Smart City Pulse

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

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(An NBA & NAAC A+ accredited and ISO 9001:2015 certified institution)

Kanuru, Vijayawada-

520007 2024-25

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CERTIFICATE

This is to certify that the project report title **"Smart City Pulse"**is the bonafide work of **Sudabathula Siva Tulasi Tejaswi (23505A0513),Pillutla Chaitanya (22501A05E6), Podili Naveen Kumar (22501A05E7), Valluru.Mallika (23505A0515)** in partial fulfilment of completing the Academic project in Mobile App Development (20SA8651) during the academic year 2024-25.

Signature of the Incharge **Signature of the HOD**

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1. ABSTRACT

The **Smart City Pulse Mobile Application** is a platform designed to empower local citizens to report community issues, enabling quick resolution by local officers. Built with **Android Studio** and **Java**, the app features an intuitive and user-friendly interface that allows users to easily submit issues related to infrastructure, safety, sanitation, and more. Users can add descriptions, images, and specify the severity of the problem.

The app utilizes **Retrofit** for seamless communication with the backend, ensuring quick and reliable issue submissions. A **navigation drawer** provides easy access to different sections such as **Profile**, **Settings**, and **Logout**. User authentication is handled via a **sign-in/sign-up system**, with an **SQLite database** used to store user details and issue history securely.

For officers, an **admin dashboard** allows them to view and manage reported issues, mark them as resolved, and provide feedback to users. The app features a **real-time issue tracking system** with status updates, as well as **push notifications** to alert users about the progress of their reported issues.

The app is built with modern UI/UX principles, ensuring responsiveness across various screen sizes, and follows a **clean and simple design**. Future updates may include additional features like **community engagement**, **analytics dashboards** for officers, and **offline capabilities** for better usability in low-connectivity areas. The **Smart City Pulse App** is a powerful tool for improving local governance and enhancing citizen engagement.

2. SDG Justification

The **Smart City Pulse Mobile Application** is a civic engagement platform that allows citizens to report urban issues, ensuring swift action by authorities. By addressing infrastructure, sanitation, safety, and environmental concerns, the app supports multiple **SDGs**:

1. **SDG 3: Good Health and Well-being** – Helps create a cleaner environment by enabling reports on sanitation, pollution, and public health hazards.
2. **SDG 4: Quality Education** – Allows reporting of school infrastructure issues, ensuring better learning environments.
3. **SDG 5: Gender Equality** – Enhances safety by enabling reports on harassment-prone areas and inadequate street lighting.
4. **SDG 6: Clean Water and Sanitation** – Supports clean water access by allowing reports on supply disruptions and sanitation issues.
5. **SDG 7: Affordable and Clean Energy** – Encourages sustainable energy use by identifying power outages and inefficiencies.
6. **SDG 9: Industry, Innovation, and Infrastructure** – Improves urban infrastructure by streamlining issue reporting and resolution.
7. **SDG 10: Reduced Inequalities** – Provides an inclusive platform for all citizens to report and access urban services.
8. **SDG 11: Sustainable Cities and Communities** – Enhances sustainable urban planning by addressing waste management, pollution, and safety concerns.
9. **SDG 12: Responsible Consumption and Production** – Promotes sustainable resource use by identifying waste and environmental hazards.
10. **SDG 13: Climate Action** – Supports climate resilience by enabling reports on deforestation, pollution, and illegal activities.
11. **SDG 16: Peace, Justice, and Strong Institutions** – Strengthens governance through transparent issue reporting and resolution.
12. **SDG 17: Partnerships for the Goals** – Encourages collaboration between citizens, local governments, and organizations for sustainable urban development.

3.INTRODUCTION

Urban communities face various challenges, including infrastructure issues, sanitation concerns, safety hazards, and environmental degradation. The **Smart City Pulse Mobile Application** is designed to empower local citizens by providing a platform to report these problems directly to the concerned authorities. This ensures timely intervention and contributes to the development of **smarter, cleaner, and safer cities**.

Built as an **efficient and user-friendly** mobile application, Smart City Pulse enables users to submit complaints related to road damage, waste management, water supply, electricity issues, and public safety. The application ensures seamless communication between citizens and government agencies, fostering **community engagement** and **responsible urban governance**.

With a simple and intuitive interface, the app allows users to track their complaint status, ensuring **transparency and accountability**. Future enhancements may include AI-based issue categorization, predictive analytics for urban problem trends, and integration with smart city infrastructure for **automated issue detection and resolution**.

