PUNE INSTITUTE OF COMPUTER TECHNOLOGY, PUNE – 411043

Department of Electronics & Telecommunication Engineering

BATCH AND ROLL NO: P5-42114
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:

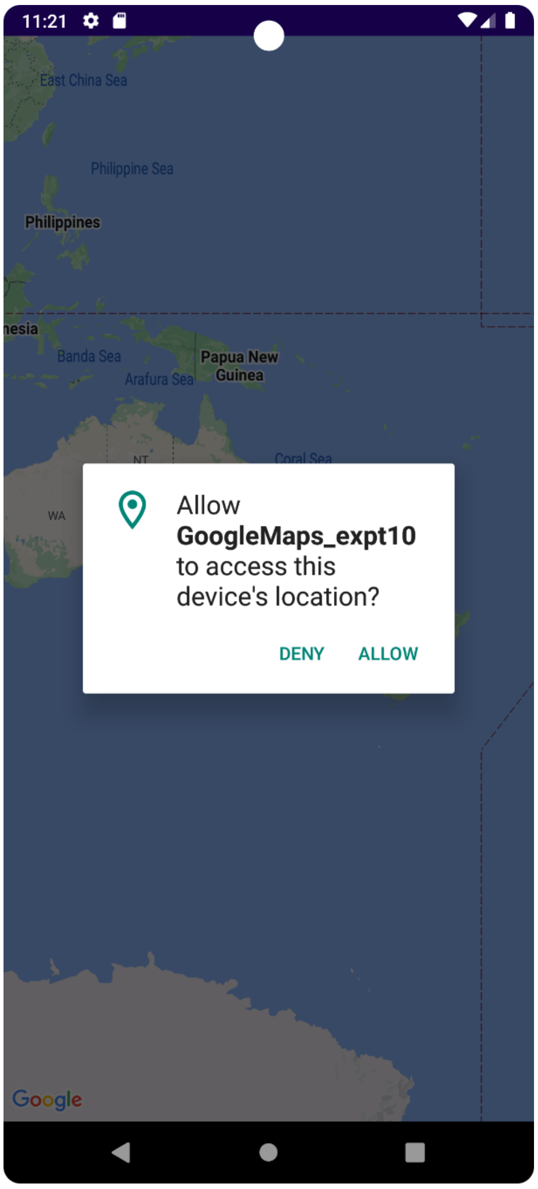
```
<?xml version="1.0" encoding="utf-8"?>
<fragment xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:map="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/map"
    android:name="com.google.android.gms.maps.SupportMapFragment"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

Java Code:

```
package com.example.googlemaps_expt10;

import androidx.annotation.NonNull;
import androidx.appcompat.app.AppCompatActivity;
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.googlemaps_expt10.databinding.ActivityMainBinding;

public class MainActivity extends FragmentActivity implements OnMapReadyCallback {

    private GoogleMap mMap;
    private ActivityMainBinding binding;
    private LocationListener locationListener;
    private LocationManager locationManager;
    private final long MIN_DIST=5;
    private final long MIN_TIME=1000;
    private LatLng latLng;

    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
```

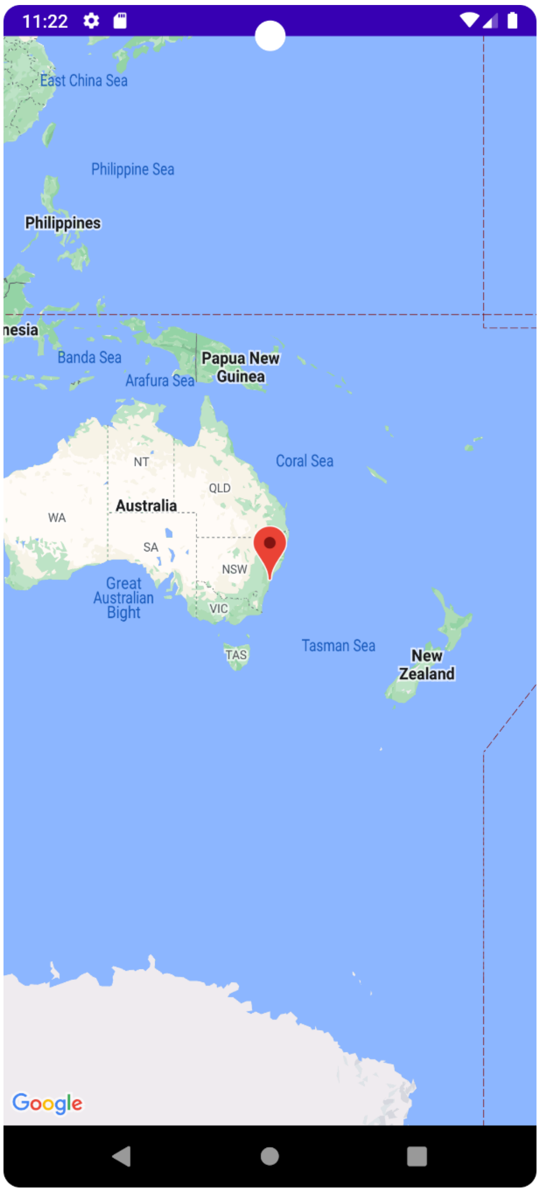
```
            binding = ActivityMainBinding.inflate(getLayoutInflater());
        setContentView(binding.getRoot());
        SupportMapFragment mapFragment =
(SupportMapFragment)getSupportFragmentManager().findFragmentById(R.id.map);
        assert mapFragment != null;
        mapFragment.getMapAsync(this);

        ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.ACCESS_FINE_LOCATION},PackageManager.PERMISSIO
N_GRANTED);
        ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.ACCESS_COARSE_LOCATION},PackageManager.PERMIS
SION_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_TIME,
MIN_DIST,locationListener);
        }
        catch (SecurityException e){
            e.printStackTrace();
        }

    }

}
```

Output:


11:21

Allow **GoogleMaps_expt10** to access this device's location?

DENY ALLOW


11:22

Conclusion:

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