Phase4:Development Part 2

Project Title	Iot-TRAFFIC MANAGEMENT
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IOT-Traffic Management System

Project Overview:

In this phase, we will continue building the project by developing a mobile app Using Android Studio. The objective is to create an app that displays real-time Traffic .data received from an ESP32 microcontroller, utilizing Firebase For data transmission and storage.

Android studio:

Android Studio is the official integrated development environment (IDE) for Android app development. It's a powerful and feature-rich IDE developed by Google, designed to make it easier for developers to create, test, and deploy Android applications. Here, I'll provide an overview of Android Studio in detail: In Android Studio, you can create various types of files for your Android app project, including Java/Kotlin source files, XML layout files, resource files, and more. Here are the general steps to create a file in Android Studio.

How to create file in android studio:

Open or Create a Project:

If you already have an Android Studio project open, make sure it's loaded in the IDE.If you're starting a new project, you can create one by going to "File" > "New" > "New Project." **Select the Destination Directory:**

In the Project Explorer on the left side of the IDE, navigate to the directory where you want to create the new file. Typically, Java/Kotlin source files are placed in the "java" directory, XML layout files in the "res" directory, and other resources in their respective directories.

Create a New File:

Right-click on the directory where you want to create the file. Select "New" to open the submenu. Choose the type of file you want to create. For example, to create a new Java or Kotlin class, select "Java Class" or "Kotlin Class."

Specify File Details:

In the dialog that appears, you'll be prompted to provide details about the file you're creating. This may include the file name, the package name for source files, and the type of file (Java class, XML layout, etc.).Fill in the necessary information and click "OK" or "Finish" to create the file.

Edit the File:

After creating the file, Android Studio will open it in the code editor. You can start editing the file by adding your code, layout components, or other resources as needed.

Save the File:

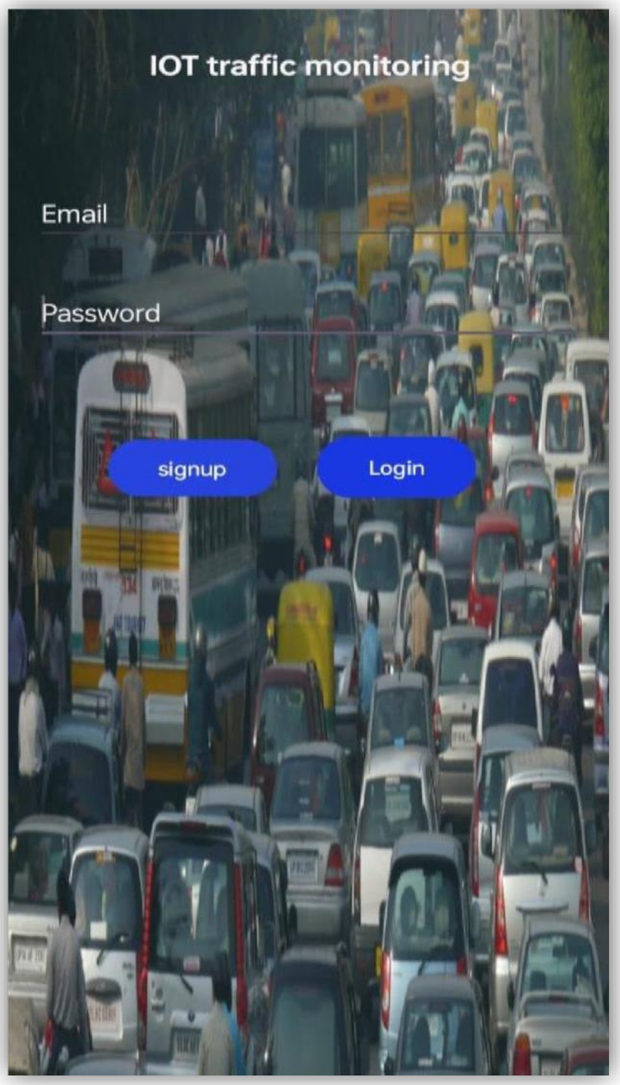
Make sure to save the file after making changes by either clicking the "Save" icon (a floppy disk icon) in the toolbar or pressing Ctrl + S (or Command + S on macOS) on your keyboard.

