

**VEHICLE REGISTRATION AND LICENSE VERIFICATION THROUGH MOBILE
APP DESIGN**

BY

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Multimedia and Creative Technology

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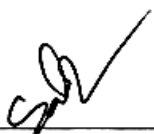


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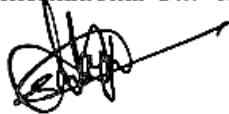
This Project titled “Vehicle Registration and License Verification through Mobile App Design”, submitted by Imtiaz Uddin Ahmed to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 6 July, 2024

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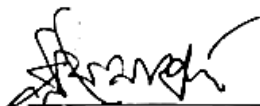
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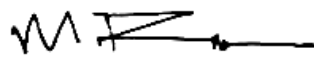
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DECLARATION

I hereby declare that this project has been done by me, Imtiaz Uddin Ahmed, ID 192-40-600 under the supervision of **Mr. Kazi Jahid Hasan, Assistant Professor, Department of Multimedia and Creative Technology**, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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Abstract

This app transforms the management of vehicle documentation, offering a comprehensive platform for users to store essential documents such as registration, driving license, tax token, and insurance. As well as serving as a digital repository, it syncs with official databases automatically to update traffic violations in real-time. The Bangladesh Road Transport Authority (BRTA) will be able to simplify administrative processes as a result of this innovation, enhancing efficiency in monitoring and enforcing traffic regulations. As the world becomes increasingly digitalized, simple yet essential tasks such as vehicle registration and license verification require efficient and user-friendly solutions. The objective of this case study was to create a mobile application to simplify and expedite these processes. There are traditionally lengthy procedures, paperwork, and visits to government offices required to check vehicle registration details and driver's license status, which leads to frustration and time waste for both users and authorities. To make driving license verification and vehicle registration information seamless and convenient, the mobile app was designed. This app simplifies paperwork procedures and reduces wait times by digitizing these processes. Vehicle owners, drivers, law enforcement officers, and government officials responsible for managing vehicle registration and licensing are the intended audience for this app. Because these users come from different backgrounds and have varying levels of technological proficiency, a user-centered design is essential. The design process was user-centered, starting with in-depth research to identify the target audience's preferences and pain points. To ensure the app's usability for all users, iterative prototyping and user testing were conducted. By providing intuitive navigation, a clear visual hierarchy, and accessibility features, the app was designed to offer multiple benefits to users and stakeholders. Users can now quickly access their vehicle registration details and driving license status with just a few taps on their mobile devices, instead of carrying the papers. Law enforcement officers can verify vehicle and license information on the spot, eliminating the need for time-consuming manual checks. Government agencies benefit from reduced administrative burden and enhanced data accuracy. All things considered, the app increases user convenience, boosts productivity, and cultivates a more engaged and technologically literate community within the domain of car licensing and registration.

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CHAPTER 1

Introduction

1.1 Introduction

In the hectic society we live in, time is a currency we can't afford to waste. So finding effective and accessible solutions to daily problems becomes crucial. Among these, confirming driver's licenses and vehicle registration information is a necessary but frequently time-consuming procedure. Whether it's confirming the legitimacy of a vehicle's registration or ensuring the validity of a driver's license, the current methods often involve extensive paperwork, long wait times, and frustrating, complicated processes. Now, consider the broader implications: Inefficient verification processes aren't just an inconvenience—they're a roadblock to productivity and peace of mind. Whether you're a busy professional rushing to a meeting or a parent trying to manage a hectic schedule, every minute counts.

As a UI/UX designer, I recognized the urgent need for a solution that simplifies this complicated process. Thus, my mission began: to create a mobile application that simplifies document verification, putting the power back in the hands of the user. But this isn't just about convenience—it's about fundamentally reshaping the way we interact with transportation and documentation.

My project focuses on the core problem: the outdated and convoluted nature of traditional verification methods. By dissecting the current state of affairs and identifying key pain points, I aim to design a solution that not only meets but exceeds user expectations.

My objectives are clear: to design an intuitive mobile application that revolutionizes the document verification experience. Through a blend of user-centric design principles, iterative prototyping, and rigorous testing, we're crafting an interface that empowers users to verify their documents seamlessly.

The significance of my research extends far beyond the realm of document verification. By championing user experience and efficiency, I am paving the way for a new era of simplified communication in the digital age. My findings not only offer practical solutions for individuals but also contribute valuable insights to the broader discourse on design innovation. The context for this introduction's exploration of the problem statement, design process, major components, and results of my effort to create a mobile application for quick and simple license and vehicle registration checks is established here.

1.2 Motivation

As a student of Multimedia & Creative Technology and a UI/UX designer, I have been able to understand how the user experience works. The user experience is something that improves my way of doing my day-to-day things.

Transportation is a huge part of my daily routine. Making it easier will help us improve our daily lives. As a vehicle owner, I have faced a problem myself. Recently, the Bangladesh Road Transport Authority (BRTA) launched a mobile app for E-Driving licenses. However, I still face the problem because of the lack of user satisfaction with the product.

Therefore, I devised the idea of “BRTA Smart Papers” for vehicle registration and license verification through a mobile app. This mobile app will be more efficient, and user-friendly, and will save a lot of time and effort. It will also help to reduce corruption and simplify the process of vehicle registration and license verification.

1.3 Objectives

In this project, my main aim is to solve a common problem with vehicle registration and license verification through “BRTA Smart Papers.” But, before I can get there, I need to tackle smaller goals first. So, my first step is to complete these smaller objectives. Once I have done that, I will be ready to achieve my main goal of solving the problem with vehicle registration and license verification.

Here are the objectives that I have set to accomplish the goal:

1. Background Study
2. Conduct User Research
3. Testing
4. User Interface design
5. Prototyping
6. Usability Testing
7. Refine

1.4 Problem Statement

Formulating a clear problem statement was a crucial step. It defined the primary issue: the lack of a comprehensive and user-friendly vehicle document verification solution on the market. This statement guided the design of the app's features and functionalities.

Users face significant challenges in managing and verifying vehicle documents due to the limitations of existing mobile apps. Current solutions like "BRTA DL Checker" and "BRTA Sheba" either lack comprehensive verification capabilities or do not provide real-time updates, resulting in inefficiencies, errors, and user dissatisfaction. There is a clear need for a user-friendly app that offers accurate, real-time verification of all essential vehicle documents, including driving licenses, registration, and tax tokens, to streamline the process and enhance user confidence and convenience.

Ashraful is a busy executive who needs a reliable solution to verify vehicle documents because he often forgets to carry the documents.

1.5 Expected outcomes

As a UI/UX designer tasked with creating a mobile app for easy and quick vehicle registration and driving license verification, the expected outcomes of the project include:

- **Seamless User Experience:** intuitive interface for effortless navigation.
- **Efficiency Improvement:** Significant reduction in time and effort for document verification.
- **Enhanced Accessibility:** user-friendly design accommodates all users.
- **Accurate Information Reliability:** reliable access to up-to-date documentation.
- **Compliance Assurance:** Enabling compliance with regulations.
- **Customer Satisfaction:** Improved user experience leading to satisfaction and loyalty.

1.6 Report Layout

The report continues as follows:

"Introduction" is the key part of this first chapter. Furthermore, Chapter 1 goes into great detail about why such research is being conducted. Following that, I will present background studies in Chapter 2, requirement specifications in Chapter 3, and design methodology in Chapter 4. Chapter 5 focuses on implementation and testing. Chapter 6 explores the impact on society, the environment, and sustainability. Finally, the conclusion and future scope are discussed in Chapter 7.

CHAPTER 2

Background Study

2.1 Market Research

Market research is the initial phase of the project. In this stage, I conducted a market analysis and discovered some competitor mobile apps. One of them is "BRTA DL Checker" which provides comparable services but falls short of user requirements. BRTA DL Checker is a mobile app that verifies driving licenses and serves as an e-driving license. However, there are additional vehicle documents, such as registration and tax tokens, to verify. I found that BRTA DL Checker does not verify these documents. As a result, I decided to create a mobile app that not only verifies the driver's license but also other vehicle documents. This app will be more comprehensive and user-friendly.

I found another app "BRTA Sheba" which serves as an informative tool for vehicle documents but doesn't serve the purpose of verifying the documents. It seems to lack the functionality necessary to ensure the authenticity and validity of these documents, leaving users with only partial assurance regarding their vehicle-related paperwork. It appears that there are not enough users for this app. According to the most recent official BRTA notice, Bangladesh has 60 lakh registered automobiles overall. BRTA Sheba was first launched in January 2020. Currently, they only have 100,000+ downloads, according to the "Play Store". which is far less than those who own vehicles and have driver's licenses.

Taking these findings into consideration, I see a clear opportunity to design a mobile application that not only addresses the shortcomings of existing solutions such as "BRTA DL Checker" and "BRTA Sheba," but also goes above and beyond by providing a complete document verification service. By incorporating features to verify not only driving licenses but also vehicle registration, tax tokens, and other essential documents, I aim to create a one-stop solution for users seeking assurance and convenience in managing their vehicle-related paperwork.

2.2 BRTA Officer Interview

During my interview with BRTA's Deputy Director (Engineer) of BRTA, Dhaka Metro-3, Turag, Uttara, Dhaka, Kazi Mohammad Morsalin, I gained valuable insights into the challenges faced by the BRTA Sheba app and the reasons behind its limited user engagement. Through in-depth discussions and analysis of the data collected, I identified a key factor contributing to the app's lack of traction among users. One of the primary reasons for the app's dissatisfied user base is its limited functionality and lack of document verification. The lack of document verification features contributes to the app's shortcomings, as users seek comprehensive solutions that not only provide information but also provide assurance about the authenticity and validity of their documents.

Based on these insights, it becomes clear that the BRTA Sheba app's inability to offer real-time updates and document verification features is a significant obstacle to users. By incorporating features that address the shortcomings identified during my interview with Mr. Morsalin, I aim to create a solution that not only attracts but also maintains a loyal user base seeking convenience, reliability, and peace of mind in managing their vehicle-related paperwork.

2.3 Traffic Sergeant Interview

In my interview with Traffic Sergeant Aniruddha Roy, I discussed the complexities surrounding document verification processes, aiming to improve and simplify them for both law enforcement officers and the general public. Through my conversation, Sergeant Roy provided invaluable insights into the challenges faced during document verification encounters and offered suggestions for improving the process.

One key point that Sergeant Roy emphasized was the need for a user-friendly interface that facilitates quick and efficient document verification on the go. He stressed the importance of minimizing the time and effort required for officers to verify vehicle documents during traffic stops, as delays can impede traffic flow and compromise safety on the roads.

Moreover, Sergeant Roy highlighted the significance of ensuring the accuracy and authenticity of verified documents, as incorrect or fake information can affect the effectiveness of law enforcement efforts. He emphasized the importance of integrating effective verification mechanisms into the mobile app to prevent misuse and ensure compliance with regulations.

Additionally, Sergeant Roy pointed out the importance of providing clear instructions and guidance within the app to assist both officers and users in navigating the verification process seamlessly. He suggested incorporating features such as intuitive prompts, visual cues, and real-time feedback to enhance usability and reduce the likelihood of errors or misunderstandings. By incorporating his suggestions and addressing the pain points identified during my interview, I aim to create a solution that empowers both law enforcement officers and the public with greater efficiency and confidence in managing vehicle-related paperwork.