By leveraging **digital innovation**, Smart City Pulse plays a crucial role in **urban sustainability and governance**, making cities more **efficient, inclusive, and responsive** to the needs of their residents.

3. OBJECTIVES AND SCOPE OF THE PROJECT

Objectives:

The primary goal of the Smart City Pulse Mobile Application **is to create a** civic engagement platform **that enables local citizens to report urban issues, ensuring prompt response from authorities. The key objectives of this project are:**

1. **Real-time Issue Reporting** – Allow users to report problems related to infrastructure, sanitation, safety, and environment.
2. **Seamless Communication** – Ensure effective interaction between citizens and local authorities for faster issue resolution.
3. **User-friendly Interface** – Develop an intuitive and responsive UI for easy navigation and complaint submission.
4. **Transparency & Tracking** – Enable users to track the status of their complaints for improved accountability.
5. **Categorization of Issues** – Classify reported problems into different categories (e.g., roads, water, electricity, waste management) for efficient handling.
6. **Community Engagement** – Encourage active citizen participation in urban development and governance.
7. **Scalability & Future Enhancements** – Provide scope for AI-based issue categorization, automated detection of problems, and integration with smart city infrastructure.

Scope of the Project:

The Smart City Pulse Mobile Application is designed to serve as a bridge between citizens and local government to address urban challenges efficiently. The app will benefit different user groups:

1. **General Citizens** – Residents who want to report civic issues affecting their daily lives.
2. **Local Authorities & Municipalities** – Government officials responsible for addressing reported problems.
3. **Urban Planners & Researchers** – Professionals analyzing city infrastructure and public concerns for better urban planning.
4. **Community Groups & NGOs** – Organizations working towards sustainable urban development.

The app ensures **efficient issue reporting, enhanced civic participation, and transparent governance**. Future improvements may include **predictive analytics, AI-driven issue detection, and integration with smart city technologies** to create **responsive and sustainable urban spaces**.

4. SOFTWARE USED

The development of the Smart City Pulse mobile application utilizes modern software technologies to ensure a responsive, efficient, and user-friendly experience for both citizens and authorities.

Frontend Technologies

- **XML(Extensible Markup Language)**
  XML is used for designing the user interface (UI) of the Android application. It helps define structured layouts for various UI elements like buttons, input fields, and navigation menus, ensuring an interactive user experience.
- **Java**
  Java serves as the primary programming language, handling user interactions, form submissions, and communication with the backend. It ensures seamless performance, data validation, and error handling.
- **Android Studio**
  Android Studio is the integrated development environment (IDE) used for building, testing, and debugging the Smart City Pulse application. It provides a robust set of tools to enhance app performance and efficiency.

Backend Technologies

- **SQLLite**
  SQLite is used as the local database for storing user-reported issues, officer responses, and user authentication details. It ensures offline functionality, enabling users to report concerns even without an active internet connection.

Design and Documentation Tools

- **Canva**
  Canva is used for designing UI elements, icons, and app prototypes, ensuring a visually appealing interface.
- **MicrosoftWord**
  Microsoft Word is used for documenting project details, writing reports, and maintaining structured documentation.

Version Control and Deployment

- **GitHub**
  GitHub is used for version control, enabling collaborative development, tracking code changes, and ensuring the security of the project's source code.

By utilizing these technologies, the Smart City Pulse application ensures efficient issue reporting, seamless communication between citizens and officials, and a structured approach to urban problem-solving.

5. PROPOSED MODEL

The **Smart City Pulse** application follows a structured model to facilitate efficient urban issue reporting and enable authorities to respond effectively. This model ensures seamless communication, real-time updates, and secure data handling while maintaining a user-friendly experience.

1. Issue Reporting System

- Citizens can report urban issues such as **potholes, garbage collection problems, streetlight failures, and public infrastructure damage**.
- Users can select an issue category, enter a description, and attach images for better clarity.
- Each report is assigned a **unique tracking ID**, allowing users to track their complaint status.

2. User Dashboard & Complaint Tracking

- Users can **view the status** of their submitted complaints (Pending, In Progress, Resolved).
- Allows users to update or add additional information to their reports if required.
- Provides a feedback system where users can rate the resolution of their reported issues.

3. Officer Dashboard & Issue Management

- City officers have a dedicated dashboard to **manage reported issues**, view complaints, and update their statuses.
- Complaints can be **filtered by category, priority level, and date of submission**.
- Authorities can add remarks to inform citizens about ongoing actions.
- Enables efficient workflow management for municipal services.

