view

```
class MapsActivity : AppCompatActivity(), OnMapReadyCallback {  
  
    private lateinit var map: GoogleMap  
  
    override fun onCreate(savedInstanceState: Bundle?) {  
        super.onCreate(savedInstanceState)  
        setContentView(R.layout.activity_maps)  
        val mapFragment: SupportMapFragment = supportFragmentManager  
            .findFragmentById(R.id.map) as SupportMapFragment  
        mapFragment.getMapAsync(this@MapsActivity)  
    }  
}
```

LOCATION - ACTIVITY LAYOUT

- ▶ activity_maps.xml
- ▶ Simplest way to place a map in an application is using a fragment

```
<?xml version="1.0" encoding="utf-8"?>
<fragment xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/map"
    android:name="com.google.android.gms.maps.SupportMapFragment"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context="graysono.com.maps.MapsActivity" />
```


LOCATION - API KEY

- ▶ Store this safely...
- ▶ Create a google_maps_api.xml (debug) in the values resource directory

```
<resources>  
  <string name="google_maps_key" templateMergeStrategy="preserve"  
    translatable="false">AIzaSyB0m2SY3mY9Awm8qmxoIMWT236M3bGZB8k</string>  
</resources>
```

LOCATION - ANDROIDMANIFEST

- ▶ Declare permissions - ACCESS_FINE_LOCATION
- ▶ API key for Google Maps

```
<?xml version="1.0" encoding="utf-8"?>

<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="graysono.com.maps">

    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="Google Map Example"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/AppTheme">

        <meta-data
            android:name="com.google.android.geo.API_KEY"
            android:value="AIzaSyB0m2SY3mY9Awm8qmxoIMwT236M3bGZB8k" />

        <activity
            android:name="graysono.com.maps.MainActivity"
            android:label="Google Map Example">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

LOCATION - ONMAPREADY

- ▶ Override function - OnMapReady
- ▶ Reference to Google Map

```
override fun onMapReady(googleMap: GoogleMap) {  
    map = googleMap  
  
    val data: ArrayList<MapsData> = arrayListOf(  
        MapsData( name: "Sunset Sound", LatLng(34.0977818, -118.3349175), R.drawable.sunset_sound),  
        MapsData( name: "MIX Recording Studio", LatLng(34.0628191, -118.281333), R.drawable.mix_recording_studio),  
        MapsData( name: "SilverLake Recording Studios", LatLng(34.089849, -118.281676), R.drawable.silverlake_recording_studios)  
    )  
  
    val zoomLevel = 15f  
    map.moveCamera(CameraUpdateFactory.newLatLngZoom(data[1].location, zoomLevel))  
  
    for (d: MapsData in data) {  
        map.addMarker(  
            MarkerOptions()  
                .position(d.location)  
                .title(d.name)  
        )  
        val overlaySize = 100f  
        val googleOverlay: GroundOverlayOptions = GroundOverlayOptions()  
            .image(BitmapDescriptorFactory.fromResource(d.drawable))  
            .position(d.location, overlaySize)  
        map.addGroundOverlay(googleOverlay)  
    }  
  
    setMapLongClick(map)  
    setPointOfInterest(map)  
    setMapStyle(map)  
    enableMyLocation()  
}
```

LOCATION - MENU

- ▶ Menu containing four items
- ▶ Change the map's type
 - ▶ Normal
 - ▶ Hybrid
 - ▶ Satellite
 - ▶ Terrain

```
override fun onCreateOptionsMenu(menu: Menu?): Boolean {  
    val inflater: MenuInflater = menuInflater  
    inflater.inflate(R.menu.map_options, menu)  
    return true  
}  
  
override fun onOptionsItemSelected(item: MenuItem): Boolean {  
    when (item.itemId) {  
        R.id.normal_map -> map.mapType = GoogleMap.MAP_TYPE_NORMAL  
        R.id.hybrid_map -> map.mapType = GoogleMap.MAP_TYPE_HYBRID  
        R.id.satellite_map -> map.mapType = GoogleMap.MAP_TYPE_SATELLITE  
        R.id.terrain_map -> map.mapType = GoogleMap.MAP_TYPE_TERRAIN  
    }  
    return true  
}
```

LOCATION

- ▶ Private function - setMapLongClick
- ▶ Reference to Google Map
- ▶ setOnMapLongClickListener
 - ▶ Add a new marker to the map
 - ▶ Add marker options - position, title, snippet & icon

