TRAFFIC PAL

A Project Report

Submitted by:

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In

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At

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

FACULTY OF TECHNOLOGY & ENGINEERING

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

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University and Computer Science Department Profile

The Maharaja Sayajirao University of Baroda, originally founded in 1881 as the “Baroda College”, is a premier unitary residential University, established on 30th April, 1949. It is the state University with English as its medium of instruction, having 13 Faculties, 3 Constituent Colleges, 2 Institutions and 8 Centers of Specialized Studies, wherein more than 37,295 students pursue higher studies, under the care and supervision of 1112 teaching (662 Permanent) and 1190 permanent supporting staff members. It houses 89 departments spread over 6 campuses.

The University offers 98 PG courses, 66 PhD programs, 39 PG Diploma courses and 88 UG courses with an option from 347 programs in 92 subjects. It also offers 11 certificate programs and 3 post diploma certificate program. As many as 205 students are currently enrolled in Ph.D. program, out of which 33% of the students are from outside Gujarat State.

The Faculty of Technology and Engineering as it stands today formed along with the establishment of the Maharaja Sayajirao University in 1949 is an outgrowth of what was popularly known as the "Kala Bhavan Technical Institute" (KBTI) established in June 1890 by his late Highness The Maharaja Sayajirao Gaekwad III of Baroda state. In May 1990, it completed 100 years of glorious services for the cause of Technical Education.

The Department of Computer Science was started in the early 80's with the first B.E. being awarded in '84 and first MCA being awarded in the year '86. The department was formally recognized and inaugurated in the year 1988.

We are one of the 14 institutions of our country to have been selected under the Project "IMPACT", initiated by the department of Electronics, WORLD BANK, & Switzerland government, which is aimed at improving the quality of Technical manpower being developed in India.

1. INTRODUCTION

1.1 ABSTRACT

On this road to make Digital India, government has introduced many reforms. One of which was DigiLocker (Appendix 1- a brief about DigiLocker), that widely called out to the Computer Engineers of the nation and went on to become one of the most successful step towards this direction in 2016. One project that we would like to work on would run alongside this DigiLocker and that would serve the traffic police rather than the people. We would like to introduce an online system that would keep check of the road activities of the citizen through his license. Either introducing a QR code (Appendix 2- a brief about QR codes) onto the License or using the DigiLocker to scan the code from the phone of the citizen, the police can instantly know the road activities of the person. This data will include the major road crimes, blacklisting, suspension of the license, and the like.

Introducing an android application for the above system would be the absolute path to meet the requirements. Used by over 80% of Indians, android's dominance cannot be neglected.

We then have introduced another application for the users to check their license history. This system facilitates the user to know when and what violations he/ she has committed.

1.2 NEED FOR THE SYSTEM

India has the second largest road networks in the world and accounts for 10% of worldwide road fatalities. Laws regulating the traffic on the road are provided under the Motor Vehicles Act, 1988 and is applicable to whole of India. However lapses in traffic laws regulations, violations and accidents are glaring reality. The menace of driving is till on and the victims look upon the suitability of laws to curb such menace.

Roads are biggest source of interconnectivity within state and across and inter-county cooperation can give them international dimensions too. They are source of providing social, financial, health, tourism connectivity for every individual however, if safety is forgotten they can give an individual and others fatal consequences. It is important to realize that right to life and liberty involves ensuring safety at every level including while we are walking or driving on roads.

India has seen development in many other fields, but the minor crimes related traffic are sometimes condoned since there exists no system to keep the records of minor crimes of citizen and hence after a small payment, the violation is neglected. With this system, the driving history of the citizen is saved and can be used for further punishment of offenders and hence towards the betterment of the nation.

1.3 HARDWARE SPECIFICATION

For Developers:

- Quad Core 2 GHZ CPU
- 4 GB RAM
- 100 MB Free Disk Space
- 8 MP Camera

For Client:

- Dual Core 1.4 GHZ CPU
- 1 GB RAM
- 30 MB Free Disk Space
- 2 MP Camera

1.4 SOFTWARE SPECIFICATION

For Developers:

- Android Nougat 7.0
- 1080 x1920 pixels
- Qualcomm Snapdragon 821
- Adreno 530
- API level 25

For Client:

- Android Jelly Bean 4.2.2
- 720 x 1440 pixels
- Qualcomm Snapdragon 425
- Adreno 308
- API level 17

2. TOOLS AND TECHNOLOGIES

2.1 Android

Android is a mobile operating system developed by Google, based on a modified version of the Linux kernel and other open source software and designed primarily for touchscreen mobile devices such as smartphones and tablets.

Advantages of Android:

- Open Source
- Customizable User Interface
- Multiple Sales Channels
- Low Investment & High ROI
- Easy to Adopt

2.2 JDK

JDK is the acronym for Java Development Kit- essentially a Java Platform, consisting of the API classes, a Java Compiler, and the Java Virtual Machine interpreter. The JDK is used to compile Java applications and applets.

2.3 SDK

The Android SDK (Software Development Kit) is a set of development tools used to develop applications for Android platform. The Android SDK includes the following:

- Required Libraries
- Debugger
- An emulator
- Relevant documentation for the Android application program interfaces (APIs)
- Sample source code
- Tutorials for the Android OS

2.4 Android Studio IDE

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is a replacement for the Eclipse Android Development Tools (ADT) as primary IDE for native Android application development. It is available for download on Windows, macOS and Linux based operating systems.

3. LITERATURE SURVEY

3.1 EXISTING SYSTEM

The existing system is not entirely online. The system has many flaws as it doesn't contain the transparency needed for a flawless system. A citizen, once caught by the police, provides the license. But on many aspects, we have seen that the citizen doesn't demand for a challan and bribes the official to go free. In this case, there exists no record that the citizen has ever committed the said crime.

There is another case where the existing offline system fails. Suppose a citizen is rightfully charged for a violation and is given a challan. The citizen after paying the fine is caught again for the same violation. However, the next traffic official never knows how many times the driver has committed the same violation since he doesn't have access to the records.

Another flaw with the offline system is that it requires a lot of manual work. Writing the license data of the driver on the challan and then the violations. It takes time. Even if an online system is maintained by the government to store the records of the challans, these entries have to be stored manually into the system.

3.2 PROPOSED SYSTEM

The proposed system takes the entire challan creating system online. After the dominance of Android on the Indian Market, about 80% of the smartphone users have android phones. So the proposed online system is developed as an Android application.

The application, named 'Traffic Pal' can be used only by the traffic officials to register the violations of the driver. The application is user friendly and made in such a way that it requires only about 12 mb of data in the phone. The police can scan the license number or vehicle number (in case the driver doesn't own a license), and then pick out the violations committed by him.

All of the data is stored on a Realtime Database and hence can be accessed at any point, by any authorized user. There is the facility to provide the history of all the violations registered for the particular license number.

There is a feature called **Blacklisting**, where for every violation committed by the driver, he is allotted some points based on the crimes. So even if the crimes were minor, after committing them several times, the driver can be punished.

There is another feature called **Suspension**. For every crime, the blacklist points of the driver increase according to the crimes. Once the points cross a threshold value, the license can be suspended.

All the features take place on the 'Traffic Pal' application. There is also an application developed for the user so that he can view the history of violations. He also has the option to challenge the decision of the traffic police by sending mail through the application to the authority.

4. PROJECT PROFILE

4.1 PROJECT OVERVIEW

Traffic Pal is an Android application used for the regulation and laws of traffic. It is used for substituting the need for creating challans. This application can only be accessed by the traffic officials with their username and password. The police, once having caught a citizen, enters the license number or the vehicle number. It opens a page where the entire license detail of the citizen is shown along with the blacklist history.

The Traffic official is able to tick the faults/ violations committed by the citizen. After submitting, according to the severity of the violations, Blacklist points are added to the license number. The suspension of the citizen is carried out on the basis of these blacklist points. Once they cross a barrier value, the citizen's license is suspended.

Along with Traffic Pal, another app is developed called 'License Assistant'. This application can be accessed by the citizens to know their license details and the blacklisting history. Both, the officials and citizens, through their respective apps, can send emails through the application to register any complaints or suggestions.

The Applications are developed with attractive and at the same time user friendly UIs. The clients are given the facility to reset password, and the official are given the option to request changes in their entries.

4.2 DATABASE

We have used the **Firebase** Database to store and retrieve our application data. The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in realtime to every connected client.

When you build cross-platform apps with our iOS, Android, and JavaScript SDKs, all of your clients share one Realtime Database instance and automatically receive updates with the newest data. Data is persisted locally, and even while offline, realtime events continue to fire, giving the end user a responsive experience. When the device regains connection, the Realtime Database synchronizes the local data changes with the remote updates that occurred while the client was offline, merging any conflicts automatically.

The Realtime Database provides a flexible, expression-based rules language, called Firebase Realtime Database Security Rules, to define how your data should be structured and when data can be read from or written to. When integrated with Firebase Authentication, developers can define who has access to what data, and how they can access it. The Realtime Database is a NoSQL database and as such has different optimizations and functionality compared to a relational database.

4.3 MODULES

The Modules are described below. These belong to either **'Traffic Pal'** (application for traffic police) or **'License Assistant'** (application for citizens), or both.

Login Module:

This is the generic Login module. It is supported by both applications. The user enters the username and password. After the validation, a new session starts for the user. The user can close the application but will not have to again login since the session is saved. Only when the user explicitly Logs out, then he has to login again. The username for Traffic Pal is the email id of the official. The username for License Assistant is his License Number.

Forgot Password Module:

This module works on both the applications. This module in Traffic Pal sends a password reset link to the mail id of the traffic police. Whereas in License Assistant app, the citizen receives an OTP on the registered mobile number. After verification of the reset code, the user can change the password.

Registration Module- License Assistant:

This module works for License Assistant app since every citizen has the authority to register for this application. Whereas not every citizen is a traffic official, hence this module is not developed for Traffic Pal. A citizen enters the License number and the aadhar card number. An OTP is sent to the mobile number linked with the aadhar number. After validating the code, a user can register his License number for the 'License Assistant' application.

Scanning License Number/ Vehicle Number- Traffic Pal:

This module works for Traffic Pal app. A traffic official, once having caught a citizen, can enter his License Number. The data from the database is fetch for the particular License Number. If the number is not registered, that means it is not a valid License, and an error is shown. If the citizen doesn't have a License, then the police scans using the Vehicle number. The vehicle number is used to fetch the license data of the citizen that is authorized for that vehicle.

Scanning License QR Code- Traffic Pal:

It is probably the most important feature of the Traffic Pal app. A DigiLocker app (a virtual locker for documents, made by the government) creates a unique QR code for every license. A citizen who uses DigiLocker can show the QR code. On the other hand, the traffic official, using Traffic Pal, can scan this QR code, and the License data will be fetched from the database. There is no need to manually type the License number.

