BATCH AND ROLL NO:
EXPERIMENT NO.10
TITLE: Design a mobile app using Google Map and GPS to trace the location.
DATE OF PERFORMANCE:
DATE OF SUBMISSION:

Title: Design a mobile app using Google Map and GPS to trace the location.

Requirements:
1 Android studio
2.Google Play service Packages

Theory:

Introduction

In the ever-connected world of mobile applications, harnessing the power of location-based services has become essential for creating dynamic and context-aware applications. This lab focuses on designing a mobile application that integrates Google Maps and Global Positioning System (GPS) functionalities, enabling users to trace their location and visualize it on a map. The fusion of Google Maps and GPS empowers developers to craft applications that provide real-time location-based information, fostering an enriched user experience.

Objective of the Lab: The primary objective of this lab is to guide you through the process of designing a mobile application that leverages Google Maps and GPS technology. By the end of this lab, you should be adept at implementing features such as obtaining real-time location updates, displaying the user's location on a Google Map, and incorporating additional functionalities to enhance the overall location tracking experience.

Components of the Application:

1. **Google Maps Integration:**
    - The application will integrate Google Maps, allowing users to view and interact with a map interface.
    - Developers will utilize the Google Maps API to embed the map and leverage its rich features for location-based interactions.
2. **GPS Location Tracking:**
    - The application will utilize the device's GPS functionality to trace and update the user's real-time location.
    - GPS data will be used to dynamically update the user's marker on the Google Map.

Lab Prerequisites:

- Basic understanding of mobile application development concepts.
- Familiarity with the chosen development environment (e.g., Android Studio).
- Prior knowledge of programming languages such as Java (for Android)

Steps:

Step 1: Set Up Your Development Environment

- Ensure that you have Android Studio installed and configured on your machine.
- Create a new project in Android Studio.

Step 2: Obtain Google Maps API Key

- Obtain a Google Maps API key from the Google Cloud Console.
- Enable the "Maps SDK for Android" for your project.

Step 3: Add Google Maps SDK to Your Project

- Open the build.gradle file (Module: app) and add the following dependency:

  implementation 'com.google.android.gms:play-services-maps:17.0.1'

Step 4: Design the User Interface

- Open the XML layout file associated with your main activity (e.g., activity_main.xml).
- Add a SupportMapFragment or MapView element to your layout to display the Google Map.

Step 5: Implement Google Maps Integration

- Open the Java file associated with your main activity (e.g., MainActivity.java).
- Initialize the Google Map and set up its features, such as zoom controls and markers.

Step 6: Implement GPS Location Tracking

- Request permission for accessing the device's location in the AndroidManifest.xml.
- Implement a LocationListener to receive location updates.

Step 7: Test Your Application

- Run your application on an emulator or a physical device.

- Verify that the Google Map is displayed, and the user's location is updated on the map as they move.

XML Code:

AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
 xmlns:tools="http://schemas.android.com/tools"
 >
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
 <uses-permission
android:name="android.permission.ACCESS_COARSE_LOCATION"/>
 <uses-permission android:name="android.permission.INTERNET"/>
 <uses-feature android:name="android.hardware.location.gps"/>
 <application
 android:allowBackup="true"
 android:dataExtractionRules="@xml/data_extraction_rules"
 android:fullBackupContent="@xml/backup_rules"
 android:icon="@mipmap/ic_launcher"
 android:label="@string/app_name"
 android:supportsRtl="true"
 android:theme="@style/Theme.Lab10"
 tools:targetApi="31">
<meta-data
 android:name="com.google.android.geo.API_KEY"
 android:value="AIzaSyCBlap-jqb0uC3vp7eBrzJn8iiTKJpxtgM" />
 <activity
 android:name=".MapsActivity"
 android:exported="true"
 android:label="@string/title_activity_maps">
 <intent-filter>
 <action android:name="android.intent.action.MAIN" />
 <category android:name="android.intent.category.LAUNCHER"
/>
 </intent-filter>
 </activity>
 </application>
</manifest>
```

Activity_maps.xml