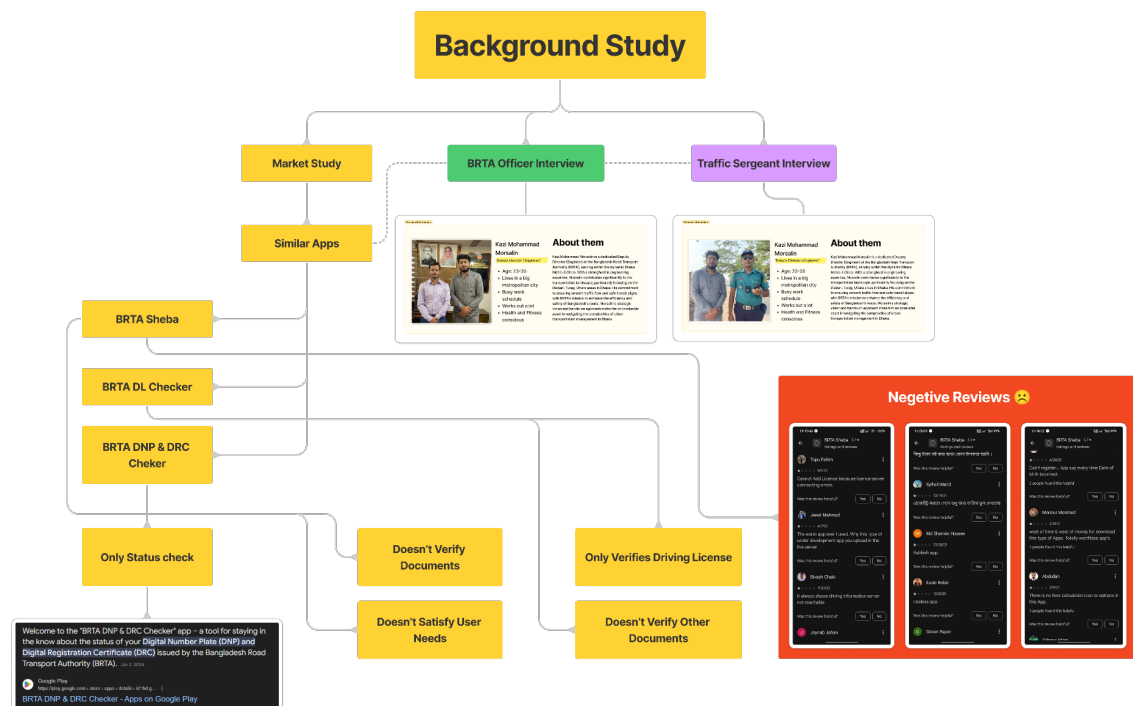


Figure 2.3.1: Background study

CHAPTER 3

Requirement Specification

3.1 Business Process Modeling

This “Vehicle Registration and License Verification through Mobile App Design” project aligns with the principles of user-centric design, ensuring that the needs and preferences of users are at the forefront of the design process. By focusing on user-centric design, BRTA Smart Paper aims to enhance the user experience, making the app both highly functional and easy to use. This approach ensures that the app meets users' needs for vehicle document management and verification while providing a seamless and enjoyable experience. The business model for BRTA Smart Paper is built around this principle, focusing on creating a comprehensive, user-friendly solution that stands out in the market.

The primary principles involved in User-Centered design (UCD) aim to ensure that usability is the main focus throughout the entire design process. These principles, if implemented correctly, will make sure that the user experience is met not only upon the initial release of a product but for the duration of its use.

To add to that, each of the principles below can be customized to meet each product’s unique requirements and interaction needs. By adhering to the core concepts of UCD, as outlined in Don Norman's book "User Centered System Design," BRTA Smart Paper can effectively address user needs and enhance the overall user experience.

- **User Involvement:** Actively involve users throughout the design and design process to ensure the product meets their needs and expectations.
- **Usability Goals:** Establish clear usability goals and evaluate the product against these goals to ensure it remains user-friendly.
- **Iterative Design:** Employ an iterative design process that allows for continuous feedback and improvements based on user testing and evaluation.
- **Context of Use:** Understand and consider the context in which users will interact with the product, tailoring features and functionalities accordingly.
- **Ease of Access:** Ensure that the product is easy to access and use for all drivers, regardless of their technological proficiency, by following usability guidelines and best practices.

BRTA Smart Paper aims to revolutionize vehicle document management and verification through a comprehensive and user-friendly mobile application. Here's what I offer in this project:

- **Digital Document Storage:**
 - Secure storage of driving licenses, vehicle registrations, tax tokens, and other relevant vehicle documents in digital format.
- **Real-Time Verification:**
 - Instant verification of vehicle documents using integrated government databases, allows users to present valid digital documents during traffic stops.
- **User-Friendly Interface:**
 - A simple and intuitive user interface is designed to make document management and verification easy and accessible for all users.
- **Document Expiry Notifications:**
 - Automated reminders and notifications for document renewals, ensure users never miss important deadlines for their vehicle documentation.
- **Comprehensive Coverage:**
 - Verification support is available for a wide range of vehicle documents, beyond just driving licenses, including registration certificates and tax tokens.
- **Secure Access:**
 - Strong security features to protect sensitive information, ensuring that digital documents are safe and accessible only to authorized users.
- **Convenience:**
 - Elimination of the need to carry physical documents, reducing the risk of loss or damage, and providing peace of mind to drivers.
- **Vehicle Owner and Driver Coordination:**
 - streamlined process for vehicle owners and drivers to coordinate document sharing through the app, ensuring that all necessary documents are available when needed.
- **Two-Step Notification Request System:**
 - ◆ A two-step notification request system that allows vehicle owners to send document requests to drivers, ensuring that the required documents are always at hand.

By offering these features, BRTA Smart Paper aims to provide a comprehensive solution for vehicle document management and verification, enhancing convenience, security, and compliance for drivers across Bangladesh.

3.2 Requirement Collection and Analysis

Stakeholders, including government officials, BRTA, traffic police, and IT designers, gather requirements and conduct technical studies during the initial phases of the design and implementation of the BRTA Smart Paper. This process is organized and methodical. This stage guarantees that the project's technical viability, economic benefits, and scope are all clearly understood. As we move into the design and designment stage, backend architecture and wireframes are created by IT designers and UX/UI designers as part of the system design. After that, the design team integrates the required APIs for document verification, codes the application, and puts strong security features in place. Thorough testing is done to find and fix bugs, guaranteeing a dependable and user-friendly application. This includes unit testing, system testing, and user acceptance testing (UAT).

BRTA and the IT team plan the implementation, create the documentation, and train BRTA employees during the deployment phase. Following the app's release, it is continuously monitored and supported to guarantee a seamless transition across app stores. User onboarding is made easier during the operational phase by providing drivers with instructions on how to use the app, enabling document uploads, and allowing traffic police and BRTA to use the app for document verification. To keep security updates up to date and enhance the app's functionality, feedback is continuously collected.

The government stands to benefit significantly from the implementation of the BRTA Smart Paper. Improved compliance with traffic laws and regulations is achieved through easier and more efficient document verification processes, reducing time and resources for both traffic police and BRTA. The accuracy of digital records minimizes errors and fraud, while reduced administrative costs and increased revenue from fines bolster economic benefits. The initiative enhances public trust through increased transparency and efficiency in government services. Additionally, the shift to digital documents supports environmental sustainability by reducing the need for physical papers. Overall, BRTA Smart Paper aligns with the government's digital transformation agenda, showcasing a commitment to modernization and innovation, ultimately benefiting officials, citizens, and the environment.

3.3 Design Requirements

The design process for BRTA Smart Paper required a robust and flexible approach to ensure the creation of a comprehensive and user-friendly mobile application. The design phase focused on several key requirements: an intuitive user interface, secure document management, real-time verification capabilities, and seamless integration with government databases. To meet these

requirements, the design team utilized Figma, a powerful cloud-based design tool known for its collaborative features and extensive functionality.

Figma was chosen for its ability to facilitate real-time collaboration among designers, designers, and stakeholders. This enabled the team to work together efficiently, ensuring that all design elements were aligned with user needs and project goals. Figma's vector editing tools and prototyping capabilities were instrumental in creating detailed wireframes and high-fidelity mockups of the app. These mockups allowed for thorough testing and iteration, ensuring that the final design was both aesthetically pleasing and highly functional.

Moreover, Figma's component libraries and design systems ensured consistency across the app, making it easier to maintain a cohesive look and feel. This was particularly important for creating a seamless user experience, as it helped to standardize elements such as buttons, forms, and navigation menus. The ability to create interactive prototypes in Figma also allowed for extensive user testing and feedback collection, which was crucial in refining the design to meet user expectations and usability standards.

By leveraging Figma's comprehensive design capabilities, the team was able to design a polished and user-friendly interface for BRTA Smart Paper. This approach ensured that the app not only met the design requirements but also provided a reliable and enjoyable experience for users, ultimately supporting the project's goals of improving vehicle document management and verification.

CHAPTER 4

Design Method

4.1 Design Method

In this chapter, I am going to describe the design method I used in this project. The design method included researching existing solutions, brainstorming ideas, prototyping, and testing. This allowed me to identify the best possible solution and create a detailed design specification. The steps I followed in this project are outlined below:

- Brainstorm (Foundational Research)
- [Background Study](#)
- Qualitative Research
- Quantitative Research
- User Persona
- Problem Statement
- Hypothesis Statement
- Low Fidelity Sketch
- Mid Fidelity Design
- User Interface Design
- Prototyping
- Testing
- Refine

4.2 Qualitative Research

Qualitative research involved conducting interviews with key stakeholders, such as BRTA's Deputy Director (Engineer) Mr. Kazi Mohammad Morsalin and Traffic Sergeant Aniruddha Roy.

Their insights provided valuable information on the challenges and needs of users and law enforcement officers regarding vehicle document verification.

4.2.1 BRTA Officer Interview

During my interview with BRTA's Deputy Director (Engineer), Mr. Kazi Mohammad Morsalin, we gained valuable insights into the challenges faced by the BRTA Sheba app and the reasons behind its limited user engagement. Through in-depth discussions and analysis of the data collected, we identified a key factor contributing to the app's lack of traction among users. One of the primary reasons for the app's dissatisfied user base is its limited functionality and lack of document verification. The lack of document verification features contributes to the app's shortcomings, as users seek comprehensive solutions that not only provide information but also provide assurance about the authenticity and validity of their documents.

Kazi Mohammad Morsalin

Deputy Director (Engineer)
Dhaka Metro-3 Circle
Diabari, Turag, Uttara, Dhaka

May 02, 11.00am—11.30am



Question	Answer	Additional notes
Is “BRTA Sheba” BRTA’s official app?	Yes, "BRTA Sheba" is the official app of BRTA (Bangladesh Road Transport Authority).	It serves as an informational tool for vehicle-related services and regulations.
What's the main reason for your app?	The main purpose of "BRTA Sheba" is to provide convenient access to information related to vehicle registration, renewal, fees, and regulations issued by BRTA.	It aims to streamline processes and improve transparency in service delivery.

Why isn't BRTA Sheba used as a document verification app?	"BRTA Sheba" was primarily designed to provide information rather than for real-time document verification.	Its current functionalities focus on service information and not on the technical requirements needed for document verification processes.
Will the Bangladesh government allow e-document verification?	The Bangladesh government has been exploring digital solutions to enhance service delivery and efficiency.	While there is no specific policy at present for e-document verification, there is growing interest in and consideration for such advancements in regulatory processes.
What do you think about vehicle document verification through a mobile app like the "BRTA DL Checker"?	"BRTA DL Checker" and similar apps play a significant role in providing convenient and accessible means for drivers to verify their driving licenses.	However, comprehensive document verification, including vehicle registration and tax tokens, requires a more integrated approach and robust technological infrastructure. Such apps can complement existing services but may need enhancements to cover all document verification needs effectively.

Table 4.2.1: BRTA Officer Interview

Based on these insights, it becomes clear that the BRTA Sheba app's inability to offer real-time updates and document verification features is a significant obstacle to users. By incorporating features that address the shortcomings identified during my interview with Mr. Morsalin, we aim to create a solution that not only attracts but also maintains a loyal user base seeking convenience, reliability, and peace of mind in managing their vehicle-related paperwork.

4.2.2 Traffic Sergeant Interview

In my interview with Traffic Sergeant Aniruddha Roy, we discussed the complexities surrounding document verification processes, aiming to improve and simplify them for both law enforcement officers and the general public. Through my conversation, Sergeant Roy provided invaluable insights into the challenges faced during document verification encounters and offered suggestions for improving the process.

Aniruddha Roy

Sergeant,
Traffic Mirpur Zone
Mirpur, Dhaka

May 02, 03.30pm—04.30pm



Question 1: What challenges do you face during routine vehicle document checks?	I often face one challenge, drivers give us the excuse that they left the document at home.	At that moment, I often hesitate to apply the law strictly, as I understand it can be a genuine mistake.
Question 2: How often do drivers need their vehicle documents? What usually happens in these cases?	When they don't have the document, they usually say they left it at home.	At that moment, they make the document verification process much more difficult and time-consuming.
Question 3: What are your thoughts on the current system of physical document verification? What improvements are needed?	The current system of physical document verification is quite difficult and time-consuming	Recently, BRTA offered a solution for e-driving licenses. which is verified through a mobile application. If all vehicle documents could be verified, it would be much easier.
Question 4: How would a digital solution for vehicle	A digital solution would greatly simplify my daily	reducing the need for excuses and ensuring compliance.

Does document verification impact your daily duties?	duties. With a digital verification app, I could quickly check all necessary documents on the spot,	This would save time, minimize delays, and make the verification process much smoother and more efficient.
Question 5: What features are essential for a mobile app designed to verify vehicle documents?	A mobile app designed to verify vehicle documents should include essential features such as secure document storage, real-time document verification capabilities	User-friendly interface for user-robust encryption for data security, and integration with existing databases for validation.

Table 4.2.2: Traffic Sergeant Interview

One of the key points emphasized by Sergeant Roy was the need for a user-friendly interface that facilitates quick and efficient document verification on the go. He stressed the importance of minimizing the time and effort required for officers to verify vehicle documents during traffic stops, as delays can impede traffic flow and compromise safety on the roads.