Request Changes- Traffic Pal:

This module in the Traffic Pal app facilitates the official to request changes in the entries made by him in the past. Suppose there was a mistake in the entry, and the police wishes to change it. The police can view all the entries made by him and then select the erroneous one. He writes the mistakes made in the entry and then sends an email. The email is sent to the predefined account that handles all these requests.

Blacklisting- Traffic Pal:

This is an important feature of the system. A traffic official, after selecting the faults and violations, submits the entry. Every violation has particular points on it according to its severity. Those points will be added on the License number of the citizen. Blacklisting points also vary according to the type of vehicle driven by the driver.

Suspension- Traffic Pal:

A citizen gets suspended under two cases. One, when the blacklisting points have crossed 12 points since the last suspension. In this case, the license is suspended for seven days. During this period, the License is invalid and if the driver uses it, the police official will know this, once the number is scanned. Another way a license is suspended is when an ‘accident case’ is pending. In cases of major accidents, there might be an ongoing court case. Until the case has been resolved, the license stays suspended.

Contact Us:

This module is developed for both the applications. The apps contain contact us pages where they write their name, email, subject and message. After ‘send message’ button is clicked, the user is asked to select one mailing service from the list available on his phone. The data from the application is sent to the service and the user can send the mail.

Blacklist History:

This module is developed for both the applications. A License number is used to fetch the blacklist data of the citizen. This history contains data like violations, date of violation, violation id and points allotted for that entry. The blacklist history is fetched into a Recycler View.

Remove Suspension:

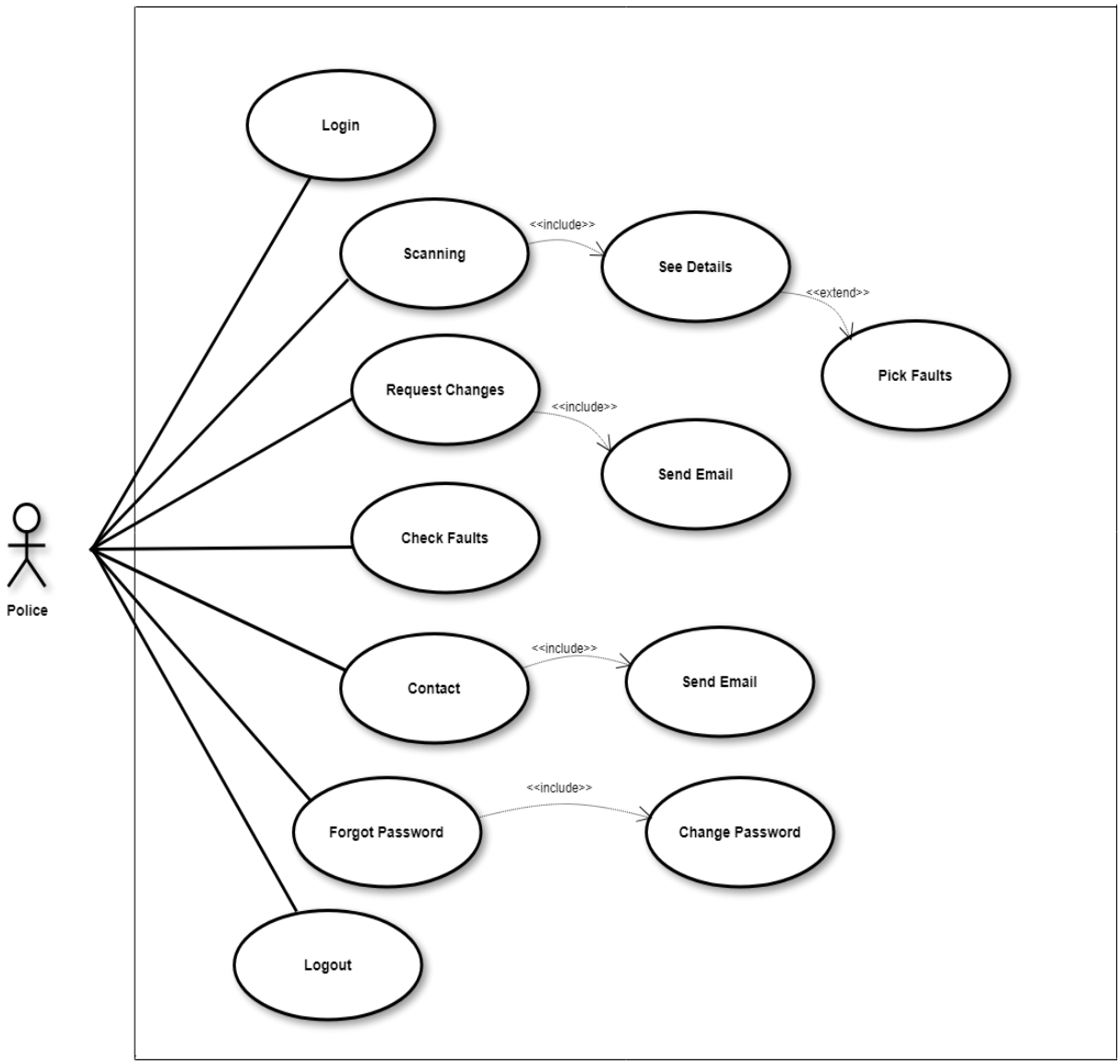
This module is used for removing the suspension from the License number. If a license is suspended for seven days, then after seven days, the suspension is removed for the license number automatically. If the license is suspended because of an accident case, then after the user provides valid proof that case has been resolved, the suspension can be removed by the admin.