Layout Progran:

Activity_login.xml

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

<androidx.constraintlayout.widget.ConstraintLayout xmlns:android=http://schemas.android.com/apk/res/android

   Xmlns:app=http://schemas.android.com/apk/res-auto

   Xmlns:tools=http://schemas.android.com/tools

   Android:layout_width="match_parent"

   Android:layout_height="match_parent"

   Android:background="@drawable/traffic"

   Android:padding="16dp">


   <EditText

      Android:id="@+id/emailEditText"

      Android:layout_width="match_parent"

      Android:layout_height="wrap_content"

      Android:hint="Email"

      Android:inputType="textEmailAddress"

      Android:textColor="#F1ECEC"

      Android:textColorHint="#FFFFFF"

      App:layout_constraintBottom_toTopOf="@+id/passwordEditText"

      App:layout_constraintTop_toTopOf="parent"

      App:layout_constraintVertical_bias="0.846"

      Tools:layout_editor_absoluteX="16dp" />


   <EditText

      Android:id="@+id/passwordEditText"

      Android:layout_width="match_parent"

      Android:layout_height="wrap_content"

      Android:layout_marginBottom="436dp"

      Android:hint="Password"

      Android:inputType="textPassword"

      Android:textColorHint="#FFFFFF"
```

```
    App:layout_constraintBottom_toBottomOf=”parent”

    Tools:layout_editor_absoluteX=”16dp” />


  <Button

    Android:id=”@+id/registerButton”
    Android:layout_width=”wrap_content”

    Android:layout_height=”wrap_content”

    Android:backgroundTint=”#090305”

    Android:text=”Register”

    App:layout_constraintBottom_toBottomOf=”parent”

    App:layout_constraintEnd_toEndOf=”parent”

    App:layout_constraintHorizontal_bias=”0.803”

    App:layout_constraintStart_toStartOf=”parent”

    App:layout_constraintTop_toBottomOf=”@+id/passwordEditText”

    App:layout_constraintVertical_bias=”0.094” />


  <TextView

    Android:id=”@+id/textView2”

    Android:layout_width=”286dp”

    Android:layout_height=”69dp”

    Android:text=”IOT Air Quality Sign Up”

    Android:textAlignment=”center”

    Android:textAllCaps=”true”

    Android:textSize=”24sp”

    Android:textStyle=”bold”

    Tools:layout_editor_absoluteX=”48dp”

    Tools:layout_editor_absoluteY=”39dp” />


</androidx.constraintlayout.widget.ConstraintLayout>
```



Activity_Main:

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

<androidx.constraintlayout.widget.ConstraintLayout xmlns:android=http://schemas.android.com/apk/res/android
```

```
Xmlns:app=http://schemas.android.com/apk/res-auto
Xmlns:tools=http://schemas.android.com/tools
Android:layout_width=”match_parent”
Android:layout_height=”match_parent”
Android:background=”@drawable/traffic”
Android:padding=”16dp”
Tools:ignore=”ExtraText”>


<EditText
    Android:id=”@+id/emailEditText”
    Android:layout_width=”match_parent”
    Android:layout_height=”wrap_content”
    Android:hint=”Email”
    Android:inputType=”textEmailAddress”
    Android:textColor=”#FAFAFA”
    Android:textColorHint=”#FFFFFF”
    App:layout_constraintBottom_toTopOf=”@+id/passwordEditText”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.812”
    Tools:layout_editor_absoluteX=”16dp” />

<EditText
    Android:id=”@+id/passwordEditText”
    Android:layout_width=”match_parent”
    Android:layout_height=”wrap_content”
    Android:layout_marginBottom=”476dp”
    Android:hint=”Password”
    Android:inputType=”textPassword”
    Android:textColor=”#F1EEEE”
    Android:textColorHighlight=”#F8F5F5”
    Android:textColorHint=”#F3F0F0”
```

```
  App:layout_constraintBottom_toBottomOf=”parent”
  App:layout_constraintEnd_toEndOf=”parent”
  App:layout_constraintHorizontal_bias=”0.125”
  App:layout_constraintStart_toStartOf=”parent” />

<Button
  Android:id=”@+id/loginButton”
  Android:layout_width=”95dp”
  Android:layout_height=”49dp”        Android:layout_marginEnd=”64dp”
  Android:backgroundTint=”#1938E1”
  Android:text=”Login”
  Android:textColorHighlight=”#CD7C7C”
  App:layout_constraintBottom_toBottomOf=”parent”
  App:layout_constraintEnd_toEndOf=”parent”
  App:layout_constraintTop_toTopOf=”parent”
  App:layout_constraintVertical_bias=”0.419”
  App:rippleColor=”#E14545”
  App:strokeColor=”#E85656” />

<Button
  Android:id=”@+id/signup”
  Android:layout_width=”101dp”
  Android:layout_height=”46dp”
  Android:layout_marginEnd=”24dp”
  Android:backgroundTint=”#2844DF”
  Android:text=”signup”
  Android:textColorHighlight=”#DC4040”
  Android:textColorLink=”#D84577”
  App:layout_constraintBottom_toBottomOf=”parent”
  App:layout_constraintEnd_toStartOf=”@+id/loginButton”
  App:layout_constraintTop_toTopOf=”parent”
  App:layout_constraintVertical_bias=”0.42” />
  <TextView
    Android:id=”@+id/textView”
    Android:layout_width=”251dp”
    Android:layout_height=”36dp”
    Android:layout_marginBottom=”24dp”
    Android:fontFamily=”sans-serif-black”
    Android:text=”IOT traffic monitoring”
    Android:textAlignment=”center”
    Android:textColor=”#FAF6F6”
    Android:textColorHighlight=”#FAF9F9” Android:textColorHint=”#FFFFFF”
    Android:textColorLink=”#FBF9F9”
    Android:textSize=”20sp”
    Android:textStyle=”bold”
    App:layout_constraintBottom_toTopOf=”@+id/emailEditText”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintHorizontal_bias=”0.506”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.25” />

</androidx.constraintlayout.widget.ConstraintLayout>
```