4.2.3 Ashraful Islam's Interview

We conducted an interview with a busy corporate job holder. He shared with us his experience of being stopped by police officers multiple times and the inconvenience it causes. He also highlighted the importance of having an efficient system in place to streamline the process of vehicle document verification and prevent delays.

Ashraful Islam

Corporate Job holder
Khilgaon, Dhaka

May 12, 05.30pm—06.30pm

Question	Answer
How old are you?	I am 48
What kind of vehicle do you have?	I have a sedan car, which is a TOYOTA Axio 2011.
Do you feel any difficulty physically carrying the car's documents?	Yes, it's a problem. For example, I left the car documents at home, and this makes me feel tense.
Have you ever been harassed by the police or received a fine because you left the documents at home?	I can't remember. But there is always a tension about when the police might stop you
Are you aware of the BRTA E-License?"	yes. I think this is a very good initiative for me.
How would it be if all the documents related to the car, along with the E-License, were available in an online-based app?	Of course, it would be nice.
How could it be nice?	The thing is very convenient. Digital systems are very easy to store and access. We can keep it on our smartphones. There is no need to carry the original hard copy.

Are you in agreement or not about the loss of papers?	Yes, of course. After showing my documents to the police, I asked if they were returning them to me properly or if I losing a document. Both can be a big issues.
If we create a mobile app where all vehicle documents are stored together, what do you think about this?	That will be very beneficial. But ensuring security there is crucial. If that happens, it will be user-friendly and cost-effective. Printing millions of documents costs a lot and harms the environment. In this case, it's environment-friendly. Creating such a method would be good.

Table 4.2.3: Ashraful Islam Interview

4.3 Quantitative Research

Quantitative research was conducted to gather statistical data on the number of registered vehicles and user demographics. This data helped in understanding the potential user base and the growing demand for efficient document verification solutions. We surveyed my users to understand market opportunities and user requirements. We also conducted interviews with law enforcement officers to understand their perspectives on the need for document verification solutions. Finally, we examined the current market trends in the document verification industry.

4.3.1 Registered Vehicles In Bangladesh

Here's an official BRTA report for the number of registered motor vehicles in Bangladesh (year wise). This data shows the number of registered vehicles for each year. This data can be used to better understand the size and potential of the market, as well as the potential demand for document verification solutions. Additionally, this data can be used to track the growth of the market over time.



NUMBER OF REGISTERED MOTOR VEHICLES IN BANGLADESH (YEARWISE)s

Sl. No	Type of Vehicles	Upto-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Up To Jan-24	Grand Total
1	Ambulance	2486	218	181	240	337	472	374	493	563	665	788	755	591	259	17	8439
2	Auto Rickshaw	110623	20406	23528	15633	19828	18700	10656	8852	21593	29807	16724	9158	7606	9257	488	322859
3	Auto Tempo	9446	175	626	393	472	1081	1313	1592	609	224	77	25	9	8	0	16050
4	Bus	23385	1753	1438	1104	1486	2378	3832	3757	2755	3558	2395	1517	2688	2280	148	54474
5	Cargo Van	3363	489	282	686	605	398	1015	1413	1280	4	2	3	3	0	0	9543
6	Covered Van	6022	2480	1511	2347	2950	2442	3399	5201	5728	3070	2023	3800	4424	1874	145	47416
7	Delivery Van	15391	1037	802	941	1235	1779	2220	2420	2105	1523	1170	1436	1167	424	42	33692
8	Human Hauler	4827	1151	714	385	225	1129	3443	3393	1418	509	122	52	10	9	0	17387
9	Jeep(Hard/Soft)	28131	2141	1575	1303	1849	3564	4869	5419	5547	5627	4911	7602	10240	7765	761	91304
10	Microbus	62399	4037	3031	2530	4302	5177	5789	5571	4131	3682	2779	4941	7399	5072	547	121387
11	Minibus	23070	271	246	148	257	320	459	491	436	835	620	392	402	287	21	28255
12	Motor Cycle	755514	116534	101895	85321	90401	229010	315089	325876	393545	401452	311016	375252	506912	310418	25648	4343883
13	Pick Up (Double/Single Cabin)	29103	10314	7530	6443	9424	9992	11220	13454	13060	11918	10498	10897	9804	6664	453	160774
14	Private Passenger Car	207989	12942	9220	10456	14681	21029	20268	21952	18222	16779	12403	16049	16695	10784	1063	410532
15	Special Purpose Vehicle	5022	391	225	228	174	298	613	994	1334	1179	703	518	414	201	16	12310
16	Tanker	2606	309	188	218	350	319	380	317	527	417	304	248	409	334	23	6949
17	Taxicab	35122	75	170	50	372	83	43	14	159	11	8	0	4	0	0	36111
18	Tractor	14648	5195	3494	1885	1521	1689	2535	2777	3553	2561	2498	2567	1602	1407	90	48022
19	Truck	65889	6853	4043	4838	7939	6022	6605	10329	12644	8318	4719	5789	4528	2292	194	151002
20	Others	22332	1265	1062	1064	1580	2059	3842	5018	5973	5293	3900	4029	3244	1526	189	62376
TOTAL		1427368	188036	161761	136213	159988	307941	397964	419333	495182	497432	377660	445030	578151	360861	29845	5982765

Figure 4.3.1: How much vehicle

4.3.2 User Survey

We surveyed to understand the extent and frequency of issues faced by drivers regarding vehicle document management and verification. The survey aimed to gather insights on how drivers store their vehicle documents, the frequency with which they forget to carry these documents, their concerns about this issue, and their interest in a digital solution. Below are the summarized findings from the survey: 90% of the drivers had faced a situation where they had forgotten to carry their vehicle documents. 95% of drivers were interested in a digital solution for storing their vehicle documents. 50% of the drivers were concerned about the security of their documents.

I have included some survey and questionnaire results below.

For better feedback, we conducted the survey in Bangla.

- What is your age?

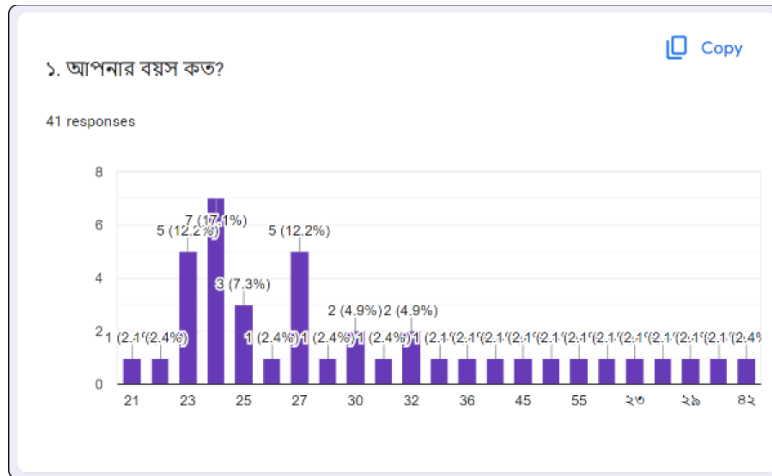


Figure 4.3.2: User Information

- What is gender?

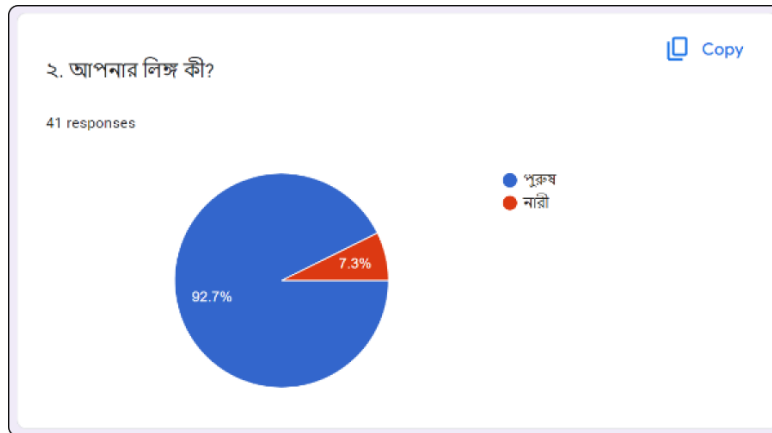


Figure 4.3.3: User Information

- Do you have driving license?

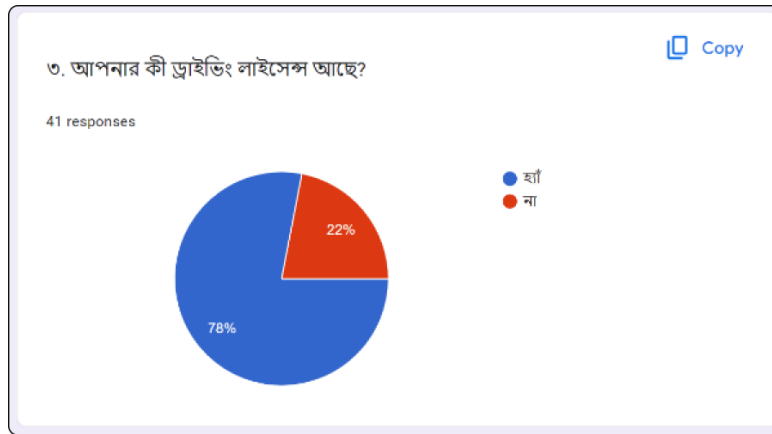


Figure 4.3.4: User Information

- Do you face any difficulties with vehicle document verification on the go?



Figure 4.3.5: User survey on difficulties in document verification

- How many times do you face this problem?

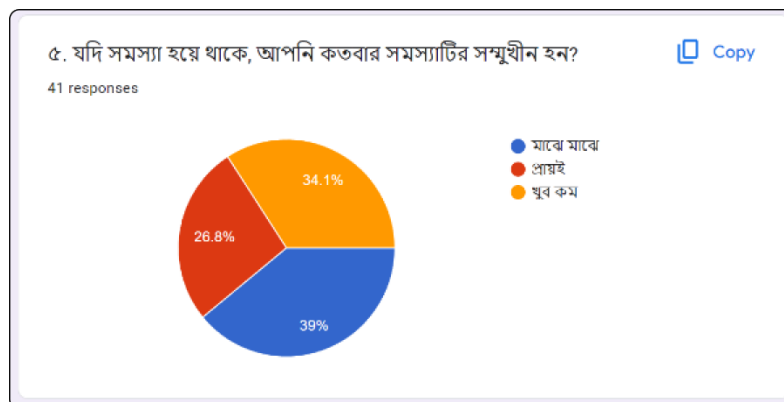


Figure 4.3.6: User survey on difficulties in document verification

- Have you ever forgotten to carry the vehicle documents?

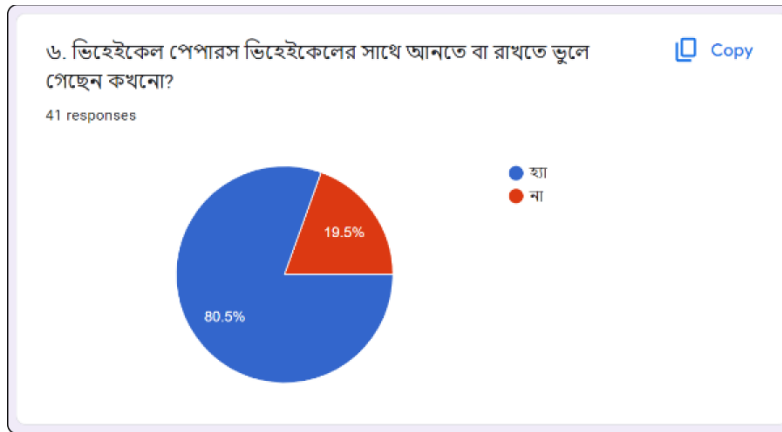


Figure 4.3.7: User survey on behavior

- If there were any options that included soft copy with the hard copy of papers. how was it?

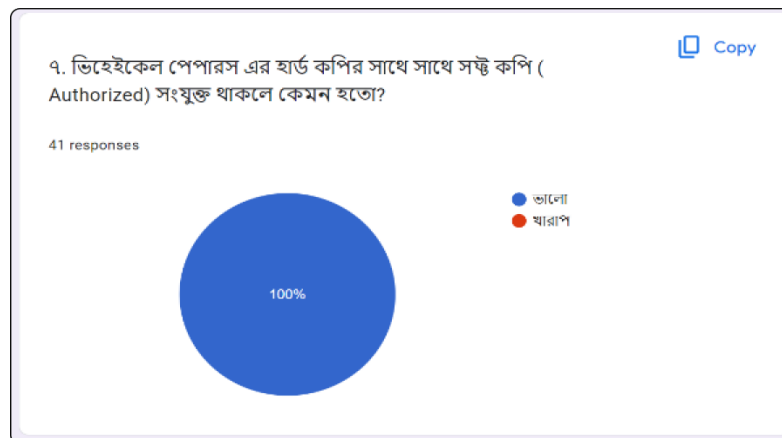


Figure 4.3.8: User survey on the current document verification process

- Have you ever been fined for not caring for vehicle documents?