5. SYSTEM ANALYSIS AND DESIGN

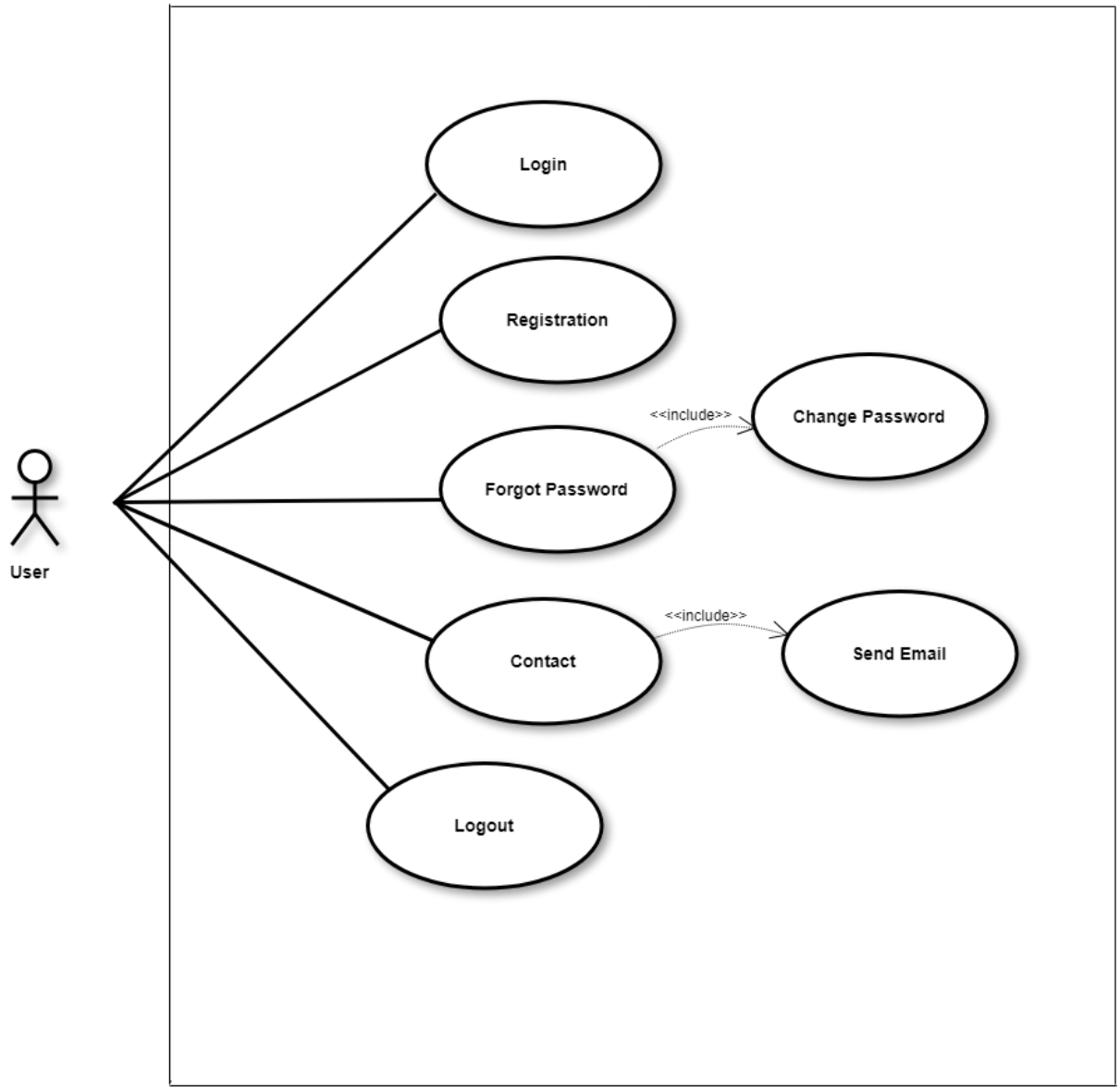
5.1 UML DIAGRAM

5.1.1 Use Case Diagram

Use Case of Police

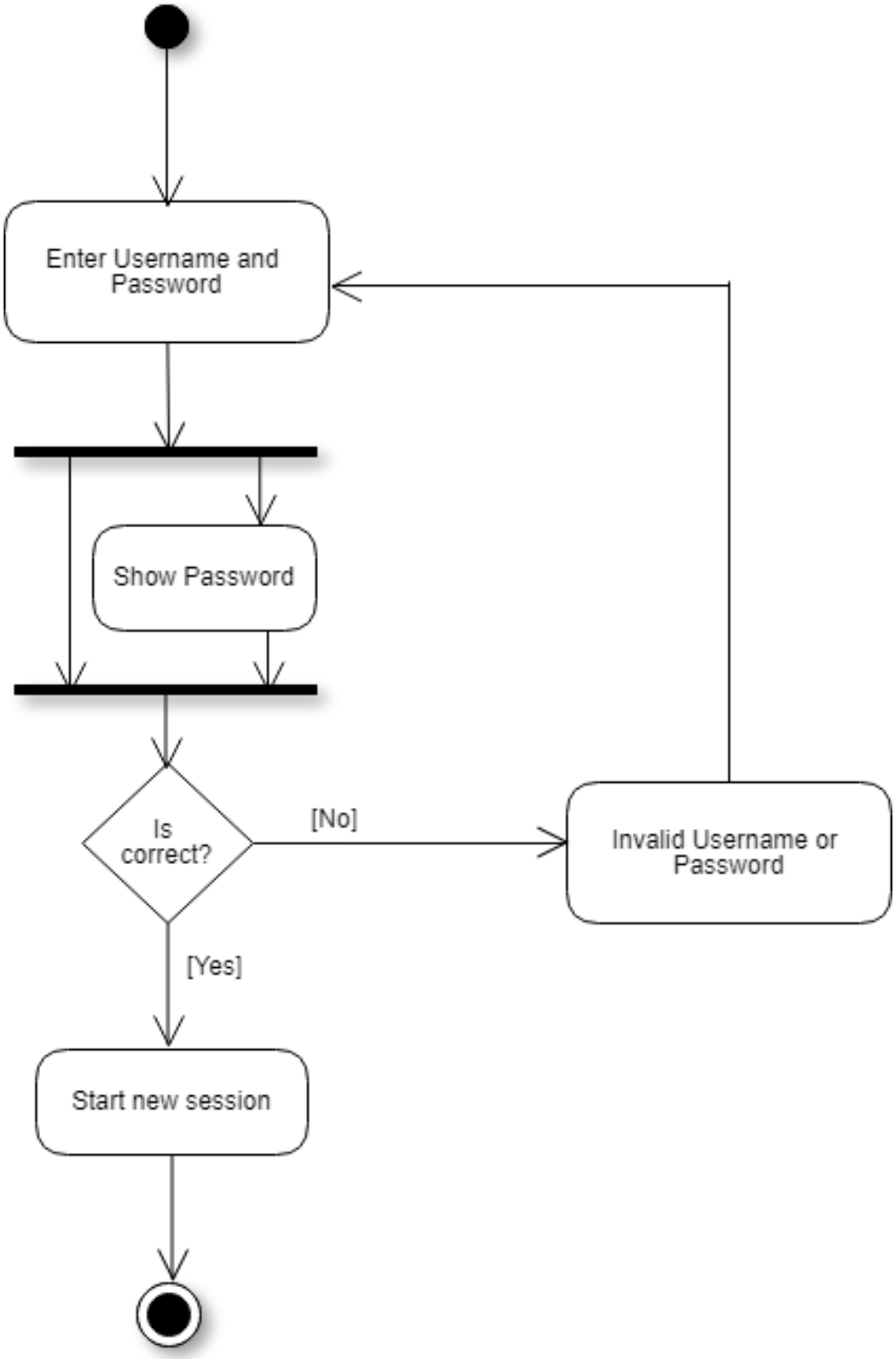


Use Case of User

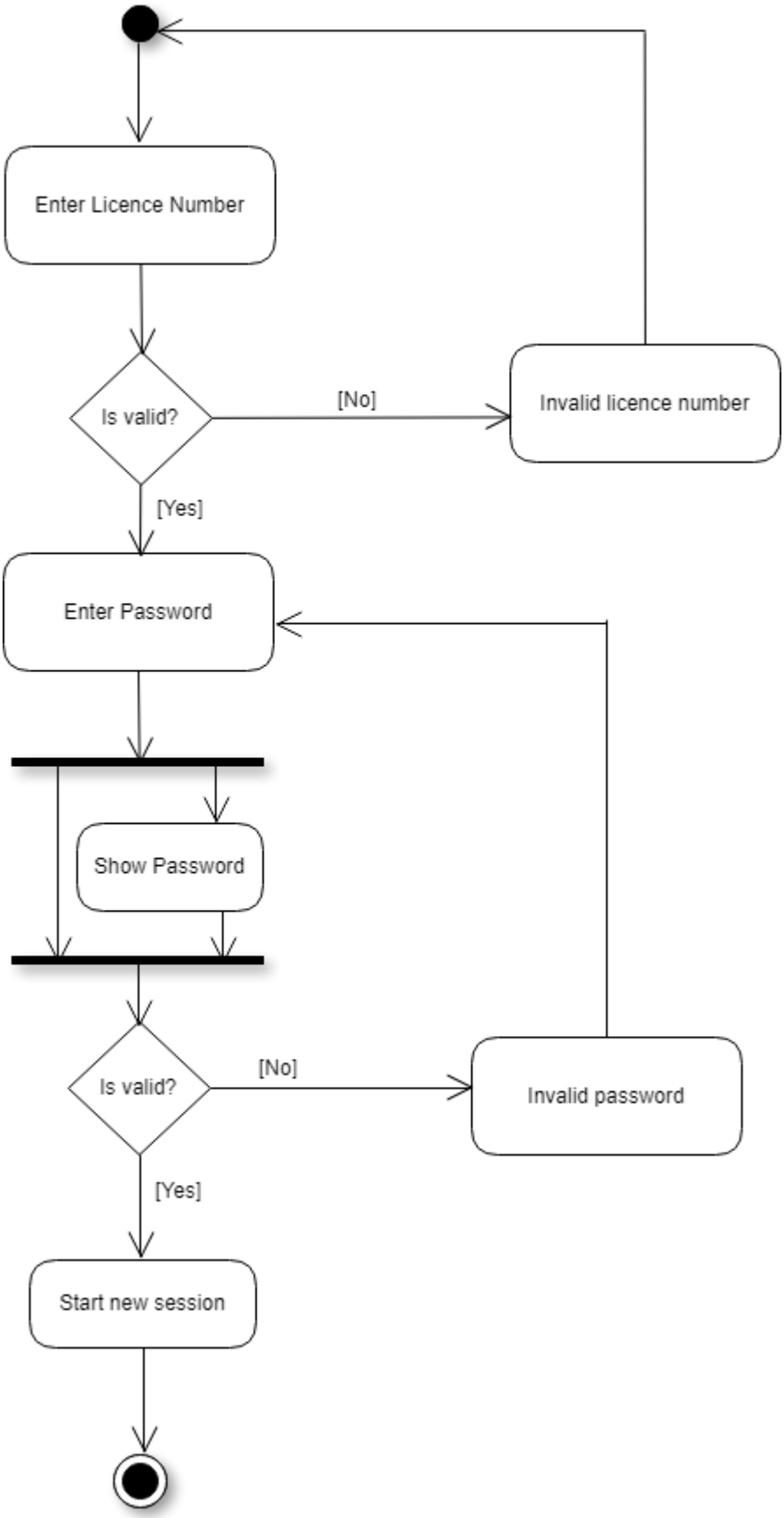


5.1.2 Activity Diagram

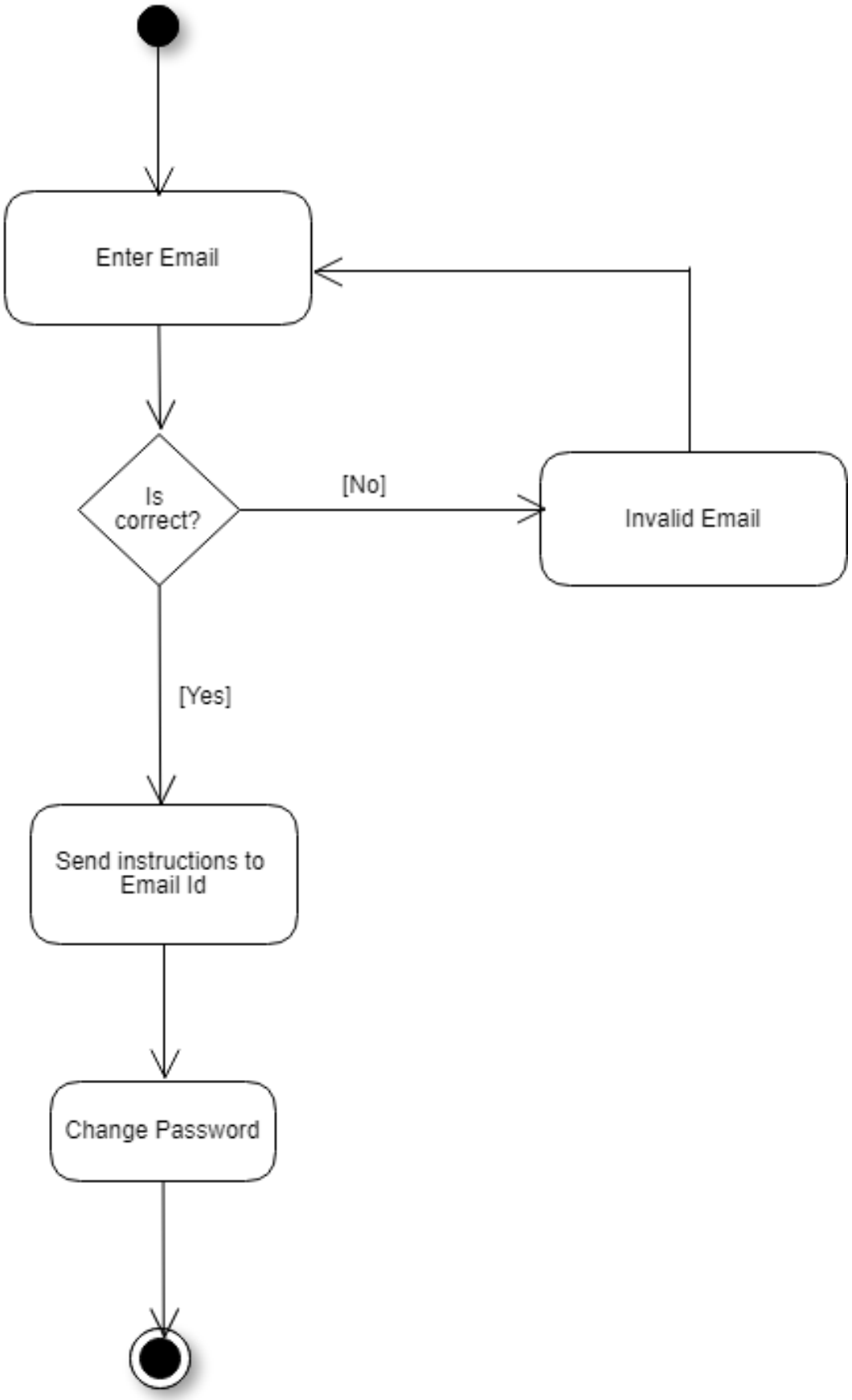