```
private fun setMapLongClick(map: GoogleMap) {  
    map.setOnMapLongClickListener { latLng ->  
        val snippet: String =  
            "Latitude: " + latLng.latitude + ", " + "Longitude: " + latLng.longitude  
        map.addMarker(  
            MarkerOptions()  
                .position(latLng)  
                .title(getString("Dropped Pin"))  
                .snippet(snippet)  
                .icon(BitmapDescriptorFactory.defaultMarker(BitmapDescriptorFactory.HUE_BLUE))  
        )  
    }  
}
```

LOCATION

- ▶ Private function - setPointOfInterest
- ▶ Reference to Google Map
- ▶ Displays each MapsData object's name in an info window
- ▶ Default marker colour - red

```
private fun setPointOfInterest(map: GoogleMap) {  
    map.setOnPoiClickListener { poi ->  
        val poiMarker: Marker = map.addMarker(  
            MarkerOptions()  
                .position(poi.latLng)  
                .title(poi.name)  
        )  
        poiMarker.showInfoWindow()  
    }  
}
```

LOCATION - MAP STYLE

- ▶ Private function - setMapStyle
- ▶ Reference to Google Map
- ▶ Loads raw resource style from raw resource directory
- ▶ JSON file containing map styling information
- ▶ Error checking - loading & missing resource style
- ▶ Resource - <https://mapstyle.withgoogle.com/>

```
private fun setMapStyle(map: GoogleMap) {  
    try {  
        val success: Boolean = map.setMapStyle(  
            MapStyleOptions.loadRawResourceStyle(  
                this,  
                R.raw.map_style  
            )  
        )  
        if (!success) {  
            Toast.makeText( context: this@MapsActivity, text: "Error loading map style.", Toast.LENGTH_LONG)  
                .show()  
        }  
    } catch (e: Resources.NotFoundException) {  
        Toast.makeText( context: this@MapsActivity, text: "Map style not found.", Toast.LENGTH_LONG).show()  
    }  
}
```

LOCATION - PERMISSIONS

- ▶ Private function - isPermissionsGranted
- ▶ Check if location has been granted by the user to the given package
 - ▶ Returns a boolean value

```
private fun isPermissionGranted(): Boolean {  
    return ContextCompat.checkSelfPermission(  
        context: this@MapsActivity,  
        Manifest.permission.ACCESS_FINE_LOCATION  
    ) == PackageManager.PERMISSION_GRANTED  
}
```


LOCATION - PERMISSIONS

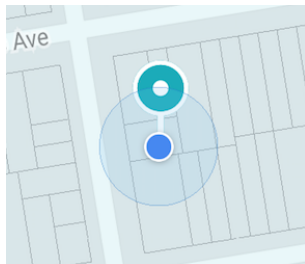
- ▶ Private function - isRequestPermissionResult
- ▶ Check if the request code = REQUEST_CODE_PERMISSION
- ▶ Enable location if location has been granted to the given package

```
override fun onRequestPermissionsResult(  
    requestCode: Int,  
    permissions: Array<String>,  
    grantResults: IntArray  
) {  
    if (requestCode == REQUEST_LOCATION_PERMISSION) {  
        if (grantResults.contains(PackageManager.PERMISSION_GRANTED)) {  
            enableMyLocation()  
        }  
    }  
}
```

LOCATION - PERMISSIONS



- ▶ Private function - enableMyLocation
- ▶ Get the status of my-location layer - set it to true
 - ▶ The little blue icon
- ▶ If the user has not granted permission, request permission

```
private fun enableMyLocation() {  
    if (isPermissionGranted()) {  
        map.isMyLocationEnabled = true  
    } else {  
        ActivityCompat.requestPermissions(  
            activity: this@MapsActivity,  
            arrayOf(Manifest.permission.ACCESS_FINE_LOCATION),  
            REQUEST_LOCATION_PERMISSION  
        )  
    }  
}
```



LOCATION - MAPSDATA

- ▶ Create a class called MapData
- ▶ MapData object contains a name, latitude/longitude & drawable

```
 class MapData (  
    var name: String,  
    var location: LatLng,  
    var drawable: Int  
 )
```

PRACTICAL

- ▶ Series of tasks covering today's lecture
- ▶ Worth 3% of your final mark for the Design and Development of Applications for Mobile Devices course
- ▶ Deadline: Friday, 12 June at 5pm