4. Communication & Notifications

- **Push notifications** alert users when their issue status is updated.
- Users receive **alerts if additional details are required** for faster issue resolution.
- Ensures two-way communication between users and authorities through an integrated messaging system.

5. User Interface & Accessibility

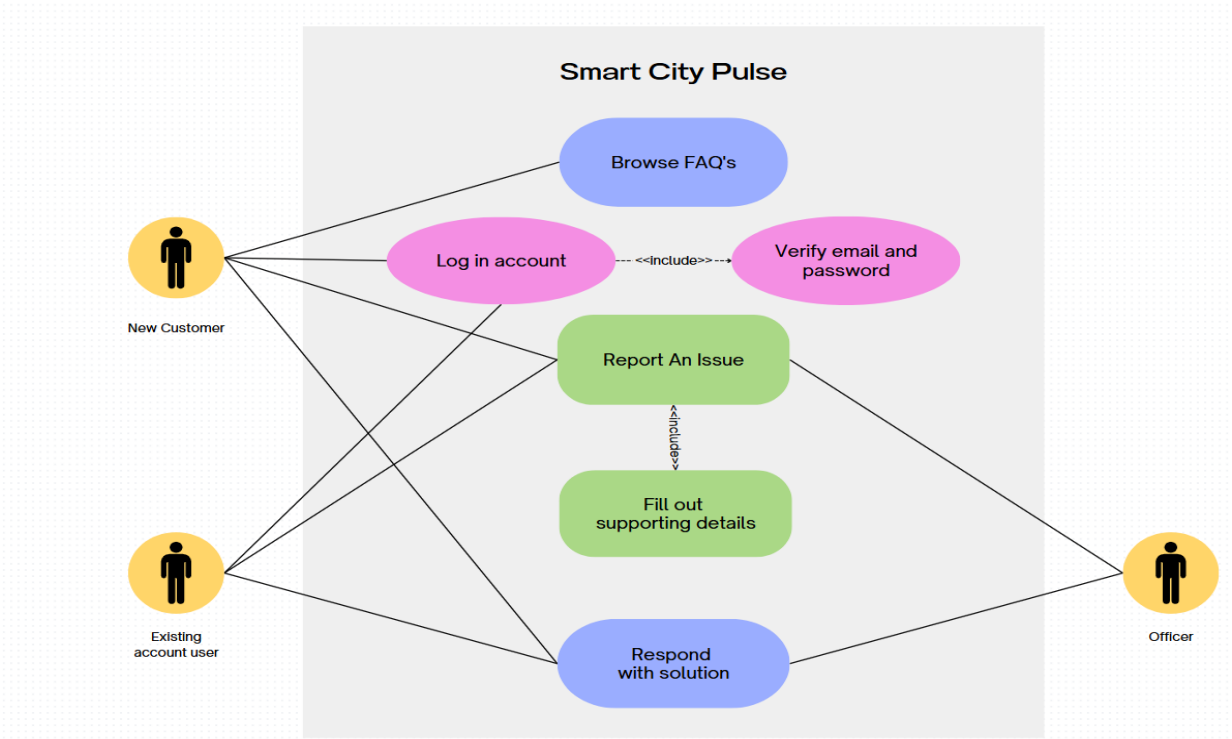
- A clean and intuitive interface designed for easy navigation.
- Includes a **navigation drawer** for quick access to:
    - **Home** – Displays reported issues and latest updates.
    - **Report Issue** – Allows users to submit new complaints.
    - **My Reports** – Lists all reports submitted by the user along with their statuses.
    - **Settings** – Enables users to customize notifications and profile settings.
- Future enhancements include **dark mode** and **multilingual support** for accessibility.