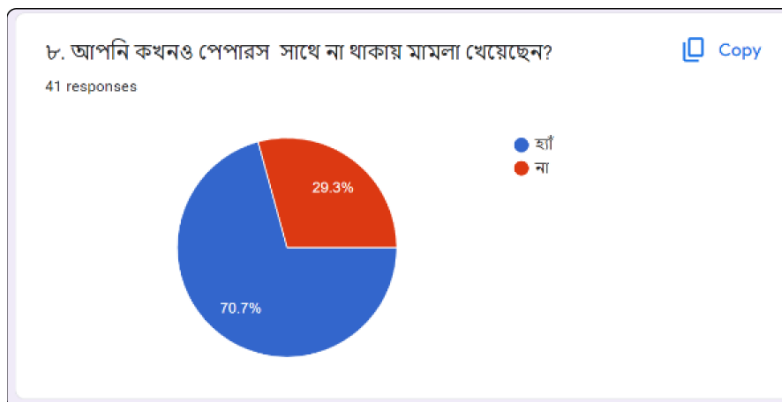


Figure 4.3.9: User survey on the current document verification process

- Do you know about any BRTA e-services?

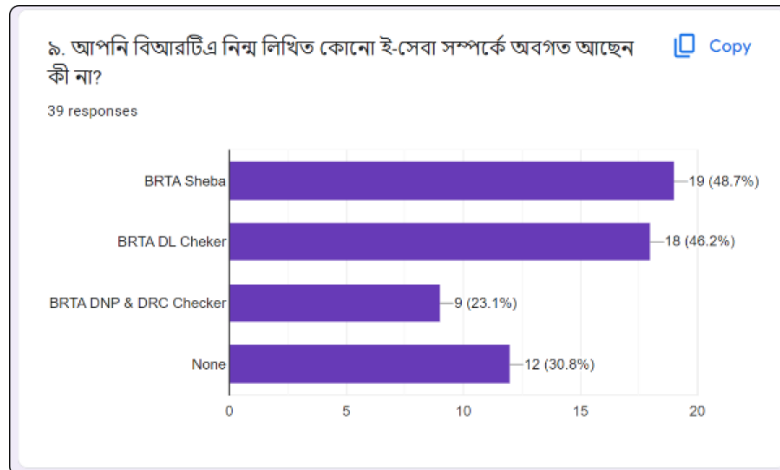


Figure 4.3.10: User survey on the current document verification process

- Do you want the digitalization of vehicle papers?

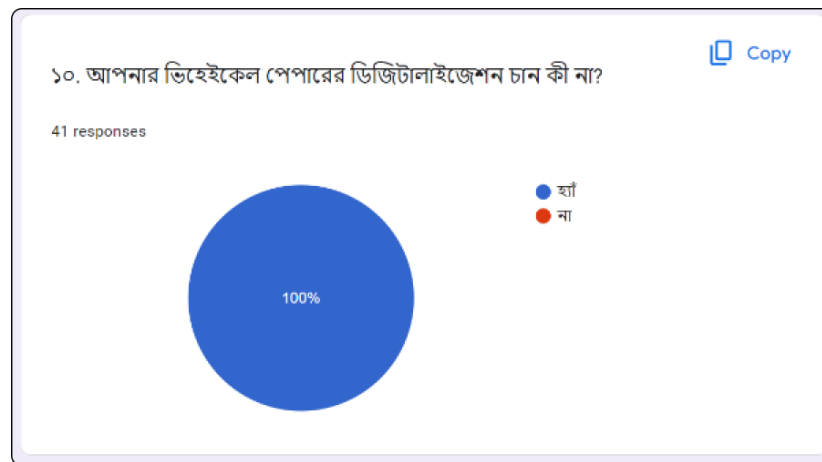


Figure 4.3.11: User survey on the current document verification process

If you have any opinion about vehicle papers, please give your opinion.

১১. ভিহেইকেল পেপারস সম্পর্কিত আপনার যদি কোনো মন্তব্য থাকে নিচে মতামত দিন

10 responses

ভিহেইকেল পেপার অনলাইন সিস্টেম করলে ভালো হতো।

Vehicle papers online hole valo hoi.

উন্নত রাষ্ট্রের মত QR scan OR fingerprint সিস্টেম থাকলে সুবিধা হতো। শুধু মাঝ পেপারস সাথে না থাকায় মামলা খেতে হচ্ছে যা কাম্যনয়। তাই পেপার ডিজিটাইজেশন করলে আমার মনে হয় বৈধ এবং অবৈধ পেপারস গুলো আইডেন্টিফাই করা যাবে সহজে।

আমার তো গাড়ি নেই 🙄

Photocopy niye ghurte parlei hoy :) ar na hoy scan kore mobile e pdf copy rakhle keno approve kore.../emn ta BRTA apps thakuk, jeita te verified papers gula oi apps e thakbe, jeno internet connection thakle ami dekhaithe pari police ke

No

পুলিশ বান্দিরপোলা বামবোলা

Figure 4.3.12: User survey on the current document verification process

4.4 User Persona

Based on the research findings, we designed user personas to represent the target audience. These personas included detailed profiles of typical users, highlighting their needs, pain points, and behavior patterns. This step was essential in guiding the design process to ensure the app meets user expectations.

Persona 1

Ashrafur Islam is a corporate job holder. Who often needs to remember to carry the vehicle papers while leaving for work in the morning. He usually falls into similar circumstances and feels anxiety while driving.

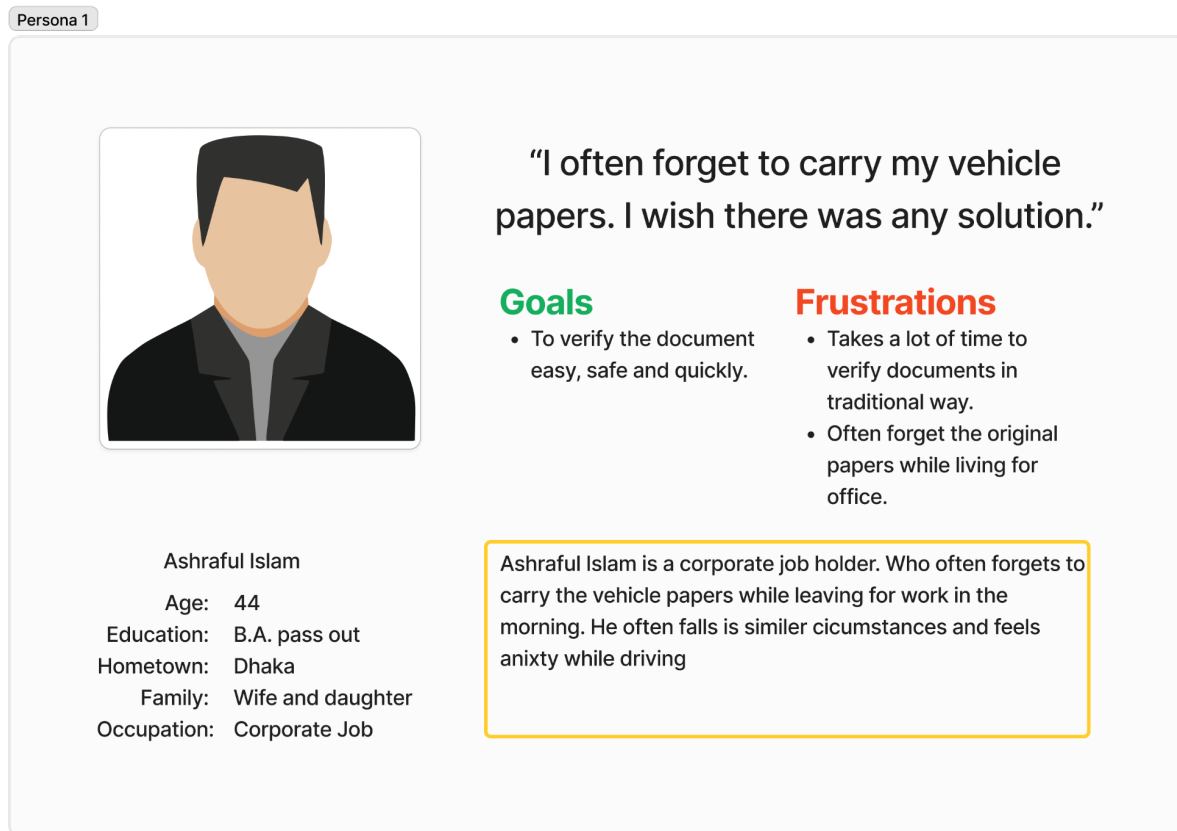


Figure 4.4.1: User Persona of Ashrafur Islam

Persona 2

Khan Jahan is a private car driver who frequently faces difficulties obtaining physical vehicle documents from the owner. This challenge creates significant stress, especially during routine traffic checks, as he needs to ensure all documents are available and up-to-date.

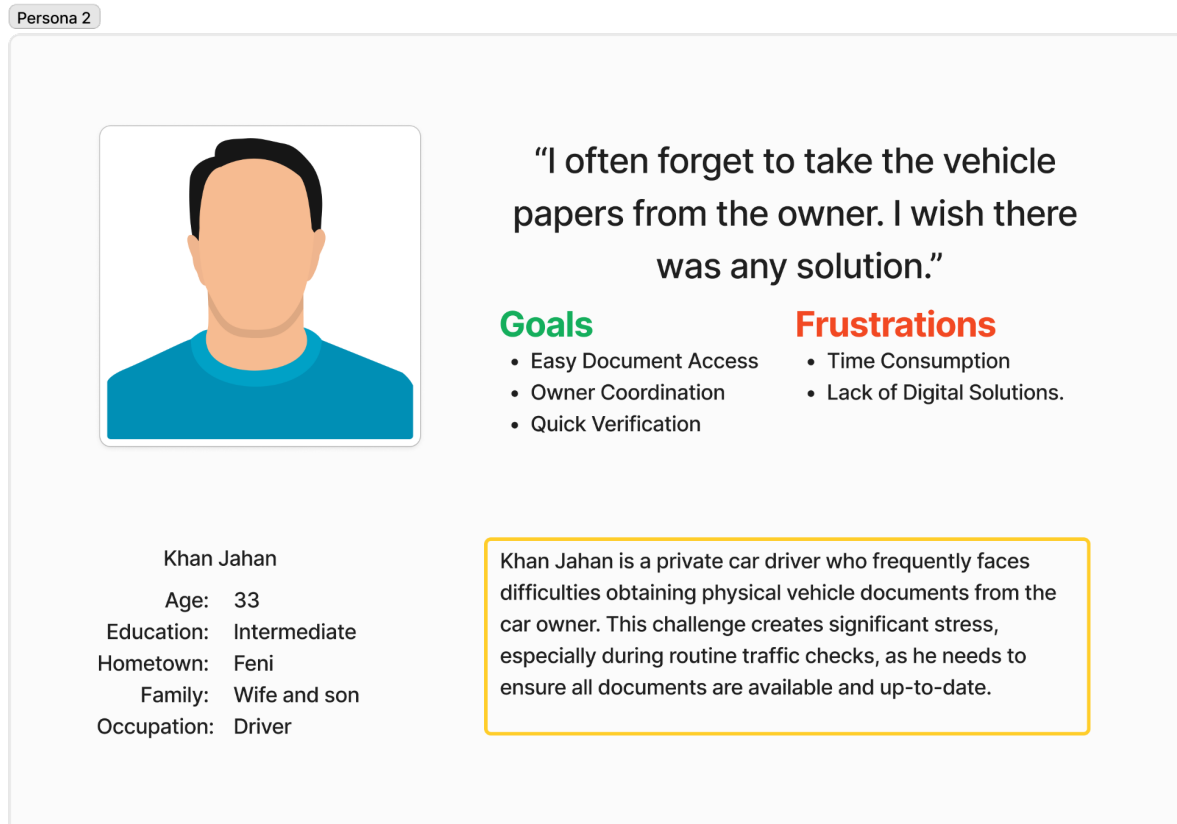


Figure 4.4.2: User Persona of Khan Jahan

4.4.1 User Journey Map

Persona 1 Overview

Name: Ashraful Islam

Occupation: Corporate Job Holder

Pain Point: Frequently forgets to carry vehicle papers, causing anxiety while driving.