Login- Traffic Pal



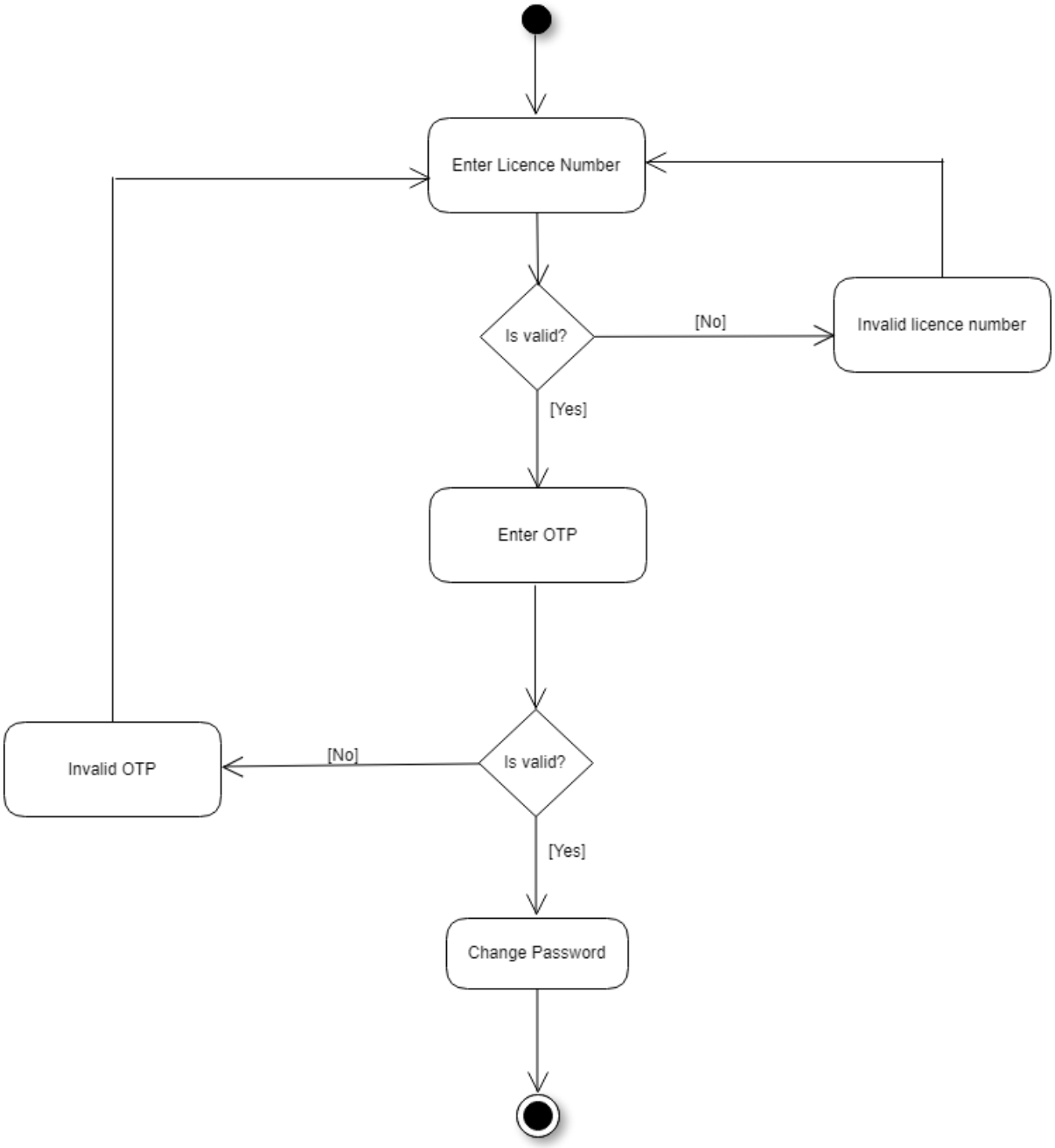
Login- License Assistant



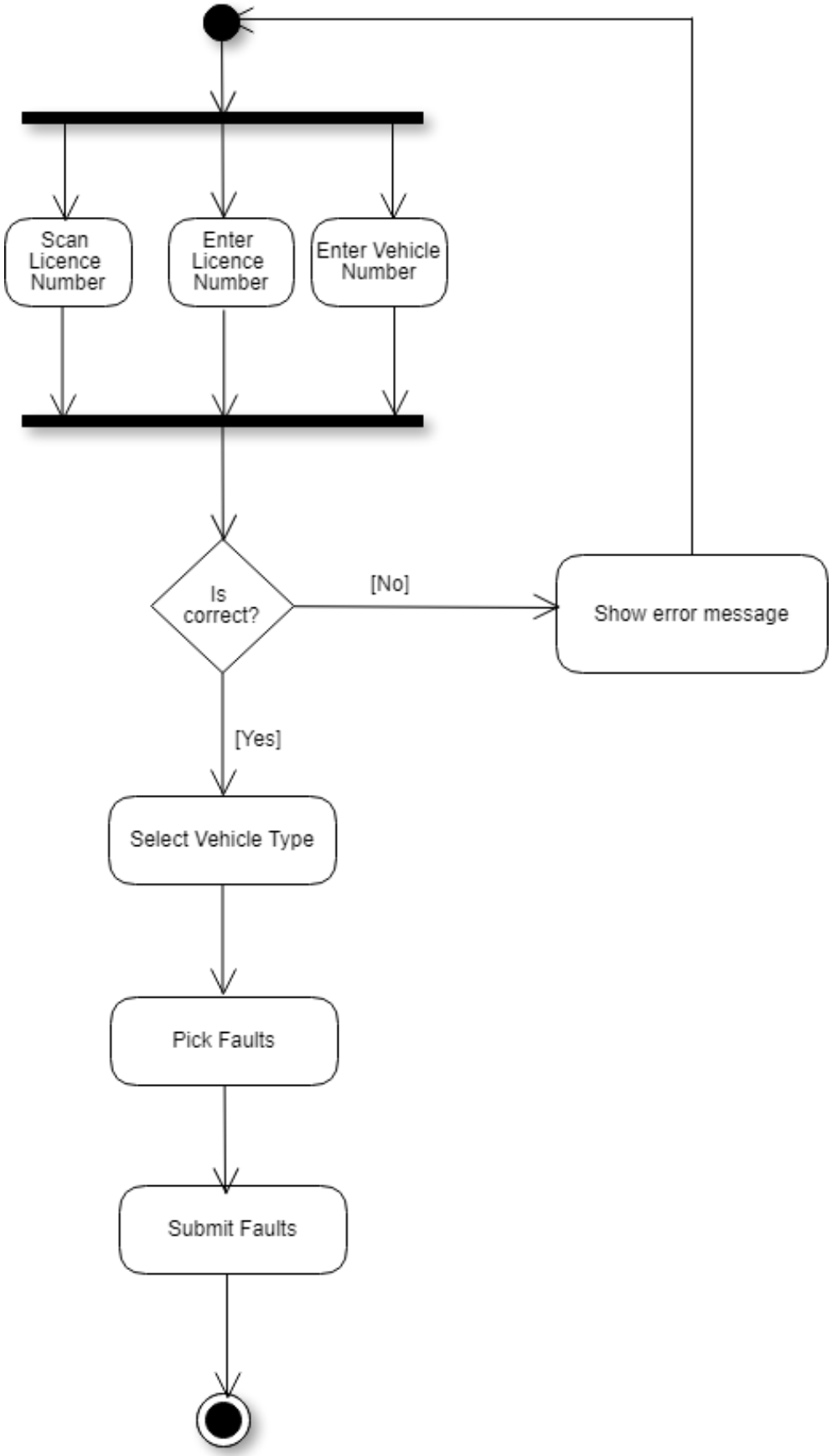
Forgot Password- Traffic Pal



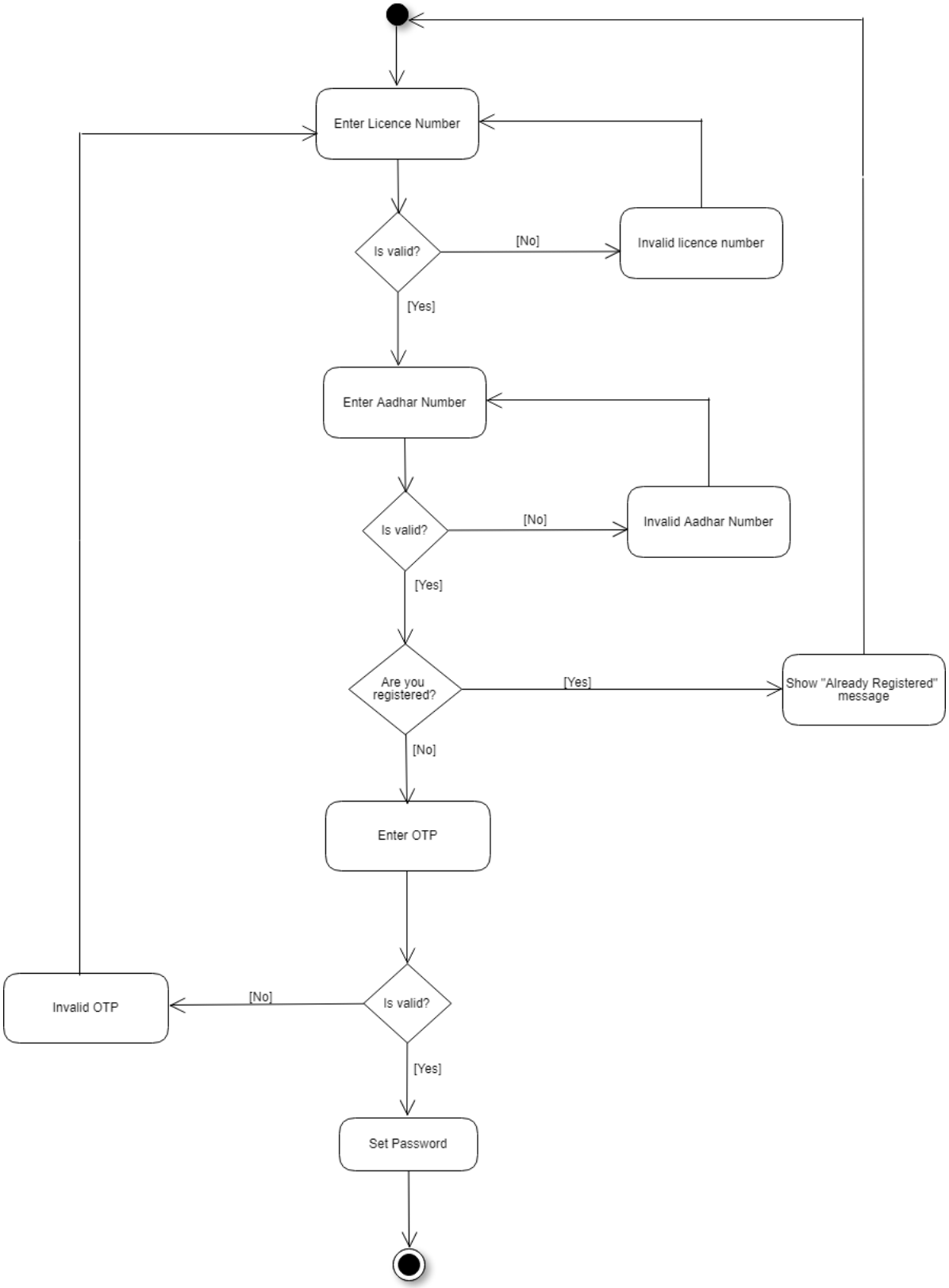
Forgot Password- License Assistant