```
<?xml version="1.0" encoding="utf-8"?>
<fragment xmlns:android="http://schemas.android.com/apk/res/android"
 xmlns:map="http://schemas.android.com/apk/res-auto"
 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=".MapsActivity" /
```

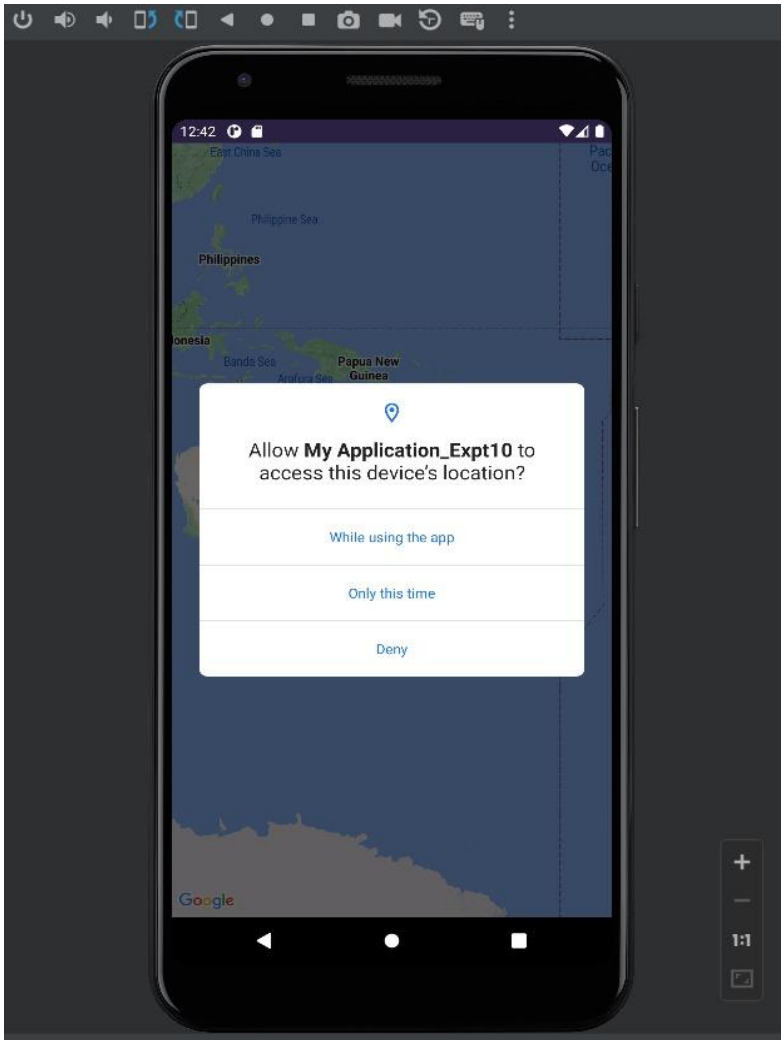
Java Code:

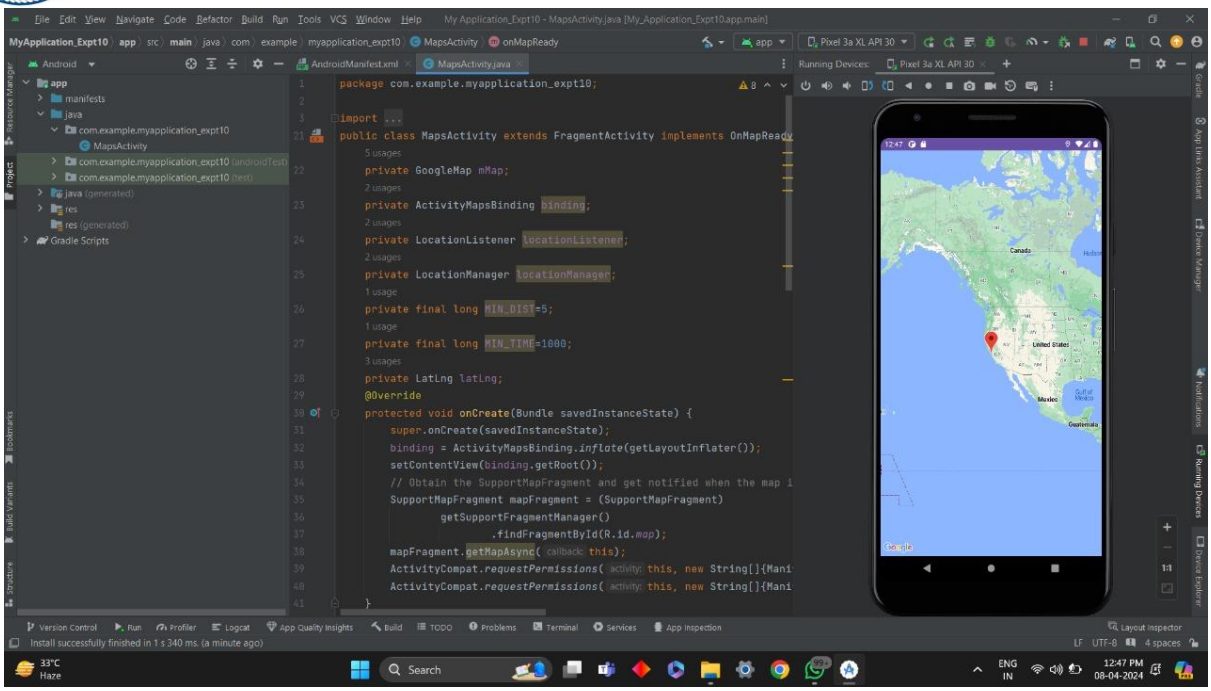
MainActivity.java

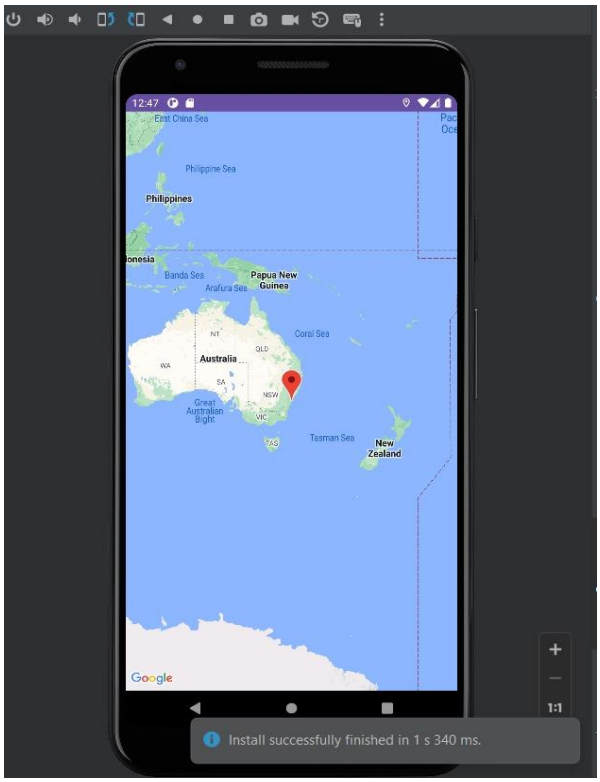
```
package com.example.lab10;
import androidx.annotation.NonNull;
import androidx.core.app.ActivityCompat;
import androidx.fragment.app.FragmentActivity;
import android.content.pm.PackageManager;
import android.location.Location;
import android.location.LocationListener;
import android.location.LocationManager;
import android.os.Bundle;
import android.Manifest;
import com.google.android.gms.maps.CameraUpdateFactory;
import com.google.android.gms.maps.GoogleMap;
import com.google.android.gms.maps.OnMapReadyCallback;
import com.google.android.gms.maps.SupportMapFragment;
import com.google.android.gms.maps.model.LatLng;
import com.google.android.gms.maps.model.MarkerOptions;
import com.example.lab10.databinding.ActivityMapsBinding;
public class MapsActivity extends FragmentActivity implements
OnMapReadyCallback {
 private GoogleMap mMap;
 private ActivityMapsBinding binding;
 private LocationListener locationListener;
 private LocationManager locationManager;
 private final long MIN_DIST=5;
 private final long MIN_TIME=1000;
 private LatLng latLng;
 @Override
 protected void onCreate(Bundle savedInstanceState) {
 super.onCreate(savedInstanceState);
```