6. Data Security & Offline Support

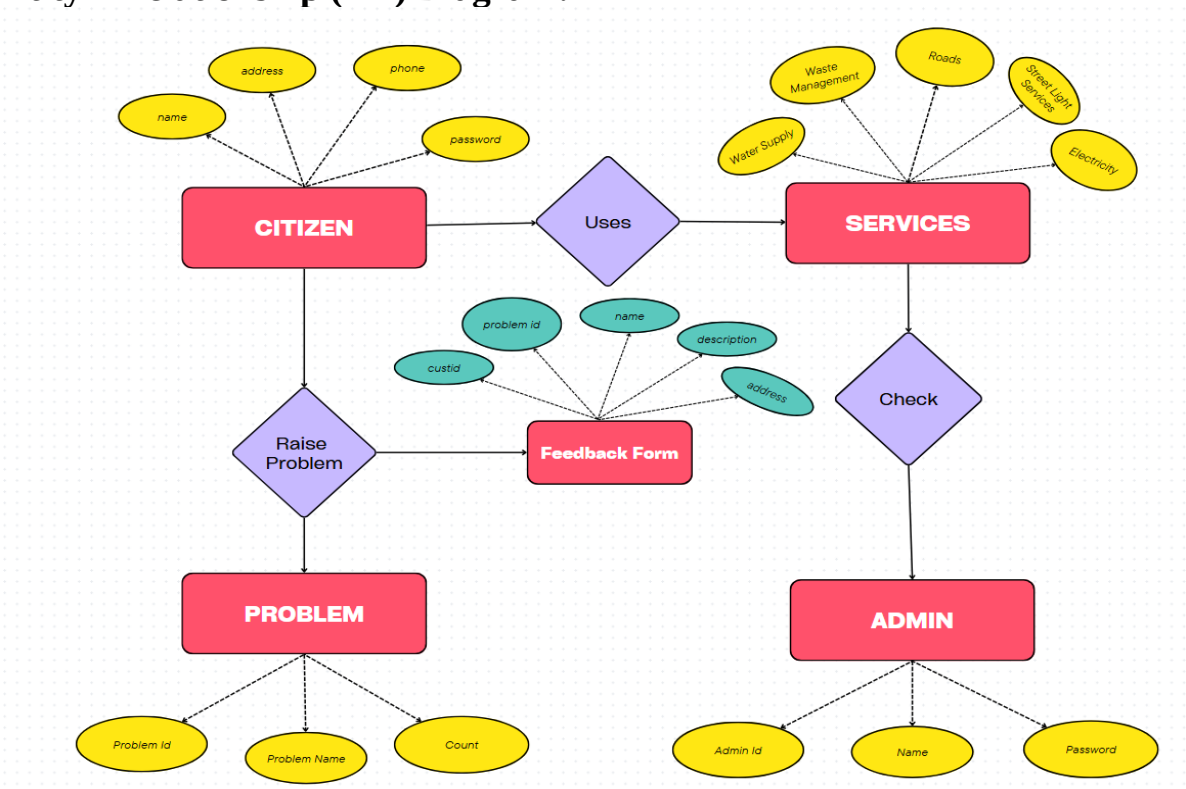
- **SQLite database** is used for **secure local data storage**, ensuring users can access their reports even offline.
- Implements **encryption techniques** to protect user data and prevent unauthorized access.
- Data automatically syncs with the server when an internet connection is restored.

This **proposed model** ensures that **Smart City Pulse** remains an efficient and reliable urban issue reporting platform, making communication between citizens and authorities seamless and transparent.

Use Case Diagram:



Entity – Relationship (ER) Diagram:

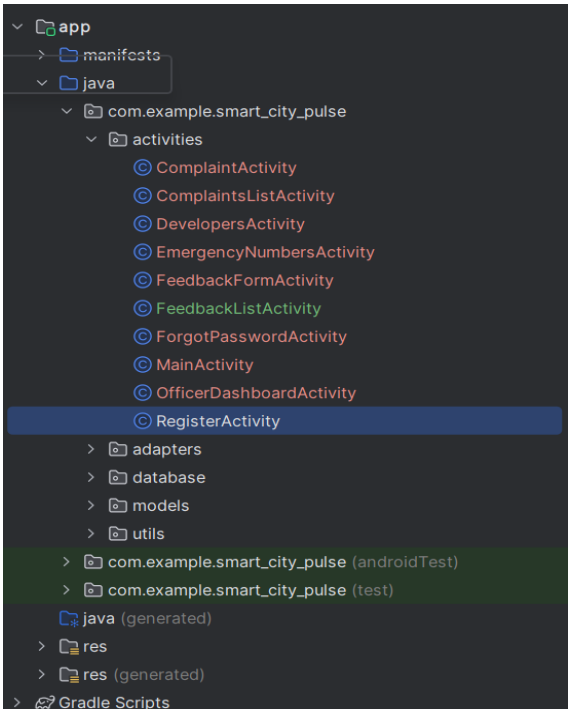


6. SAMPLE CODE

GitHub repository link:

https://github.com/Chaitu521456/SmartCityPulse

Folder Structure:



Program:

//MainActivity.java

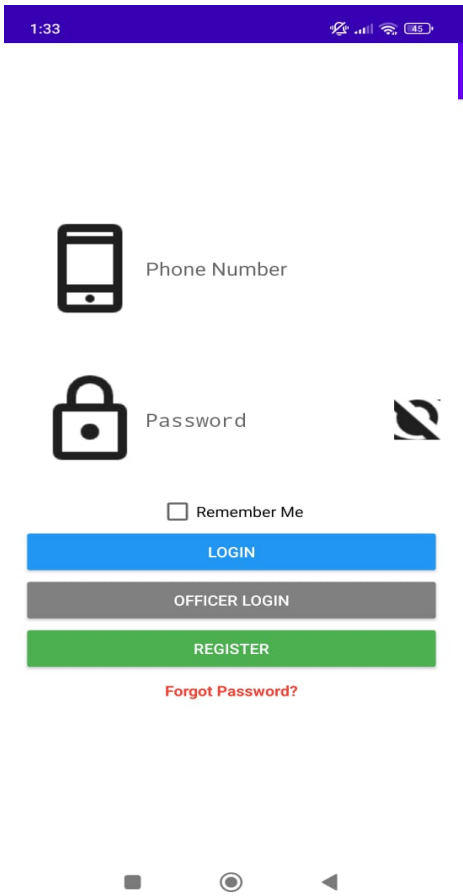
```
package com.example.smart_city_pulse.activities;

import android.app.Activity;
import android.content.Intent;
import android.content.SharedPreferences;
import android.database.Cursor;
import android.os.Bundle;
import android.text.InputType;
import android.text.method.HideReturnsTransformationMethod;
import android.text.method.PasswordTransformationMethod;
import android.view.View;
import android.widget.Button;
import android.widget.CheckBox;
import android.widget.EditText;
import android.widget.ImageButton;
import android.widget.TextView;
import android.widget.Toast;
import com.example.smart_city_pulse.R;
```

```
import com.example.smart_city_pulse.database.DatabaseHelper;

public class MainActivity extends Activity {
    private EditText phoneNumber, password;
    private Button loginBtn, officerLoginBtn, registerBtn;
    private CheckBox rememberMe;
    private TextView forgotPassword;
    private ImageButton showPassword;
    private boolean isPasswordVisible = false;
    private SharedPreferences sharedPreferences;
    private DatabaseHelper dbHelper;


@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    phoneNumber = findViewById(R.id.phoneNumber);
    password = findViewById(R.id.password);
    loginBtn = findViewById(R.id.loginBtn);
    officerLoginBtn = findViewById(R.id.officerLoginBtn);
    registerBtn = findViewById(R.id.registerBtn);
    rememberMe = findViewById(R.id.rememberMe);
    forgotPassword = findViewById(R.id.forgotPassword);
    showPassword = findViewById(R.id.showPassword);

    dbHelper = new DatabaseHelper(this);
    sharedPreferences = getSharedPreferences("SmartCityPrefs", MODE_PRIVATE);

    phoneNumber.setText(sharedPreferences.getString("savedPhone", ""));
    rememberMe.setChecked(sharedPreferences.getBoolean("rememberMeChecked", false));

    showPassword.setOnClickListener(v -> togglePasswordVisibility());
    loginBtn.setOnClickListener(v -> handlePublicLogin());
    officerLoginBtn.setOnClickListener(v -> handleOfficerLogin());
    registerBtn.setOnClickListener(v -> startActivity(new Intent(MainActivity.this,
RegisterActivity.class)));
    forgotPassword.setOnClickListener(v -> startActivity(new Intent(MainActivity.this,
ForgotPasswordActivity.class)));
}
private void togglePasswordVisibility() {
    if (isPasswordVisible) {
        password.setInputType(InputType.TYPE_CLASS_TEXT |
InputType.TYPE_TEXT_VARIATION_PASSWORD);

password.setTransformationMethod(PasswordTransformationMethod.getInstance());
    showPassword.setImageResource(R.drawable.ic_visibility_off);
}
```