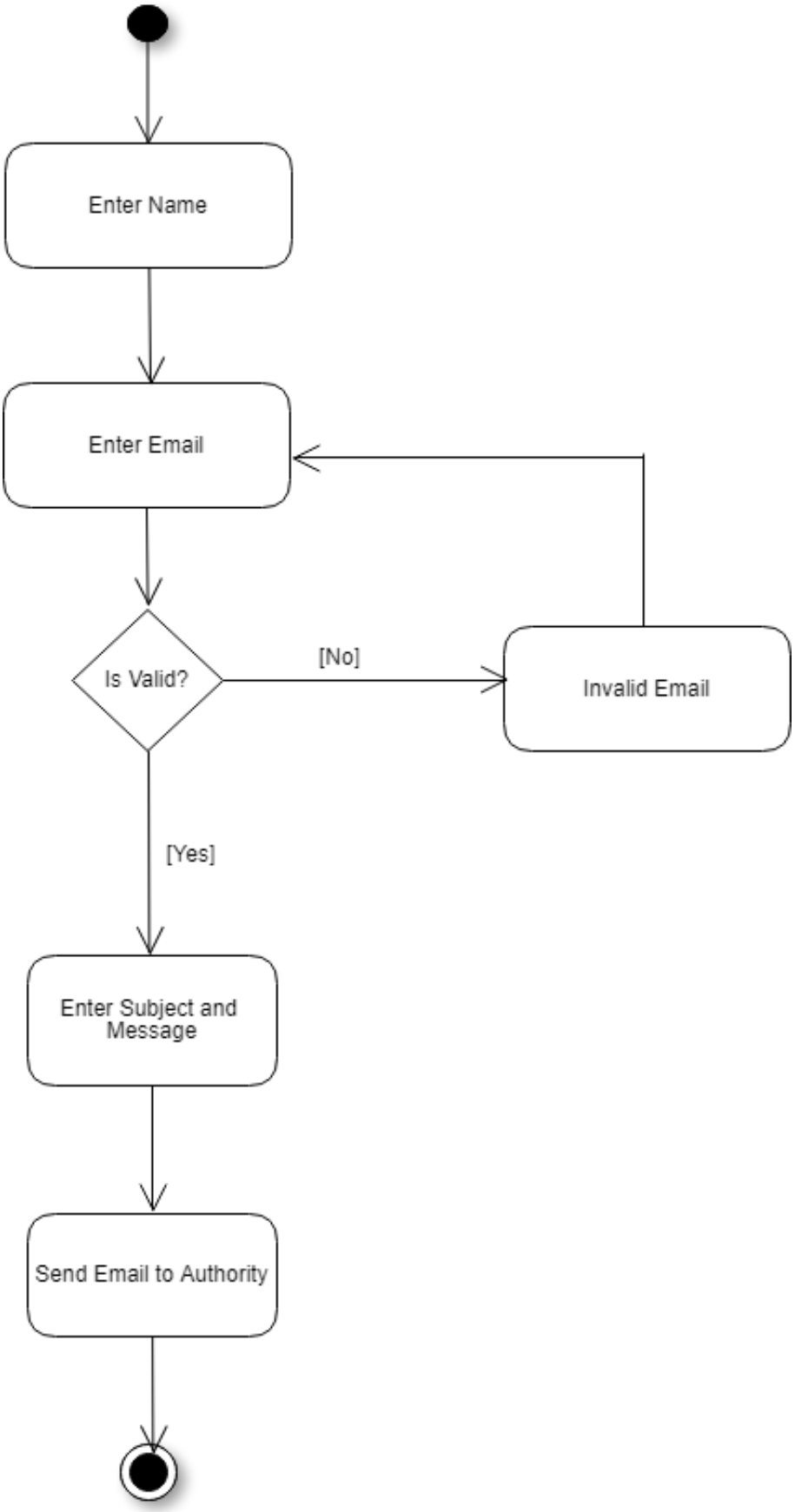
Scanning- Traffic Pal



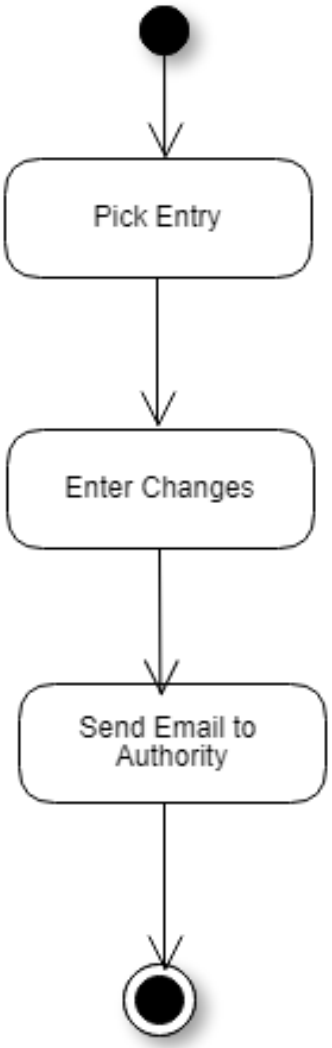
Registration- License Assistant



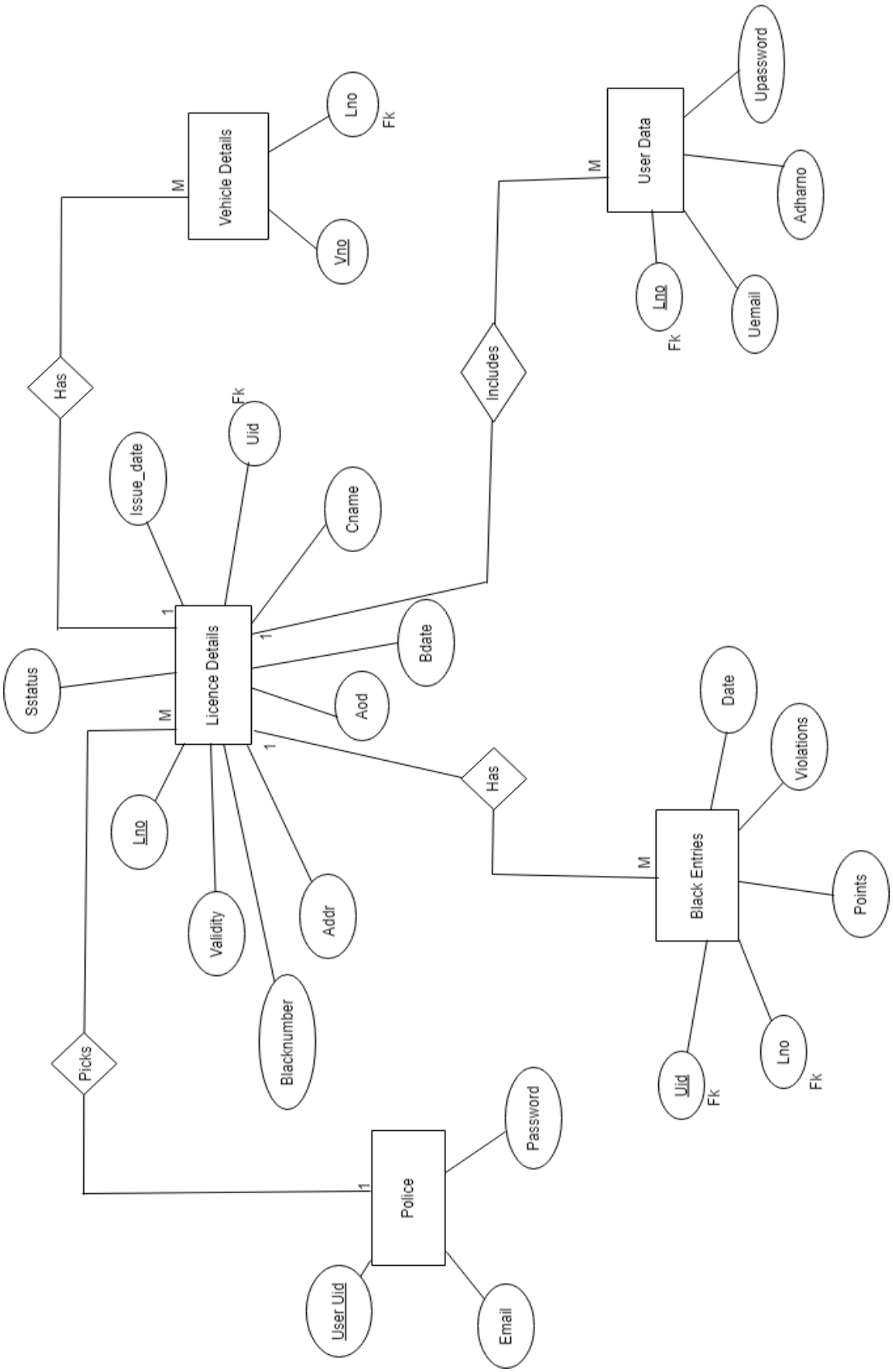
Contact


Enter Name
Enter Email
Is Valid?
[No]
Invalid Email
[Yes]
Enter Subject and Message
Send Email to Authority