User Journey

- **Morning Routine**
 - Ashraful wakes up early for his corporate job and starts his morning routine.
 - In the rush to get ready and leave on time, he often forgets to grab his vehicle documents.
- **Commute to Work**
 - Ashraful drives to work, feeling anxious because he realizes he doesn't have his vehicle papers with him.
 - He worries about the possibility of being stopped by traffic police and facing penalties for not having the required documents.
- **Encounter with Traffic Police**
 - On his way to work, Ashraful gets pulled over by a traffic sergeant for a routine check.
 - His anxiety increases as he explains to the officer that he forgot his vehicle papers at home.
- **No Digital Solution is Available.**
 - Ashraful realizes that there is no digital service available to verify his vehicle documents.
 - He tries to convince the traffic sergeant about his situation, but without digital verification, the officer remains skeptical.
- **Verification Process**

- The traffic sergeant insists on seeing the physical documents and informs Ashraful about the legal implications of not carrying them.
- Ashraful feels helpless and frustrated, knowing he has no way to prove the authenticity of his vehicle documents without the physical copies.
- **Consequences**
 - The sergeant issues a fine for not carrying the required documents and advises Ashraful to always have them on hand.
 - Ashraful is allowed to continue his journey but feels stressed and worried about facing similar situations in the future.
- **Arrival at Work**
 - Ashraful arrives at his office, parks his car, and reflects on the stressful encounter.
 - He starts his workday still concerned about the inconvenience and anxiety caused by the lack of a reliable document verification service.

Key Touchpoints

- **Realization:** Understanding the need for a digital solution during a stressful situation.
- **Frustration:** feeling helpless and frustrated without a way to verify documents digitally.
- **Verification Issues:** Facing difficulties in convincing the traffic sergeant without physical documents.
- **Emotional Stress:** experiencing stress and anxiety due to the inability to provide the necessary documentation and the resulting fine.

This user journey illustrates how Ashraful Islam faces significant challenges and stress due to the lack of a digital service for verifying vehicle documents, highlighting the urgent need for a comprehensive solution to address these issues.

Persona 2 Overview

Name: Khan Jahan

Occupation: Private Car Driver

Pain Point: Frequently faces difficulties obtaining physical vehicle documents from the car owner, leading to stress and potential fines during routine traffic checks.

User Journey

- **Morning Routine**
 - **6:00 AM:** Khan Jahan wakes up and begins his morning routine, getting ready for a day of driving clients.
 - **6:30 AM:** He sends a reminder to the car owner to ensure all necessary vehicle documents are available.
- **Pickup and Preparation**
 - **7:00 AM:** Khan Jahan arrives at the car owner's residence to pick up the car.
 - **7:15 AM:** The owner hands over the car but often forgets to provide the physical documents, causing delays and frustration.
 - **7:30 AM:** Khan Jahan starts his day feeling anxious about the possibility of being stopped by traffic police without the required documents.
- **Driving Clients**
 - **8:00 AM - 10:30 AM:** Khan Jahan drives clients to various locations, constantly worrying about the missing vehicle documents.
 - **11:00 AM:** On his way to pick up a client, Khan Jahan gets pulled over by a traffic sergeant for a routine check.
- **Encounter with Traffic Police**
 - **11:05 AM:** Khan Jahan realizes he doesn't have the physical vehicle documents with him, causing his anxiety to spike.
 - **11:10 AM:** He tries to explain the situation to the traffic sergeant, but without the documents, the officer remains skeptical.
- **Verification Process**
 - **11:15 AM:** The traffic sergeant insists on seeing the physical documents and informs Khan Jahan about the legal implications of not carrying them.
 - **11:20 AM:** Feeling helpless and frustrated, Khan Jahan cannot prove the vehicle's compliance without the documents.
- **Consequences**

- **11:30 AM:** The sergeant issues a fine for not having the required documents and advises Khan Jahan to ensure they are always available.
- **11:40 AM:** Khan Jahan resumes his journey, stressed about the penalty and the potential for future encounters.
- **Post-Encounter Reflection**
 - **5:00 PM:** After completing his workday, Khan Jahan reflects on the stressful encounter and discusses the issue with the car owner and fellow drivers.
 - **5:30 PM:** He realizes the urgent need for a reliable digital solution to manage and verify vehicle documents.
- **Realization of Need**
 - **6:00 PM:** Khan Jahan searches for digital solutions that could help him avoid such issues in the future.
 - **6:30 PM:** He discovers a new mobile app designed for comprehensive vehicle document verification and discusses it with the car owner.
- **Adoption of Solution**
 - **7:00 PM:** Khan Jahan and the car owner download the app, upload all necessary documents, and ensure they are verified and up-to-date.
 - **7:30 PM:** He feels a sense of relief knowing that the documents are now easily accessible and verifiable.
- **Future Interactions**
 - **Following Days:** Khan Jahan confidently uses the app during traffic checks, significantly reducing his anxiety and avoiding penalties.
 - **Long-Term:** He saves time, ensures compliance with regulations, and improves his daily routine and peace of mind.

This user journey illustrates how Khan Jahan navigates the challenges of managing vehicle documents, highlighting the transformative impact a comprehensive digital document verification app can have on simplifying his responsibilities and reducing stress.

4.4.2 User Empathy Map

Empathy Map: Khan Jahan

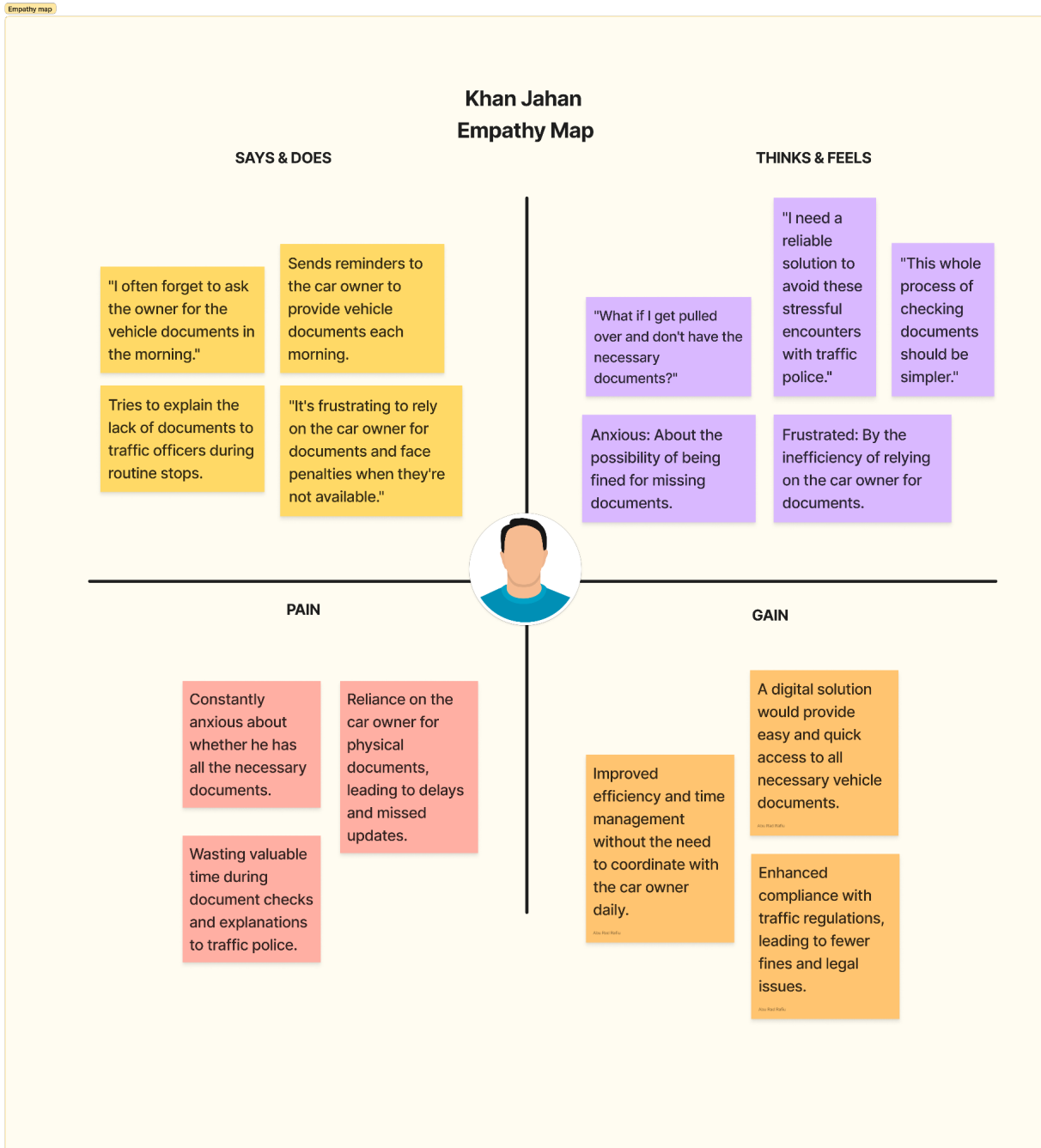


Figure 4.4.3: Empathy Map of Khan Jahan

Empathy Map: Ashrafur Islam

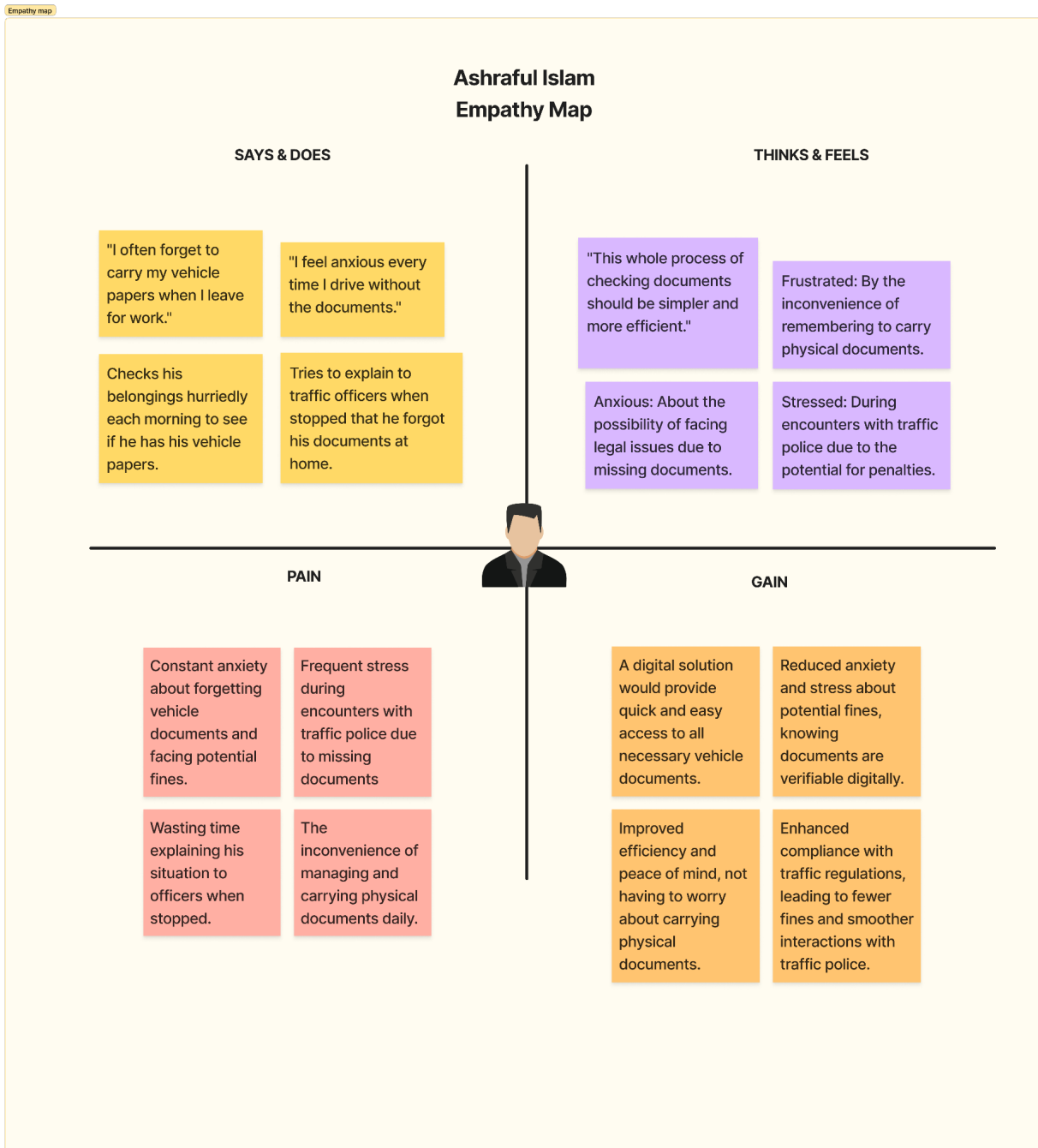


Figure 4.4.4: Empathy Map of Ashrafur Islam

4.5 The 5W & H

The 5W and H (Who, What, When, Where, Why, How) framework provides a structured approach to comprehensively describing a project or initiative. For BRTA Smart Paper, applying this framework helps clarify essential aspects of the mobile application's purpose, functionality, and benefits. By answering these questions, we can effectively communicate the scope and objectives of BRTA Smart Paper, ensuring alignment with user needs and strategic goals.