Program Description:

Android UI Layout Description

The provided code is an XML layout file for an Android app’s user interface (UI). It’s written using the ConstraintLayout, which is a type of layout in Android that allows you to create complex and responsive UIs. Here’s a brief program description:

- **The root element is a ConstraintLayout, which is used to create a flexible and responsive UI. It defines various attributes such as background, padding, and layout width/height.**

- **Within the ConstraintLayout, there are several child views:**
- **Two EditText elements for email and password input fields.**
- **Two Button elements for login and signup actions.**
- **One TextView displaying the text “IOT traffic monitoring.”**
- **Each view (EditText, Button, and TextView) has specific attributes defined, such as IDs, layout dimensions, hint text, text color, and constraints that define their position relative to other views.**

The XML file also includes various styling attributes like text color, text size, font, and background color for the UI elements.

It seems to be related to an “IOT traffic monitoring” application, possibly for user authentication with email and password.

Please note that the provided XML layout is a part of an Android app’s UI, and its functionality would be implemented in Java or Kotlin code. This layout defines the visual structure of the app’s login or signup screen.

```
<?xml version=”1.0” encoding=”utf-8”?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android=http://schemas.android.com/apk/res/android
  Xmlns:app=http://schemas.android.com/apk/res-auto
  Xmlns:tools=http://schemas.android.com/tools
  Android:layout_width=”match_parent”
  Android:layout_height=”match_parent”
  Android:background=”#130035”
  Android:padding=”16dp”>

  <TextView
    Android:id=”@+id/textViewDistance”
    Android:layout_width=”336dp”
    Android:layout_height=”31dp”
    Android:text=”Distance: 0 m”
    Android:textAlignment=”center”
    Android:textAllCaps=”true”
    Android:textColor=”#FFFFFF”
    Android:textSize=”13sp”
    App:layout_constraintBottom_toBottomOf=”parent”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintHorizontal_bias=”0.454”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.105” />

<TextView
    Android:id=”@+id/textViewDistance2”
    Android:layout_width=”314dp”
    Android:layout_height=”28dp”
    Android:text=”Distance: 0 m”