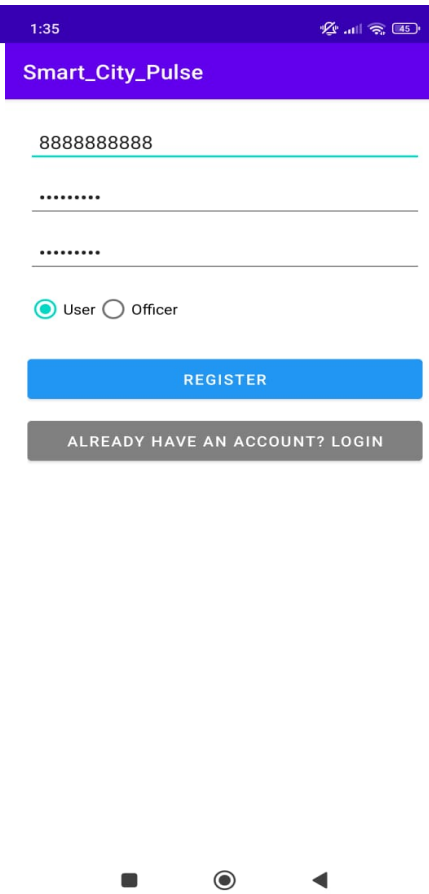
```
else {
        password.setInputType(InputType.TYPE_CLASS_TEXT |
InputType.TYPE_TEXT_VARIATION_VISIBLE_PASSWORD);
        password.setTransformationMethod(HideReturnsTransformationMethod.getInstance());
        showPassword.setImageResource(R.drawable.ic_visibility);
    }
    isPasswordVisible = !isPasswordVisible;
    password.setSelection(password.getText().length());
}

private void handlePublicLogin() {
    String phone = phoneNumber.getText().toString().trim();
    String pass = password.getText().toString().trim();

    if (validateInputs(phone, pass)) {
        if (phone.equals("8888888888") && pass.equals("Chai@123")) {
            saveLoginDetails(phone);
            Toast.makeText(this, "Test User Login Successful!", Toast.LENGTH_SHORT).show();
            startActivity(new Intent(this, PublicDashboardActivity.class));
            finish();
            return;
        }

        Cursor cursor = dbHelper.getUser(phone);
        if (cursor != null && cursor.moveToFirst()) {
            String storedPassword = cursor.getString(cursor.getColumnIndex("password"));
            if (storedPassword.equals(pass)) {
                saveLoginDetails(phone);
                Toast.makeText(this, "Login Successful!", Toast.LENGTH_SHORT).show();
                startActivity(new Intent(this, PublicDashboardActivity.class));
                finish();
            } else {
                Toast.makeText(this, "Invalid Credentials!", Toast.LENGTH_SHORT).show();
            }
        } else {
            Toast.makeText(this, "User Not Found!", Toast.LENGTH_SHORT).show();
        }

        if (cursor != null) cursor.close();
    }
}

private void handleOfficerLogin() {
    String phone = phoneNumber.getText().toString().trim();
    String pass = password.getText().toString().trim();

    if (validateInputs(phone, pass)) {
        if (phone.equals("9999999999") && pass.equals("Chai@123")) {
            saveLoginDetails(phone);
            Toast.makeText(this, "Test Officer Login Successful!", Toast.LENGTH_SHORT).show();
            startActivity(new Intent(this, OfficerDashboardActivity.class));
            finish();
            return;  }
```

```
Cursor cursor = dbHelper.getOfficer(phone);
        if (cursor != null && cursor.moveToFirst()) {
            String storedPassword = cursor.getString(cursor.getColumnIndex("password"));
            if (storedPassword.equals(pass)) {
                saveLoginDetails(phone);
                Toast.makeText(this, "Officer Login Successful!", Toast.LENGTH_SHORT).show();
                startActivity(new Intent(this, OfficerDashboardActivity.class));
                finish();
            }
else {
                Toast.makeText(this, "Invalid Officer Credentials!", Toast.LENGTH_SHORT).show();
            }
        }
 else {
            Toast.makeText(this, "Officer Not Found!", Toast.LENGTH_SHORT).show();
        }

        if (cursor != null) cursor.close();
    }
  }

  private boolean validateInputs(String phone, String pass) {
    if (phone.isEmpty() || pass.isEmpty())
{
        Toast.makeText(this, "Please enter all details!", Toast.LENGTH_SHORT).show();
        return false;
    }
    if (phone.length() != 10 || !phone.matches("\\d+"))
        {
        Toast.makeText(this, "Enter a valid 10-digit phone number!", Toast.LENGTH_SHORT).show();
        return false;
    }
    return true;
  }

  private void saveLoginDetails(String phone)
 {
    SharedPreferences.Editor editor = sharedPreferences.edit();

    if (rememberMe.isChecked()) {
        editor.putString("savedPhone", phone);
        editor.putBoolean("rememberMeChecked", true);
    }
else {
        editor.clear();
    }
    editor.apply();
  }
}
```