Who:

- **Who** refers to the target audience or users of BRTA Smart Paper, which in this case are vehicle owners and drivers in Bangladesh.

What:

- **What** describes the core functionality of BRTA Smart Paper, highlighting its role as a mobile application designed for digital storage, management, and verification of vehicle documents.

When:

- Indicates the situations or times when BRTA Smart Paper would be utilized, such as during traffic stops or when accessing regulatory checks.

Where:

- **Where** specifies the accessibility of BRTA Smart Paper, which is accessible on mobile devices across Bangladesh.

Why:

- **Why** explains the purpose and benefits of BRTA Smart Paper, emphasizing its ability to provide a convenient and secure solution for managing vehicle documents, reducing anxiety, and ensuring compliance with regulations.

How:

- **How** details the operational aspects of BRTA Smart Paper, outlining how users can upload, store, and access their digital documents, and how traffic police can verify documents in real-time using integrated government databases.

4.6 Value Proposition

Problem

Drivers frequently experience stress and inconvenience due to the need to carry physical vehicle documents, such as driving licenses, vehicle registrations, and tax tokens. Forgetting these documents can result in anxiety, delays, and potential fines during traffic checks. Current solutions are inadequate for verifying all necessary vehicle documents and providing a seamless user experience.

Solution

BRTA Smart Paper offers a comprehensive and user-friendly mobile app that digitizes and verifies all necessary vehicle documents, providing drivers with peace of mind and convenience.

Key Benefits

1. Comprehensive Document Management

- Store and access all essential vehicle documents in one secure app.
- Eliminate the need to carry physical documents and the worry of forgetting them.

2. Instant Verification:

- Quickly verify all vehicle documents during traffic checks with the app.
- Save time and avoid penalties with instant, reliable verification.

3. User-Friendly Design

- Intuitive and easy-to-use interface suitable for users of all tech-savvy levels.
- Simplified upload and update processes for all vehicle documents.

4. Enhanced Security

- Secure storage with advanced encryption and authentication features.
- Protection against loss, theft, or damage of physical documents.

5. Stress Reduction

- Alleviate anxiety related to missing documents.
- Enjoy a smoother driving experience with all documents readily accessible and up-to-date.

6. Reliable and Up-to-Date

- Ensure all vehicle documents are current and verified.
- Receive notifications and reminders for document renewals and updates.

7. Broad Applicability

- Ideal for private car owners, professional drivers, and fleet managers.
- Improve coordination between car owners and drivers regarding document management.

Why choose BRTA Smart Paper?

BRTA Smart Paper stands out by addressing the pain points associated with physical document management. By offering a comprehensive, secure, and user-friendly digital solution, BRTA

Smart Paper transforms the way drivers handle their vehicle documents, providing a stress-free and efficient driving experience.

4.7 Goal Statements

A goal statement is a sentence or two that sums up a product and the advantages it offers the user; in other words, goal statements offer ways to improve my designs. Goal statements describe the product's intended user base, its functionality, and the reasons behind its usefulness.

BRTA Smart Paper is a mobile application that digitizes and simplifies the storage, management, and verification of vehicle documents like driver's licenses, vehicle registrations, and tax tokens. This app aims to improve user convenience, reduce anxiety during traffic stops, and increase compliance with vehicle regulations.

1. Who

- BRTA Smart Paper will serve vehicle owners and drivers in Bangladesh.

2. What

- The app will provide a digital platform for securely storing, managing, and verifying vehicle documents, including driving licenses, vehicle registrations, and tax tokens.

3. Why

- This solution addresses the common issue of drivers forgetting physical documents, reduces anxiety during traffic stops, ensures compliance with regulations, and streamlines the document verification process for both drivers and traffic police.

The Goal Statements

1. For vehicle owners and drivers:

- BRTA Smart Paper will allow vehicle owners and drivers to securely store and manage their driving licenses, vehicle registrations, and tax tokens digitally, ensuring they always have access to their necessary documents, reducing anxiety, and ensuring compliance with traffic regulations.

2. **For traffic police:**

- BRTA Smart Paper will enable traffic police to efficiently verify vehicle documents in real-time through a digital platform, reducing delays during traffic stops and improving the enforcement of vehicle regulations.

3. **For the government:**

- BRTA Smart Paper will help the government streamline vehicle document management and verification processes, enhance compliance with regulations, and reduce administrative costs associated with physical document handling.

4.8 Competitive Audit

A competitive audit is an overview of competitors' strengths and weaknesses, providing insights into areas where a new product can excel. The competition for BRTA Smart Paper falls into two categories:

→ Direct competitor

◆ **BRTA DL Checker**

→ Indirect competitor

◆ **BRTA Sheba**

◆ **BRTA DNP & DRC Checker**

This audit helps identify opportunities and gaps in the market to create a more comprehensive and user-friendly solution. The audit will also examine the strengths and weaknesses of each competitor, as well as the strategies and tactics they use to gain market share. Finally, the audit will provide recommendations on how BRTA Smart Paper can differentiate itself from its competitors and gain a competitive advantage. After market research, we found 3 indirect competitors and no direct competitors.

৯. আপনি বিআরটিএ নিম্ন লিখিত কোনো ই-সেবা সম্পর্কে অবগত আছেন কী না?

 Copy

39 responses

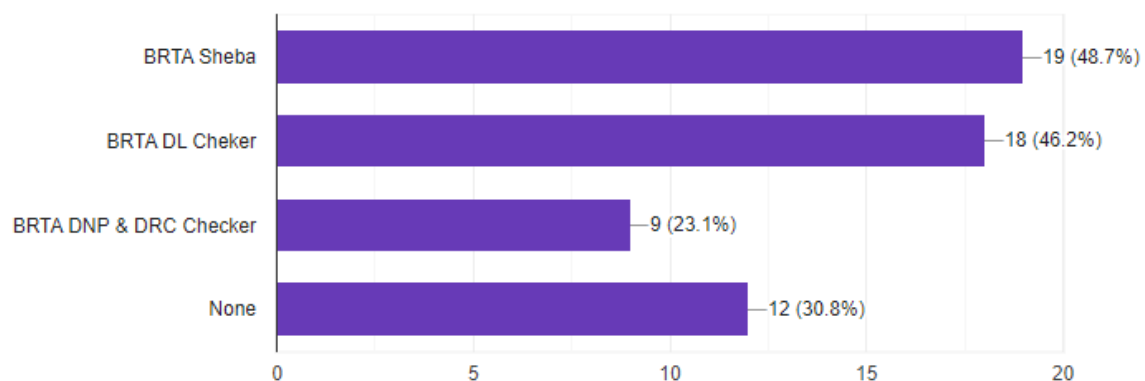


Figure 4.8.1: Survey demographics regarding how popular competitor applications are

Almost 45-50% of users know about at least one application.

In order to design a comprehensive and user-friendly vehicle document management and verification app, it is crucial to understand the strengths and weaknesses of existing solutions in the market. We conducted a competitive audit comparing BRTA Smart Paper with two prominent apps in this space: BRTA DL Checker and BRTA Sheba. This comparison highlights the unique value proposition of BRTA Smart Paper and identifies areas for improvement.

BRTA DL Checker

Overview: BRTA DL Checker is a mobile application that focuses on verifying driving licenses and serving as an e-driving license.

Strengths:

- **Driving License Verification:** Provides a reliable way to verify driving licenses.
- **User-Friendly Interface:** Easy to navigate with a straightforward design.
- **Digital License:** Acts as an electronic version of the driving license.

Weaknesses:

- **Limited Scope:** only verifies driving licenses and does not cover other vehicle documents like registration and tax tokens.
- **Lack of Document Management:** does not provide comprehensive document storage or management features.
- **Notification System:** does not have a robust notification system for document renewals.

BRTA Sheba

Overview: BRTA Sheba serves as an informative tool for vehicle documents but does not provide verification services.

Strengths:

- **Informative Content:** Offers detailed information about various vehicle documents and related services.
- **Accessibility:** Easy access to information about BRTA services and processes.

Weaknesses:

- **No Verification Feature:** Does not verify vehicle documents, limiting its utility in practical scenarios.
- **Document Management:** Lacks features for storing and managing vehicle documents digitally.
- **User Interaction:** Primarily an informational tool with limited interactive capabilities.

BRTA Smart Paper

Overview: BRTA Smart Paper is designed to be a comprehensive solution for vehicle document management and verification, addressing the gaps identified in existing apps.

Strengths:

- **Comprehensive Document Verification:** Verifies a wide range of vehicle documents, including driving licenses, registration certificates, and tax tokens.
- **Digital Document Storage:** Secure storage for all vehicle documents in digital format.
- **User-Friendly Interface:** intuitive design ensuring ease of use.
- **Real-Time Verification:** Integration with government databases for instant document verification.

- **Document Expiry Notifications:** Automated reminders for document renewals to ensure compliance.
- **Vehicle Owner and Driver Coordination:** simplified process for sharing documents between vehicle owners and drivers.
- **Two-Step Notification Request System:** Ensures that required documents are always at hand through a simple request and approval process.

Weaknesses:

- **Designation Stage:** As a new application, it may initially face user adoption challenges and require continuous improvement based on user feedback.

Summary

While BRTA DL Checker and BRTA Sheba provide useful services in their respective areas, they fall short of offering a comprehensive solution for vehicle document management and verification. BRTA Smart Paper addresses these gaps by offering a holistic approach that combines document verification, digital storage, user-friendly interface, and effective notification systems. By building on the strengths and addressing the weaknesses of existing solutions, BRTA Smart Paper aims to provide a superior and more complete service to vehicle owners and drivers in Bangladesh.

4.9 Information Architecture

Information architecture (IA) is the structural design of shared information environments. It involves organizing, structuring, and labeling content effectively and sustainably. The goal is to help users find information and complete tasks efficiently. IA focuses on the principles of organizing data, creating navigation systems, and enhancing the user experience. This discipline plays a critical role in web and app design, ensuring that users can easily access and interact with the content they need. In the context of BRTA Smart Paper, IA ensures that vehicle document management is intuitive and user-friendly.

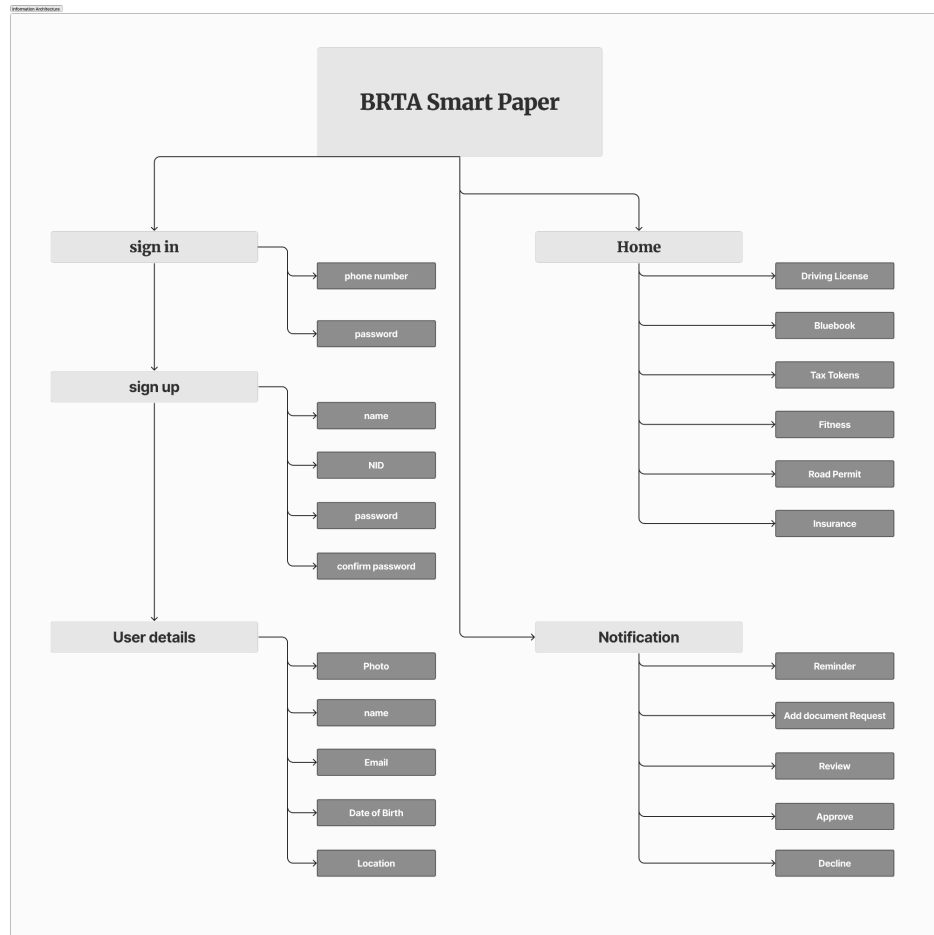


Figure 4.9.1: Information Architecture of BRTA Smart Paper

4.10 Sitemap

The sitemap for BRTA Smart Paper is a comprehensive blueprint of the app's structure, showcasing the hierarchy and relationships between various sections and pages. It provides a visual representation of the app's layout, ensuring that all functionalities are easily accessible. This organized structure helps users navigate through the app effortlessly, from document verification to profile management and notifications. The sitemap is designed to enhance user experience by providing clear pathways and intuitive access to all features, ensuring seamless interaction with the app.