    Android:textAlignment=”center”
    Android:textAllCaps=”true”
    Android:textColor=”#FFFFFF”
    Android:textSize=”13sp”
    App:layout_constraintBottom_toBottomOf=”parent”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.608” />

<ImageView
    Android:id=”@+id/trafficLightImage”
    Android:layout_width=”192dp”
    Android:layout_height=”167dp”

    App:layout_constraintBottom_toBottomOf=”parent”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintHorizontal_bias=”0.456”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.223” />

<ImageView
    Android:id=”@+id/trafficLightImage2”
    Android:layout_width=”192dp”
    Android:layout_height=”167dp”


    App:layout_constraintBottom_toBottomOf=”parent”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintHorizontal_bias=”0.461”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.852” />    <TextView
    Android:id=”@+id/textViewStatus”
    Android:layout_width=”wrap_content”
    Android:layout_height=”wrap_content”
    Android:shadowColor=”#FDFDFD”
    Android:text=”Status: Red”
    Android:textAlignment=”center”
    Android:textAllCaps=”true”
    Android:textColor=”#FFFFFF”
    Android:textSize=”15sp”
    App:layout_constraintBottom_toBottomOf=”parent”
    App:layout_constraintEnd_toEndOf=”parent”
    App:layout_constraintHorizontal_bias=”0.47”
    App:layout_constraintStart_toStartOf=”parent”
    App:layout_constraintTop_toTopOf=”parent”
    App:layout_constraintVertical_bias=”0.437” />

<TextView
```

```
   Android:id=”@+id/textViewStatus2”
   Android:layout_width=”wrap_content”
   Android:layout_height=”wrap_content”
   Android:shadowColor=”#FFFFFF”
   Android:text=”Status: Red”
   Android:textAlignment=”center”
   Android:textAllCaps=”true”
   Android:textColor=”#FFFFFF”
   Android:textSize=”15sp”
   App:layout_constraintBottom_toBottomOf=”parent”
   App:layout_constraintEnd_toEndOf=”parent”
   App:layout_constraintHorizontal_bias=”0.476”
   App:layout_constraintStart_toStartOf=”parent”
   App:layout_constraintTop_toTopOf=”parent”
   App:layout_constraintVertical_bias=”0.942” />


 <TextView
   Android:id=”@+id/textView3”
   Android:layout_width=”wrap_content”
   Android:layout_height=”wrap_content”
   Android:text=”Signal 1 “
   Android:textAlignment=”center”
   Android:textAllCaps=”true”
   Android:textColor=”#FFFFFF”
   Android:textSize=”20sp”
   Android:textStyle=”bold”
   App:layout_constraintBottom_toBottomOf=”parent”
