IOT Phase 4: DEVELOPMENT PART 2

Project :Air quality monitoring

To implement a air quality monitoring system into a mobile app, we need to integrate various technologies and APIs.
Code snippet using the Google Maps API and Firebase Realtime Database to get air quality information and display it in a mobile app:

1. **Set up the project:**

```
// Initialize Firebase
FirebaseApp.initializeApp(this);

// Initialize Google Maps
MapView mapView = findViewById(R.id.mapView);
mapView.onCreate(savedInstanceState);
mapView.getMapAsync(new OnMapReadyCallback()
 {
   @Override
   public void onMapReady(GoogleMap googleMap)
 {
      // Handle map initialization here
   }
});
DatabaseReference databaseReference =
FirebaseDatabase.getInstance().getReference("air_quality");
```

```
databaseReference.addValueEventListener(new
ValueEventListener()
{
   @Override
   public void onDataChange(DataSnapshot dataSnapshot)
{
      for (DataSnapshot data : dataSnapshot.getChildren())
 {
         // Parse and process air quality data
         AirQuality airQuality = data.getValue(AirQuality.class);

         // Use the data to display markers on the map
         LatLng location = new LatLng(airQuality.getLatitude(),
airQuality.getLongitude());
         MarkerOptions markerOptions = new MarkerOptions()
               .position(location)
               .title("AQI: " + airQuality.getAqi());

         googleMap.addMarker(markerOptions);
      }
   }

   @Override
   public void onCancelled(DatabaseError databaseError)
{
      // Handle database error
   }
});
```

```
public class AirQuality
 {
   private double latitude;
   private double longitude;
   private int aqi;

   public AirQuality()
 {
      // Default constructor required for Firebase
   }

   public AirQuality(double latitude, double longitude, int aqi)
 {
      this.latitude = latitude;
      this.longitude = longitude;
      this.aqi = aqi;
   }

   public double getLatitude()
{
      return latitude;
   }

   public double getLongitude()
{
      return longitude;
   }
```

```
    public int getAqi()
{
        return aqi;
    }
}
```

2. Prepare the Firebase database structure:

Before running the app code, we need to configure and populate our Firebase Realtime Database with air quality information.

```
// Initialize Firebase Realtime Database reference
DatabaseReference airQualityRef =
FirebaseDatabase.getInstance().getReference("air_quality");

// Sample data
double latitude = 37.7749; // Replace with actual latitude
double longitude = -122.4194; // Replace with actual longitude
int aqi = 50; // Replace with actual AQI value
long timestamp = System.currentTimeMillis(); // Timestamp of data

// Create an AirQuality object
AirQuality airQuality = new AirQuality(latitude, longitude, aqi,
timestamp);

// Generate a unique key for the new data entry
String entryKey = airQualityRef.push().getKey();

// Save the data to Firebase
```

airQualityRef.child(entryKey).setValue(airQuality);

This code sets up a simple mobile app with a Google Map embedded, connecting to a Firebase Realtime Database to fetch air quality information.