Request Changes- Traffic Pal

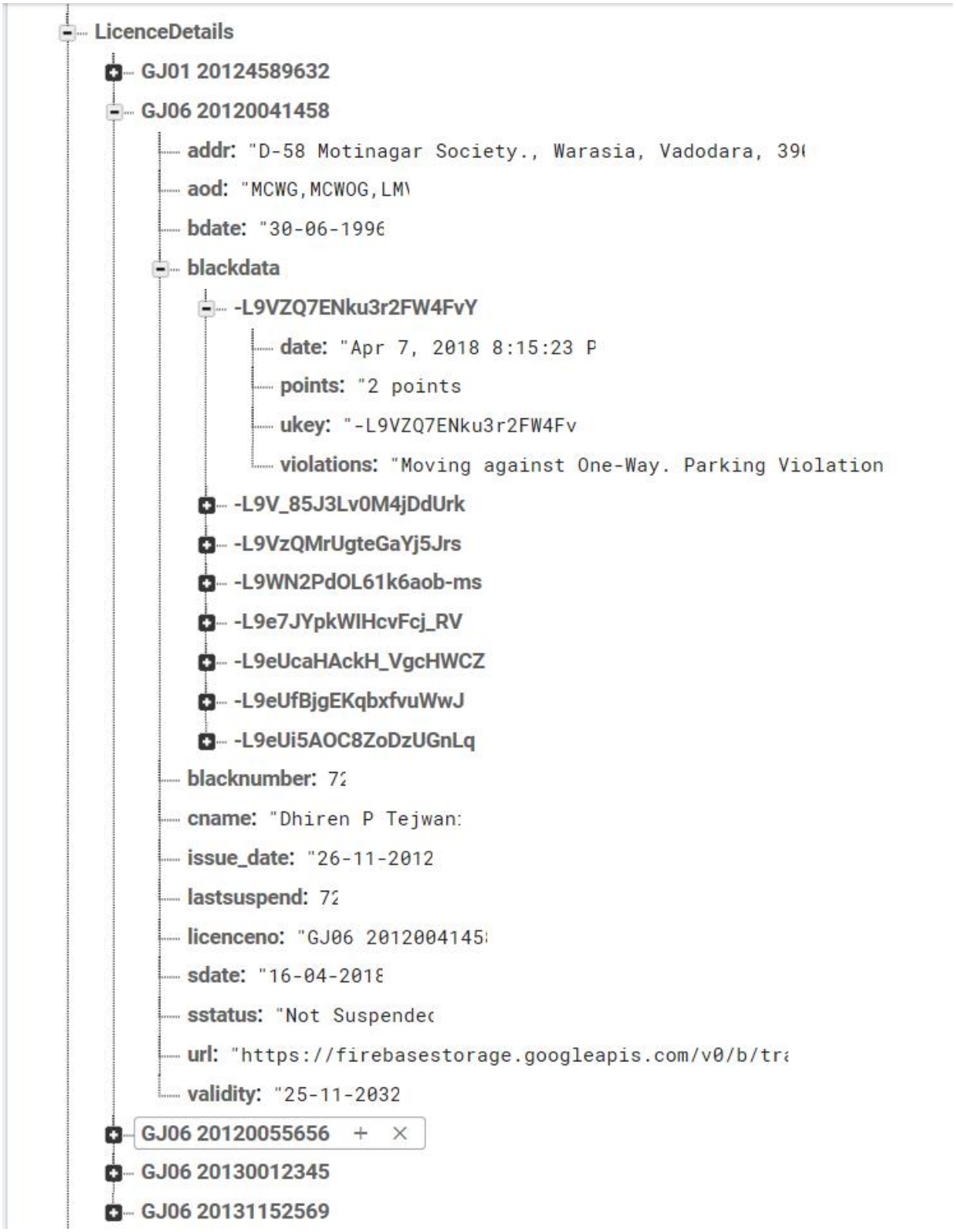


5.2 ER DIAGRAM



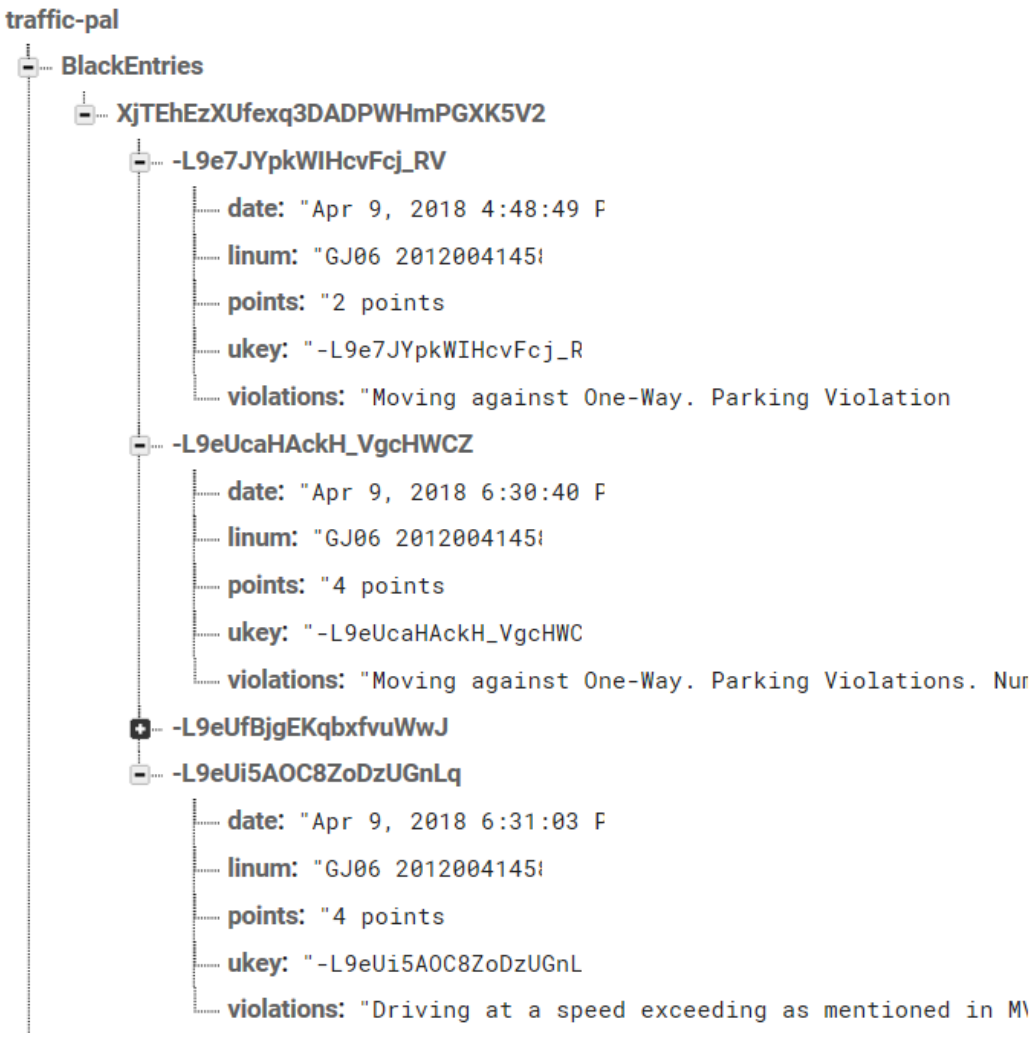
5.3 DATA DICTIONARY

License Details node:



User Data and Vehicle Details node:

Black Entries node:



6. IMPLEMENTATION AND RESULT

6.1 USER MANUALS

Traffic Pal helps the traffic officials do the challan work online and reduce their labor.

It stores the entries from the application into the server. It is at all times synchronized with a central server.

It is very user friendly application. Android OS configured smartphone users can start using it by just installing it. It doesn't require any extra configurations to the smartphone.

Login in:

When the user starts the app, Login Page is displayed. Here you input your username and password in the text boxes and then press the Sign in button. If the credentials are wrong, it will show the error message.

Forgot Password:

If you have forgot your password, then at the login page, you can click on forgot password. It will send you code to reset your password. Then you will be prompted to add a new password.

Home Page:

The home page contains the guidelines on how to scan the license number/ vehicle number. It has the guidelines on how to pick faults and submit the entries.

Scanning Page:

This page contains three options. If the Driver has DigiLocker account, then choose scan QR code option. If the Driver has License, then select Enter License Number option. If the Driver doesn't have License, then enter the Vehicle Number of the vehicle used for driving. Click the Submit button when done.

This will redirect you to a page where the License details and blacklist history of driver is shown.

Picking Faults:

After reviewing the License data, click next and you will be shown the faults list. Select the type of the vehicle driven and then tick the violations committed by the driver.

After that click on next button and you will be shown the report of the faults. Review this report and click Submit button when done.

Request Changes:

If you want to make any changes to any of the entries made by you, then go to request changes page. You will be shown all the entries from your account in the past. Click on the entry you want to make changes to.

After clicking on the entry, you will be shown the data of the entry and have a text field where you can enter the changes you want to make. Click on Send Changes button and you will be directed to select a mailing service.

About Us:

You can get to know more about the application through the about us page.

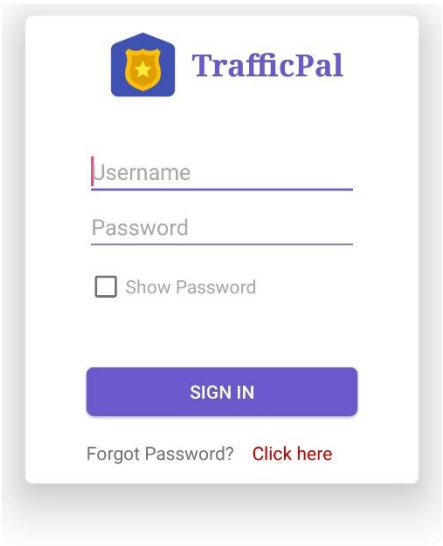
Even after the guidelines, you have any doubts, you can go to the FAQs page, where we have the frequently asked questions from the users along with their answers.

Contact Us:

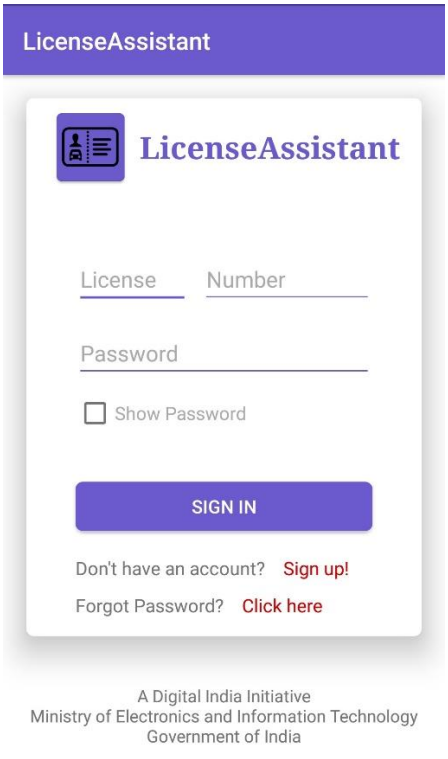
At any time, you can contact us by sending us a mail. Open the contact us page. You will have 4 entries to fill. Firstly your name, then your email, subject and then the message. Click on the Send Message button and you will be prompted to select any one of the available mailing services in your phone.