   App:layout_constraintEnd_toEndOf=”parent”
   App:layout_constraintHorizontal_bias=”0.503”
   App:layout_constraintStart_toStartOf=”parent”
   App:layout_constraintTop_toTopOf=”parent”
   App:layout_constraintVertical_bias=”0.046” />
```

```
  <TextView
    Android:id="@+id/textView4"
    Android:layout_width="wrap_content"
    Android:layout_height="wrap_content"
    Android:text="Signal 2"
    Android:textAlignment="center"
    Android:textAllCaps="true"
    Android:textColor="#FFFFFF"
    Android:textSize="20sp"
    Android:textStyle="bold"
    App:layout_constraintBottom_toBottomOf="parent"
    App:layout_constraintEnd_toEndOf="parent"
    App:layout_constraintHorizontal_bias="0.495"
    App:layout_constraintStart_toStartOf="parent"
    App:layout_constraintTop_toTopOf="parent"
    App:layout_constraintVertical_bias="0.542" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

Program description:

- The provided XML code represents the layout of an Android app's user interface using a ConstraintLayout. Here's a brief program description:
- The root element is a ConstraintLayout, which is a flexible layout manager for positioning and aligning UI elements.
- It contains several child elements, including TextViews and ImageViews, which are used to display text and images.
- There are two TextViews with IDs textViewDistance and textViewDistance2, which display the text "Distance: 0 m." They are positioned at different vertical biases within the layout.
- Two ImageViews with IDs trafficLightImage and trafficLightImage2 are used to display images. They are also positioned differently within the layout.
- Two TextViews with IDs textViewStatus and textViewStatus2 display the text "Status: Red." They are positioned at different vertical biases and use shadow effects for text.

- Two additional TextViews, textView3 and textView4, display the text “Signal 1” and “Signal 2” respectively, with different vertical biases.

- The layout elements have various attributes for specifying their dimensions, text content, text styles, colors, and constraints for positioning.

This XML layout is designed to create a user interface with text and image elements, likely for displaying information related to traffic lights or signals. It uses a ConstraintLayout to manage the positioning of these elements on the screen.

Java program:

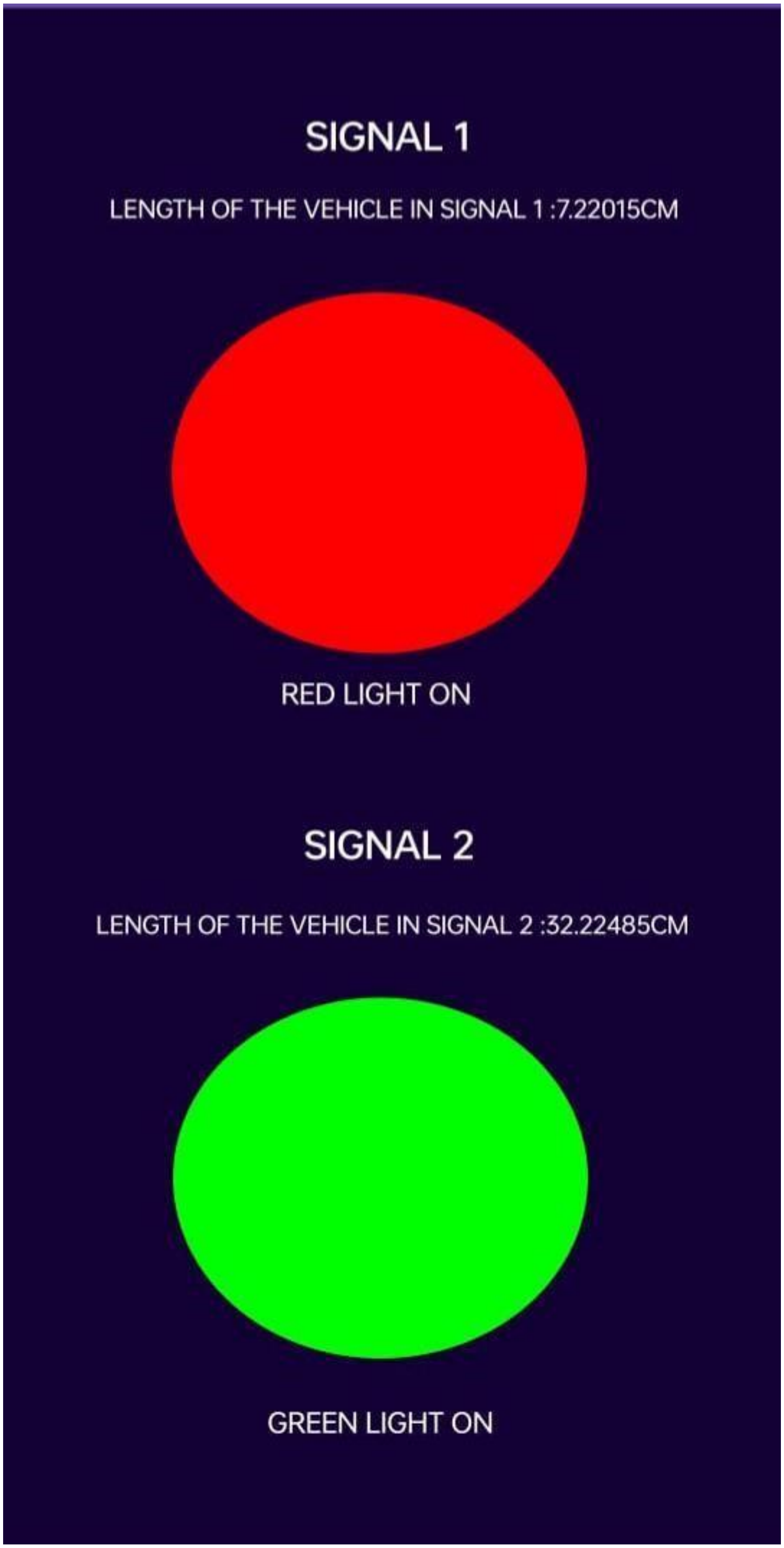
```
Package com.example.smarttrafficmanagement;