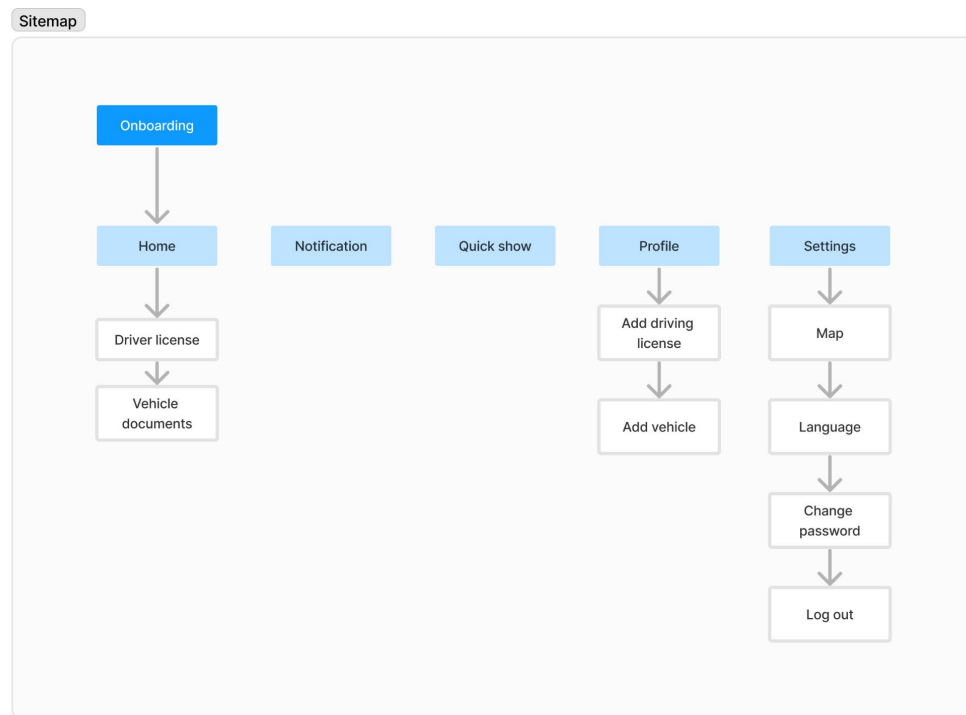
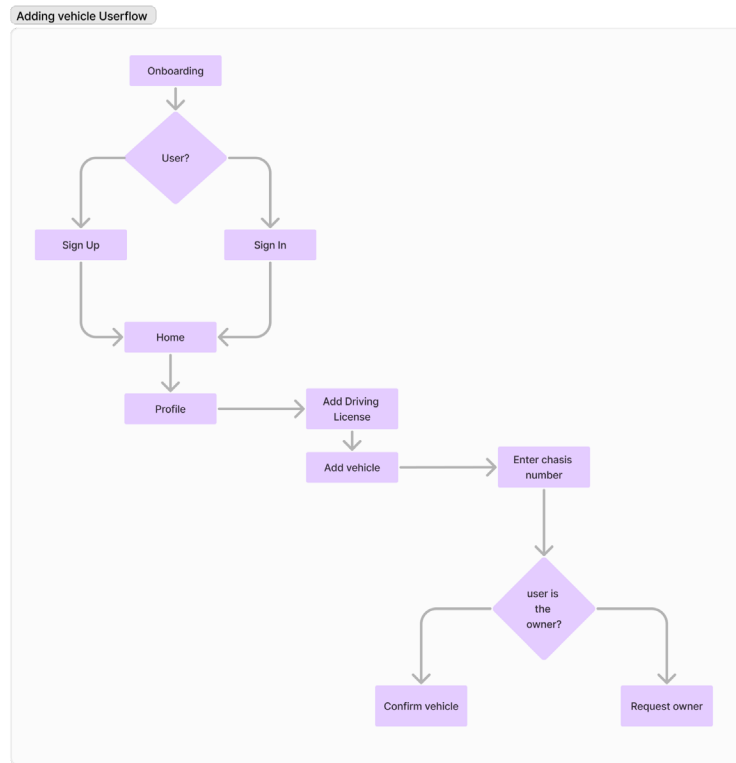


Figure 4.10.1: Sitemap of design

4.11 User flow

User flow is a visual representation of the steps a user takes to complete a task within an app. For BRTA Smart Paper, the user flow outlines the journey from launching the app to verifying vehicle documents, managing profiles, and receiving notifications. It details each interaction and decision point, ensuring a smooth and intuitive experience. By mapping out these steps, we can identify potential bottlenecks and optimize the process, ensuring users can efficiently achieve their goals with minimal friction.



4.11.1: User flow

4.12 Wireframe

A wireframe is a visual guide that represents the skeletal framework of a mobile app or website. It outlines the structure, layout, and placement of key elements without focusing on design details such as color or graphics. Wireframes are crucial in the early stages of design, allowing stakeholders to visualize the basic functionality and flow of the application. They serve as a blueprint for the user interface, helping to identify potential issues and ensure that the user experience is intuitive and efficient. In the design process for BRTA Smart Paper, wireframes were

used to map out the app's features, including digital document storage, real-time verification, and user notifications, ensuring a seamless and user-friendly experience.

4.12.1 Low Fidelity Sketch

Creating low-fidelity sketches was the first step in visualizing the app's interface. These basic sketches helped in mapping out the primary layout and navigation structure without focusing on design details. It served as a preliminary blueprint for the app's design. Basically it is called the wireframe.