6.2 SCREEN SHOTS

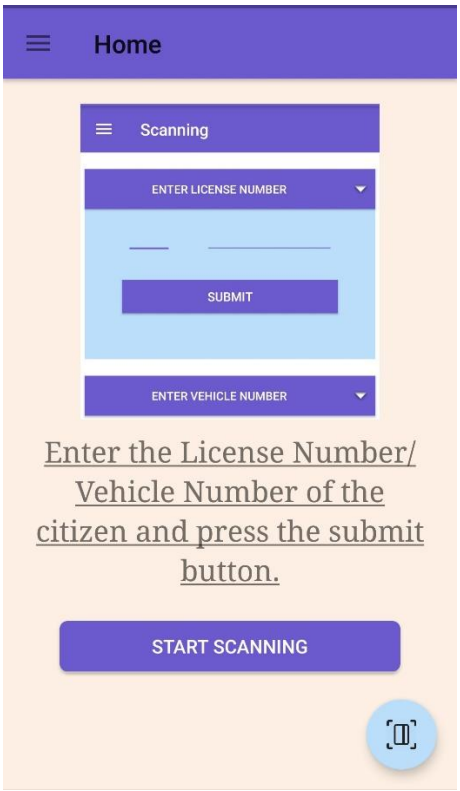
Login page- Traffic Pal:



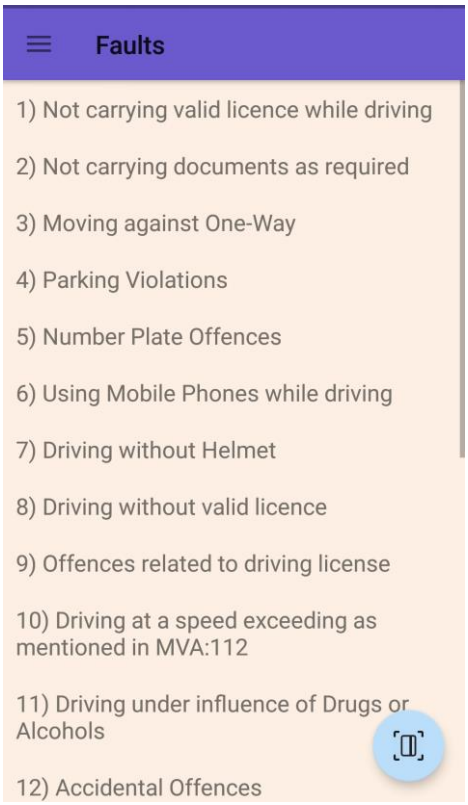
Login page- License Assistant:



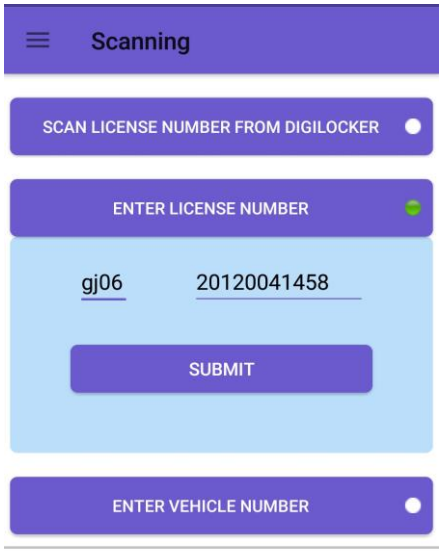
Home Page- Traffic Pal:



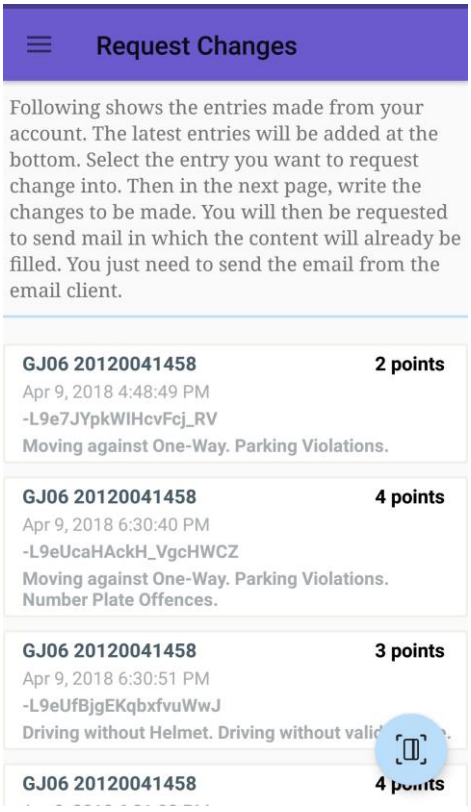
Faults Page- Traffic Pal:



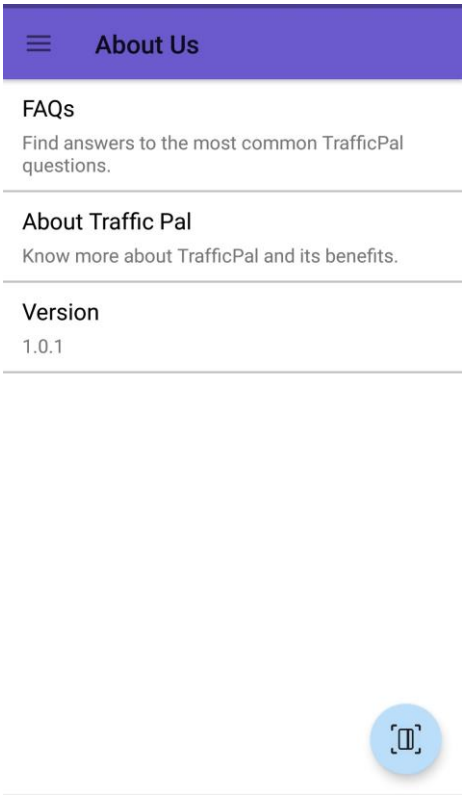
Scanning Page- Traffic Pal:



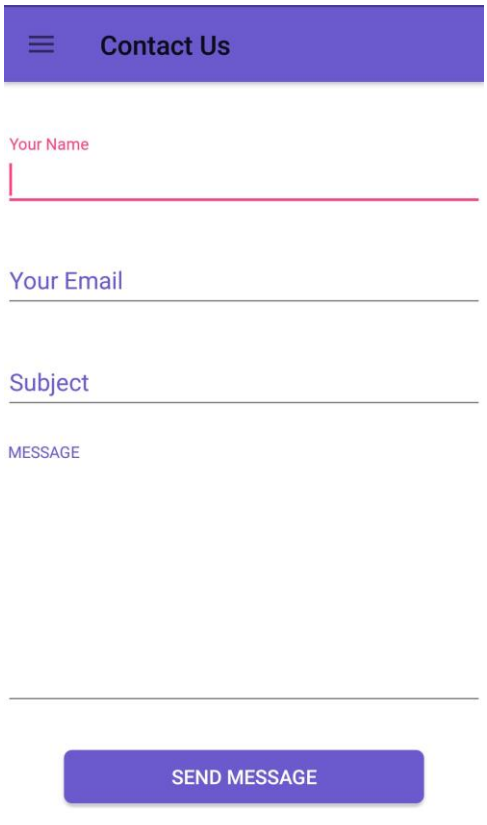
Request Changes- Traffic Pal:



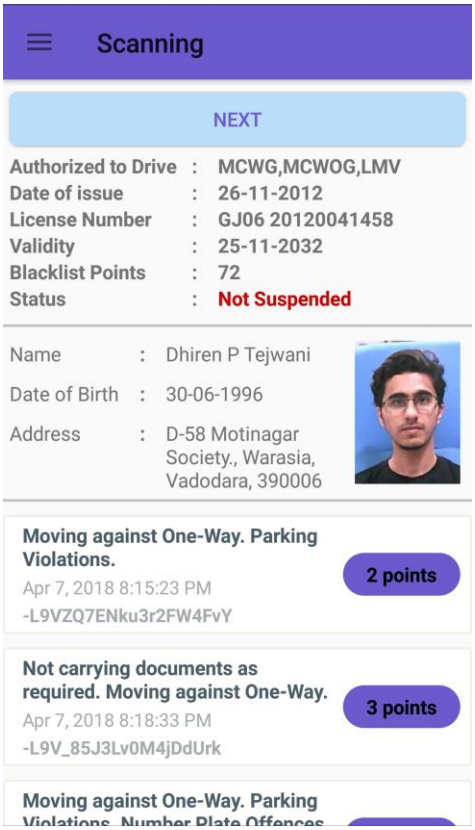
About Us Page- Traffic Pal:



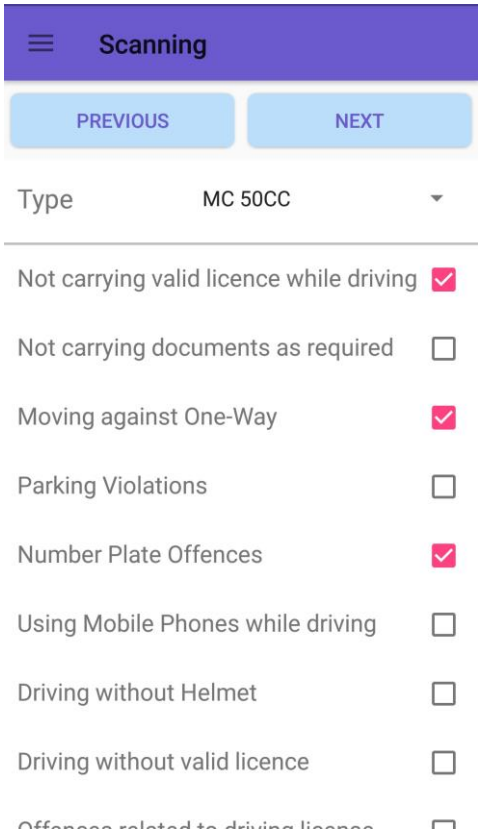
Contact Us Page- Traffic Pal:



License Review Page- Traffic Pal:



Pick Faults Page- Traffic Pal:



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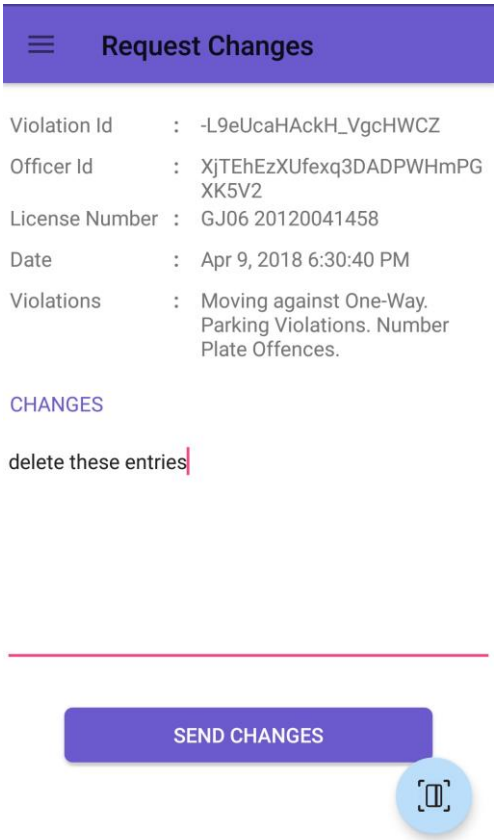