Import android.annotation.SuppressLint;

Import android.os.Bundle;

Import android.util.Log;

Import android.widget.ImageView;

Import android.widget.TextView;

Import android.widget.Toast;


Import androidx.annotation.NonNull;

Import androidx.appcompat.app.AppCompatActivity;
Import com.google.firebase.database.DataSnapshot;

Import com.google.firebase.database.DatabaseError;

Import com.google.firebase.database.DatabaseReference;

Import com.google.firebase.database.FirebaseDatabase;

Import com.google.firebase.database.ValueEventListener;


Public class Firebase extends AppCompatActivity {


    Private DatabaseReference sensorDataRef,sensorDataRef1;


    Private TextView textViewDistance;

    Private TextView textViewDistance2;


    Private TextView status,status1;
```

```
  Private TextView airQualityTextView;
Private ImageView img1,img2;
  @SuppressLint("CutPasteId")
  @Override
  Protected void onCreate(Bundle savedInstanceState) {
Super.onCreate(savedInstanceState);
setContentView(R.layout.activity_firebase);


    // Initialize Firebase
    FirebaseDatabase firebaseDatabase = FirebaseDatabase.getInstance();
sensorDataRef = firebaseDatabase.getReference("TrafficLightStatus1");
sensorDataRef1 = firebaseDatabase.getReference("TrafficLightStatus2");
// Get references to GaugeView widgets in your layout
textViewDistance=findViewById(R.id.textViewDistance);
textViewDistance2=findViewById(R.id.textViewDistance2);
status=findViewById(R.id.textViewStatus);
status1=findViewById(R.id.textViewStatus2);
img1=findViewById(R.id.trafficLightImage);
img2=findViewById(R.id.trafficLightImage2);
sensorDataRef.addValueEventListener(new ValueEventListener() {

      @SuppressLint("SetTextI18n")
      @Override
      Public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
        If (dataSnapshot.exists()) {
          // Retrieve values from the dataSnapshot
          Double Distance = dataSnapshot.child("Distance1").getValue(Double.class);
          Integer redstatus = dataSnapshot.child("Red").getValue(Integer.class);
          Integer yelstatus = dataSnapshot.child("Yellow").getValue(Integer.class);
Integer grnstatus = dataSnapshot.child("Green").getValue(Integer.class);
```

```
            textViewDistance.setText(“Length of the Vehicle in Signal 1 :”+String.valueOf(Distance)+”CM”);


            if(redstatus==1)
            {
                Status.setText(“RED LIGHT ON”);
                Img1.setBackgroundResource(R.drawable.red_circle);


            }
            If(yelstatus==1)
            {
                Status.setText(“YELLOW LIGHT ON”);
                Img1.setBackgroundResource(R.drawable.yellow_circle);


            }
            If(grnstatus==1)
            {
                Status.setText(“Green LIGHT ON”);
                Img1.setBackgroundResource(R.drawable.green_circle);
            }



        }


    }


    @Override
    Public void onCancelled(@NonNull DatabaseError databaseError) {
        // Handle database error
    }
});
sensorDataRef1.addValueEventListener(new ValueEventListener() {
    @SuppressLint(“SetTextI18n”)
    @Override
    Public void onDataChange(@NonNull DataSnapshot dataSnapshot) {
```

```
  If (dataSnapshot.exists()) {

    // Retrieve values from the dataSnapshot

    Double Distance = dataSnapshot.child(“Distance2”).getValue(Double.class);

    Integer redstatus1 = dataSnapshot.child(“Red”).getValue(Integer.class);

    Integer yelstatus1 = dataSnapshot.child(“Yellow”).getValue(Integer.class);

    Integer grnstatus1 = dataSnapshot.child(“Green”).getValue(Integer.class);



    textViewDistance2.setText(“Length of the Vehicle in Signal 2 :”+String.valueOf(Distance)+”CM”);


    if(redstatus1==1)

    {

      Status1.setText(“RED LIGHT ON”);

      Img2.setBackgroundResource(R.drawable.red_circle);


    }

    If(yelstatus1==1)

    {

      Status1.setText(“YELLOW LIGHT ON”);

      Img2.setBackgroundResource(R.drawable.yellow_circle);
    }

    If(grnstatus1==1)

    {

      Status1.setText(“Green LIGHT ON”);

      Img2.setBackgroundResource(R.drawable.green_circle);

    }




  }


}


@Override
```

```
            Public void onCancelled(@NonNull DatabaseError databaseError) {
                // Handle database error
            }
        });
    }
}
```



SIGNAL 1

LENGTH OF THE VEHICLE IN SIGNAL 1 :7.22015CM

RED LIGHT ON

SIGNAL 2

LENGTH OF THE VEHICLE IN SIGNAL 2 :32.22485CM

GREEN LIGHT ON

CONCLUSION:

In conclusion, the traffic management project represents a crucial step toward enhancing transportation efficiency, safety, and sustainability in our community. By implementing a combination of smart traffic signals, data analytics, and public awareness campaigns, we aim to reduce congestion, minimize accidents, and promote eco-friendly modes of transport. While challenges may arise, continuous monitoring and adaptation of the system will be essential for long-term success. Ultimately, this project is poised to make a positive impact on the quality of life for residents and visitors alike.