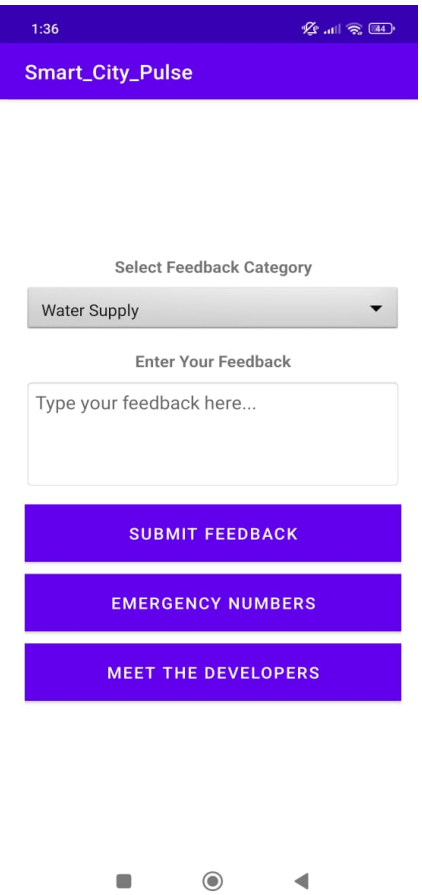
7. RESULT/OUTPUT SCREENS



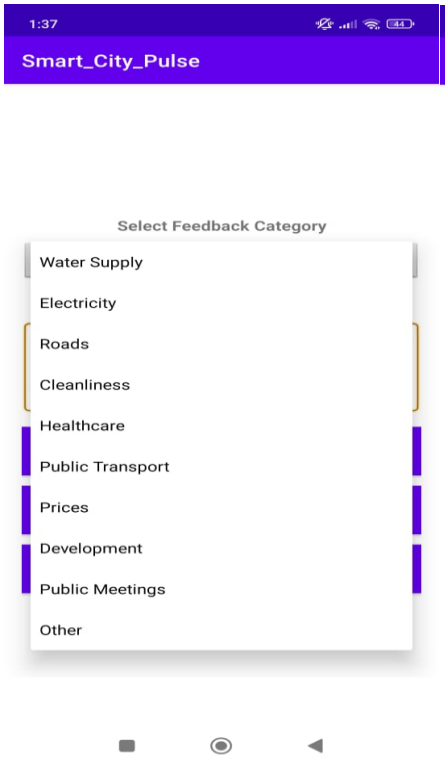
Initial Page after open



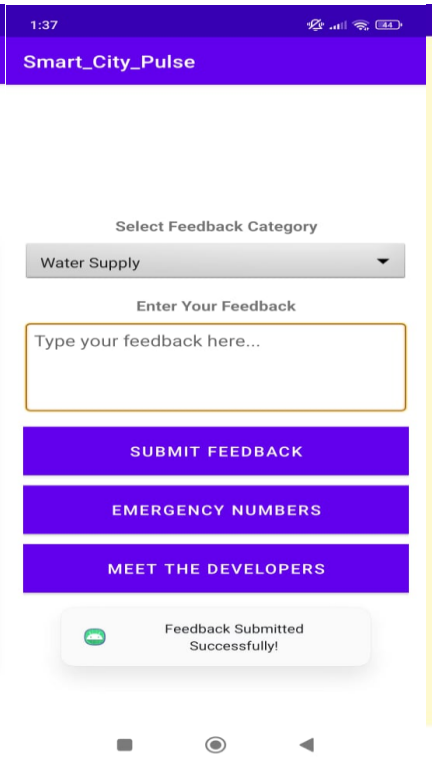
User Registration to login



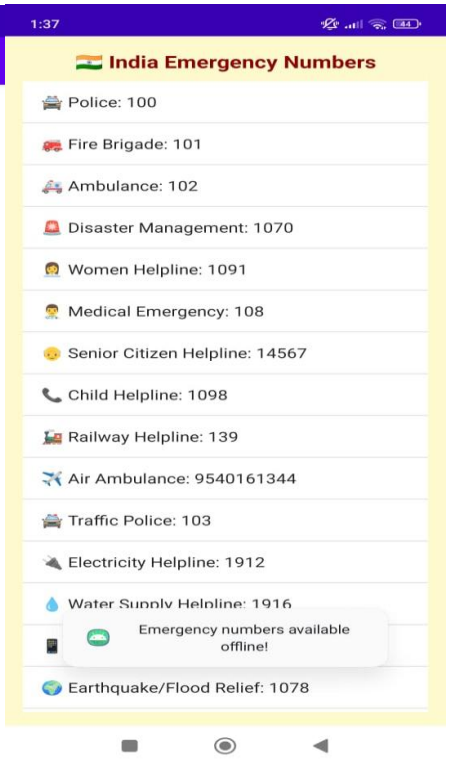
User Login After Register



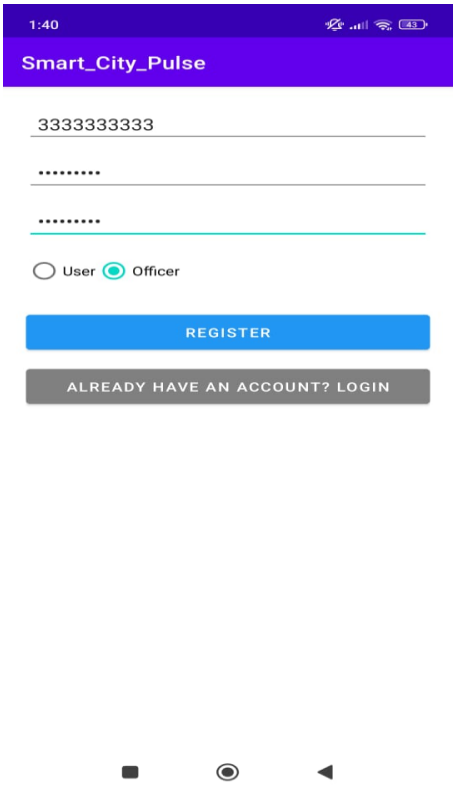
List Of Isuues To Raise



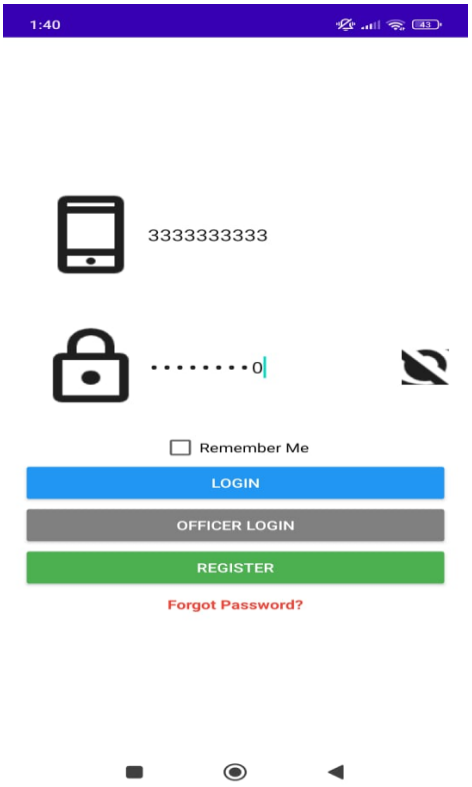
select the Issue and submit



Emergency numbers for offline



Registration for the Officer



Officer Login

Officer Page After Login

List of Isuues Raised

8. CONCLUSION & FUTURE ENHANCEMENTS

The **Smart City Pulse** project successfully implements a citizen-driven urban issue reporting system, enabling residents to report problems such as potholes, streetlight failures, and waste management concerns directly to city officials. The application streamlines the communication between citizens and authorities, ensuring timely issue resolution and improved urban management.

By leveraging **Android Studio** and **SQLite**, the app provides a structured and efficient way to store and retrieve reported issues. The user-friendly interface ensures that citizens can easily submit complaints, track their status, and receive updates on resolutions. Additionally, officers can efficiently manage and address these issues, ensuring transparency and accountability.

The system follows best development practices, ensuring modularity, scalability, and maintainability. The integration of **real-time notifications** keeps users informed about issue progress, while secure data storage ensures reliability.

Future enhancements for **Smart City Pulse** could include **AI-based issue categorization, analytics for urban planning, automated report summaries, and multilingual support** to improve accessibility. By continually evolving, this application can contribute significantly to **better governance, improved urban infrastructure, and enhanced civic engagement.**

1. REFERENCES (WEB SITE URLS)

GitHub repository links:

https://github.com/SudabathulaTejaswi/Smart-City-Pulse

1. **SQLite for Android** - https://developer.android.com/training/data-storage/sqlite
2. **Android Development Documentation** - https://developer.android.com/docs
3. **Google API Services** - https://developers.google.com/
4. **Android App Development Guide** - https://developer.android.com/guide
5. **Emergency Disaster Call Details** - https://www.fema.gov/emergency-managers