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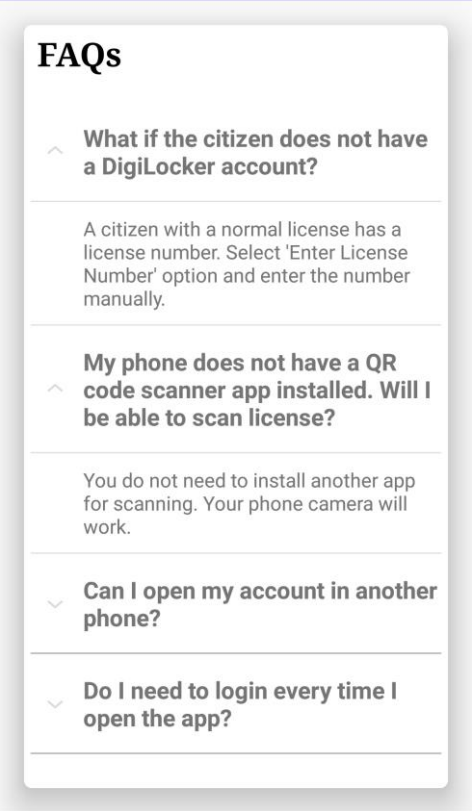

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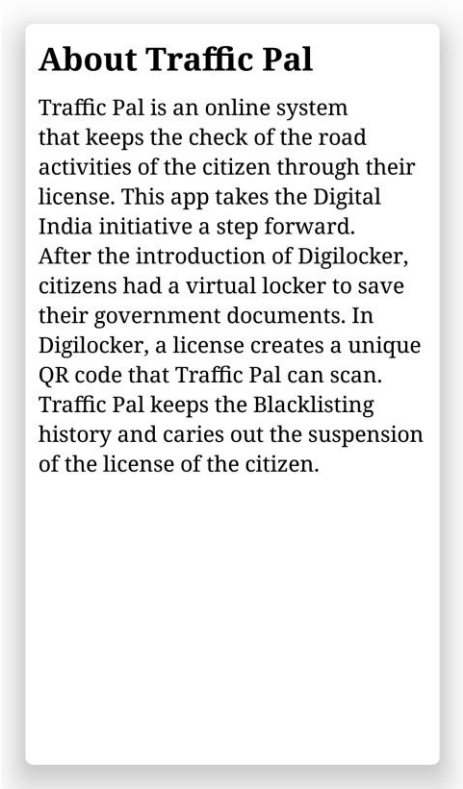

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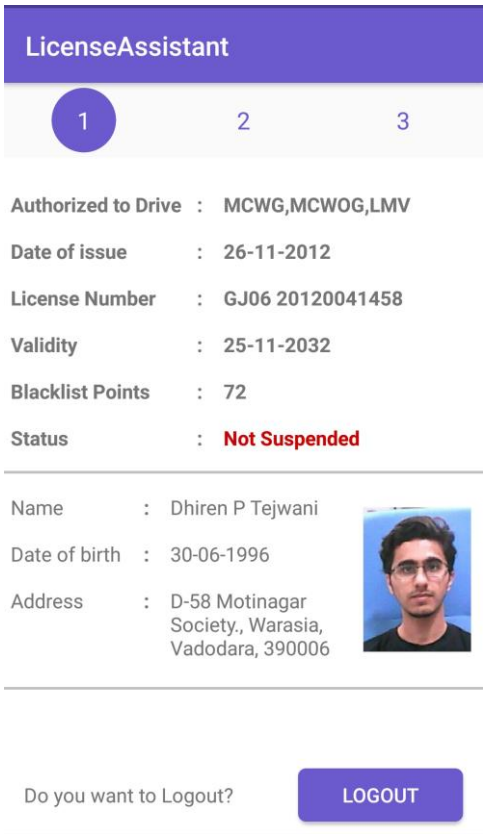

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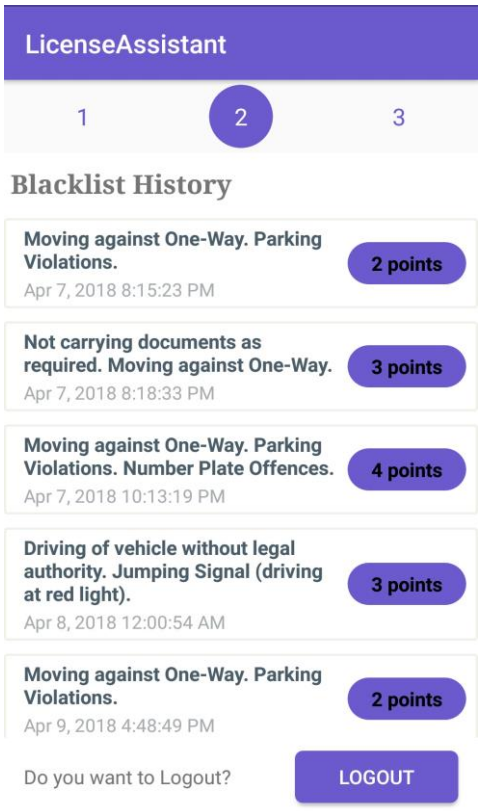

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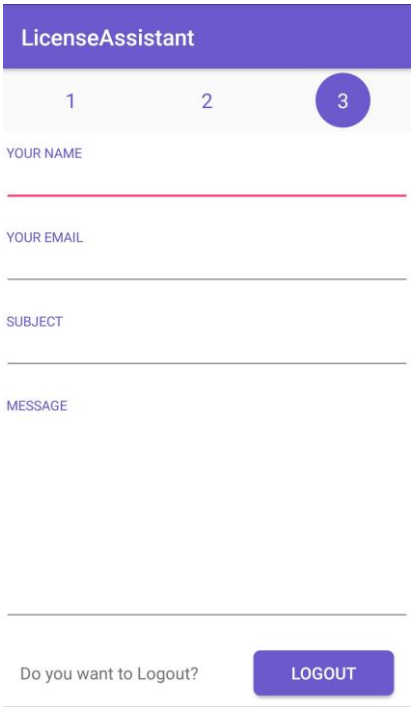
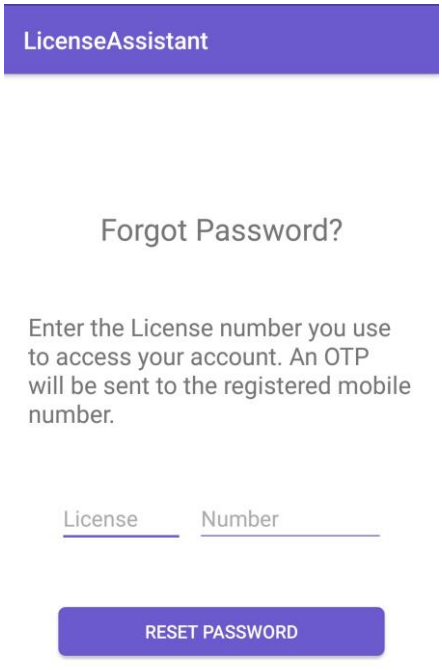


Forgot Password- License Assistant:



7. CONCLUSION AND FUTURE ENHANCEMENTS

Conclusion:

- The proposed system can work as a substitute to the existing offline system.
- The entire data is online, which makes data manipulation and access easy.
- The system has achieved the goal of Blacklisting and Suspension.
- The system can work along with DigiLocker and the database can be shared.
- The data in the app is synchronized with the central server.
- It is very user friendly and has attractive GUI.

Future Enhancements:

- The app can be linked with the database currently used by the government and can be linked with aadhar data.
- The app has multi- language support for static data. The database can configured to store data that can be translated at run time, hence giving multi-language support for the entire system.
- OCR (Appendix 3- a brief about OCR) can be implemented in the app to take photos of License or Vehicle and extract License Number and Vehicle Numbers respectively.
- Application can have a feature to detect speed of the moving vehicle, hence can detect if the speed limit was broken.

8. APPENDICES

APPENDIX-1

A BRIEF ABOUT DIGILOCKER

DigiLocker is a "digital locker" service operated by the Government of India that enables Indian citizens to store certain official documents on the cloud. The service is aimed towards reducing the need to carry physical documents, and is part of the government's Digital India initiative.

1 GB of storage space is offered to users to store identification card issued by government agencies, education certificates, PAN cards, driving license, vehicle ownership documents and some other documents.

Users need to possess an Aadhar card to use DigiLocker. For sign-up, the Aadhar card number and the one-time password sent to the Aadhar-associated mobile number, need to be entered. For later log-ins, the user can set their own password it link the account to Facebook or Google logins.

The beta version of the service was rolled out in February 2015, and launched by the Prime Minister on 1 July 2015. The storage space provided was 10 MB initially, and was later increased to 1 GB.

In July 2016, DigiLocker recorded 20.13 lakh users with a repository of 24.13 lakh documents. The number of users saw a large jump of 7.53 lakh in April when the government had urged all municipal bodies to use DigiLocker to make their administration paperless.

There is also an associated facility for e-signing documents. The service is intended to minimize the use of physical documents, reduce administrative expenses, provide authenticity of the e-documents, and provide secure access to government-issued documents and to make it easy for the residents to receive services.

APPENDIX- 2

A BRIEF ABOUT QR CODES

QR code (abbreviated from **Quick Response Code**) is the trademark for a type of matrix barcode (or two-dimensional barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached. A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji to efficiently store data; extensions may also be used.

The Quick Response (QR code) system became popular outside the automotive industry due to its fast readability and greater storage capacity compared to standard UPC barcodes. Applications include product tracking, item identification, time tracking, document management, and general marketing.

A QR code consists of black squares arranged in a square grid on a white background, which can be read by an imaging device such as a camera, and processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image.

QR codes have become common in consumer advertising. Typically, a smartphone is used as a QR code scanner, displaying the code and converting it to some useful form (such as a standard URL for a website, thereby obviating the need for a user to type it into a web browser). QR code has become a focus of advertising strategy, since it provides a way to access a brand's website more quickly than by manually entering a URL.

APPENDIX- 3

A BRIEF ABOUT OCR

Optical character recognition (also **optical character reader**, **OCR**) is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example from a television broadcast). It is widely used as a form of information entry from printed paper data records, whether passport documents, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable documentation. It is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining. OCR is a field of research in pattern recognition, artificial intelligence and computer vision.

OCR is generally an "offline" process, which analyses a static document. Handwriting movement analysis can be used as input to handwriting recognition. Instead of merely using the shapes of glyphs and words, this technique is able to capture motions, such as the order in which segments are drawn, the direction, and the pattern of putting the pen down and lifting it. This additional information can make the end-to-end process more accurate. This technology is also known as "on-line character recognition", "dynamic character recognition", "real-time character recognition", and "intelligent character recognition".

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