```
binding = ActivityMapsBinding.inflate(getLayoutInflater());
 setContentView(binding.getRoot());
 // Obtain the SupportMapFragment and get notified when the map is
ready to be used.
 SupportMapFragment mapFragment = (SupportMapFragment)
getSupportFragmentManager()
 .findFragmentById(R.id.map);
 mapFragment.getMapAsync(this);
 ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.ACCESS_FINE_LOCATION},
PackageManager.PERMISSION_GRANTED);
 ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.ACCESS_COARSE_LOCATION},
PackageManager.PERMISSION_GRANTED);
 }
 @Override
 public void onMapReady (GoogleMap googleMap){
 mMap = googleMap;
 // Add a marker in Sydney and move the camera
 LatLng sydney = new LatLng(-34, 151);
 mMap.addMarker(new
MarkerOptions().position(sydney).title("Marker in Sydney"));
 mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney));
 locationListener = new LocationListener() {
 @Override
 public void onLocationChanged(@NonNull Location location)
{
 latLng = new
LatLng(location.getLatitude(),location.getLongitude());
 mMap.addMarker(new MarkerOptions().position(latLng
).title("My position"));

mMap.moveCamera(CameraUpdateFactory.newLatLng(latLng));
 }
 };
 locationManager = (LocationManager)
getSystemService(LOCATION_SERVICE);
 try{

locationManager.requestLocationUpdates(LocationManager.GPS_PROVIDER,MIN_TI
ME,MIN_DIST,locationListener);}
 catch (SecurityException e){
 e.printStackTrace();
 }
 }
}
```

Output:


12:42
East China Sea
Philippine Sea
Philippines
Banda Sea
Papua New Guinea
Allow My Application_Expt10 to access this device's location?
While using the app
Only this time
Deny
Google
1:1


package com.example.myapplication_expt10;
import ...
public class MapsActivity extends FragmentActivity implements OnMapReady
private GoogleMap mMap;
private ActivityMapsBinding binding;
private LocationListener locationListener;
private LocationManager locationManager;
private final long MIN_DIST=5;
private final long MIN_TIME=1000;
private LatLng latLng;
@Override
protected void onCreate(Bundle savedInstanceState) {
super.onCreate(savedInstanceState);
binding = ActivityMapsBinding.inflate(getLayoutInflater());
setContentView(binding.getRoot());
// Obtain the SupportMapFragment and get notified when the map i
SupportMapFragment mapFragment = (SupportMapFragment)
getSupportFragmentManager()
.findFragmentById(R.id.map);
mapFragment.getMapAsync(callback: this);
ActivityCompat.requestPermissions(activity: this, new String[]{Mani
ActivityCompat.requestPermissions(activity: this, new String[]{Mani
}
Install successfully finished in 1 s 340 ms. (a minute ago)


12:47
East China Sea
Philippine Sea
Philippines
Banda Sea
Arafura Sea
Papua New Guinea
Coral Sea
Australia
Great Australian Bight
Tasman Sea
New Zealand
Google
Install successfully finished in 1 s 340 ms.

Conclusion:

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