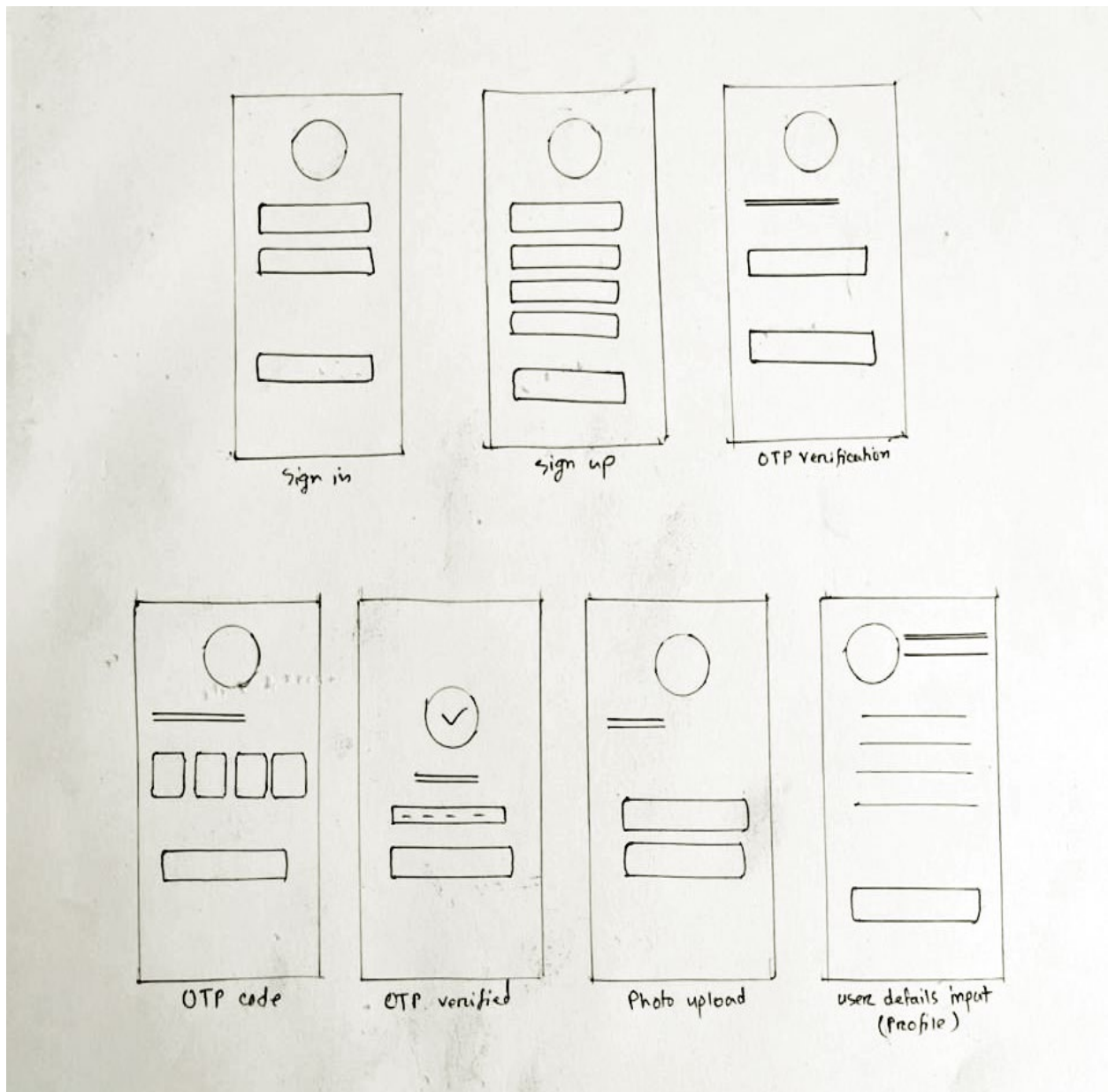


Figure 4.12.1: Low Fidelity Sketch of UI Design

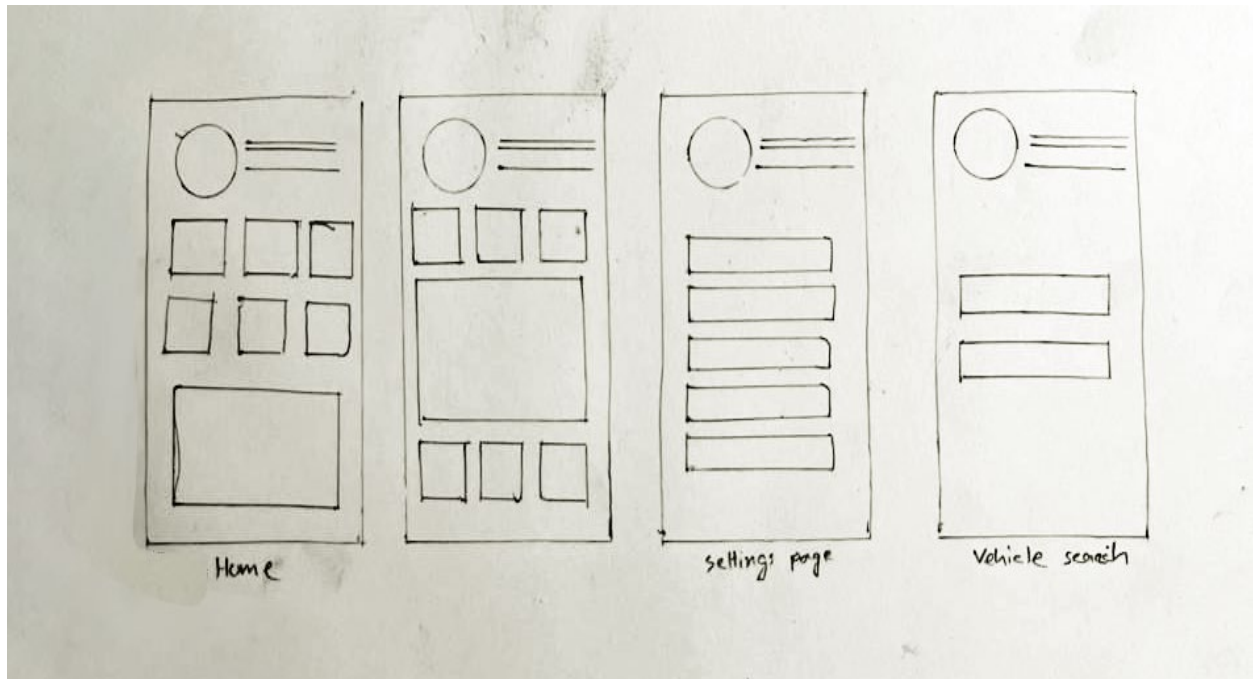


Figure 4.12.2: Low Fidelity Sketch of UI Design

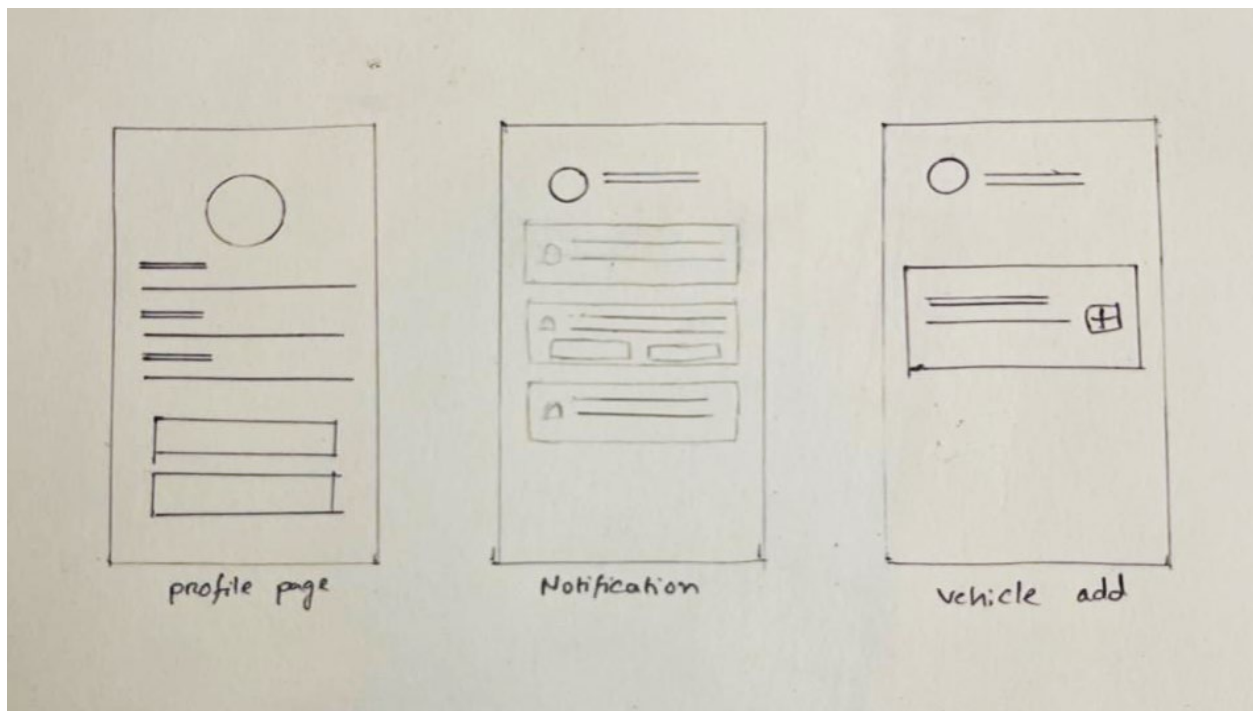


Figure 4.12.3: Low Fidelity Sketch of UI Design

4.12.2 Mid-Fidelity Design

Mid-fidelity designs bridge the gap between basic wireframes and high-fidelity prototypes. They include more detailed layout structures, content, and interactions, but still avoid final design elements like color schemes and images. For BRTA Smart Paper, mid-fidelity designs were instrumental in refining user flows and interactions. These designs allowed for more comprehensive user testing and feedback, ensuring that the app's functionalities, such as digital document storage, real-time verification, and notification systems, were effectively integrated and intuitive. Mid-fidelity designs help validate design choices and guide the design toward a more polished and user-friendly product. Mid-fidelity also called layout.

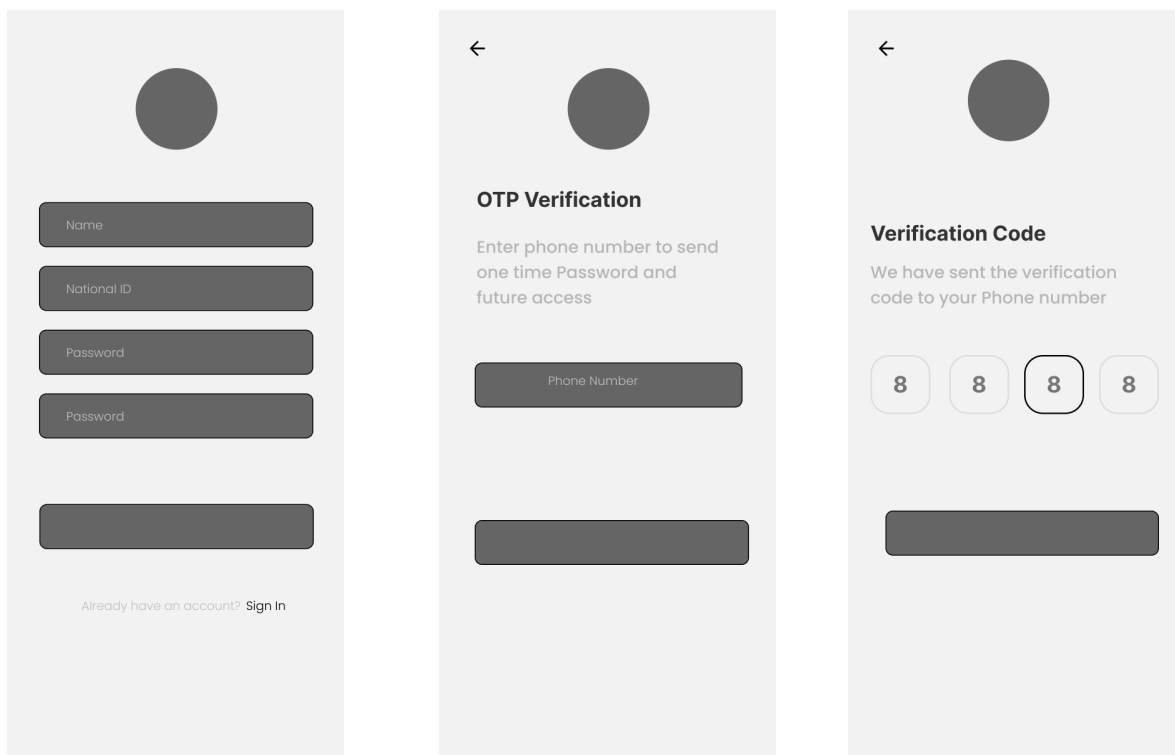


Figure 4.12.4: Initial Sign-up Page (Mid-fidelity)

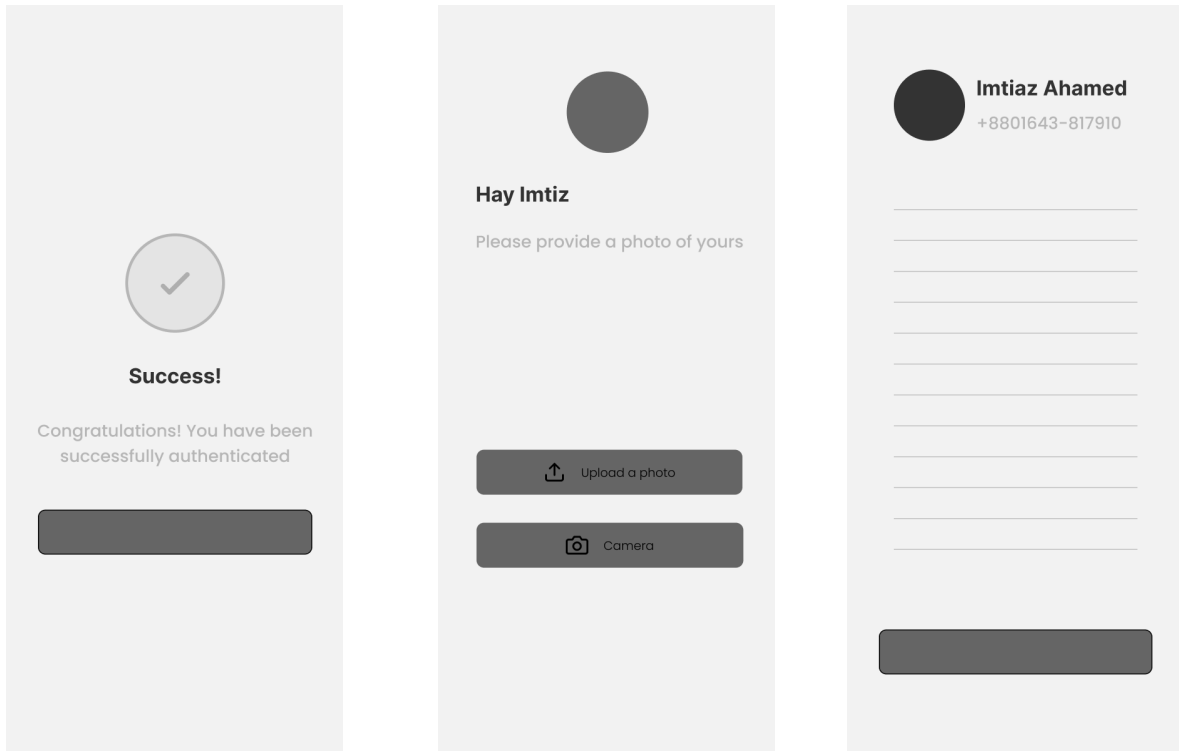


Figure 4.12.5: Adding the user details

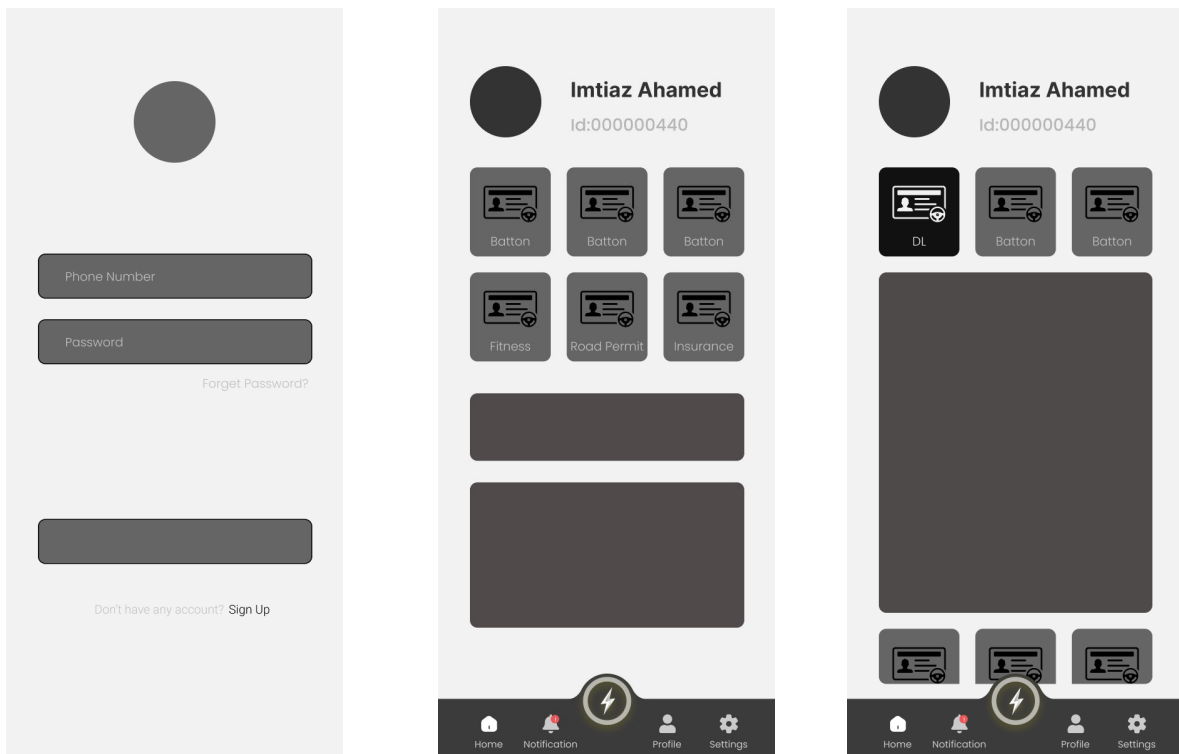


Figure 4.12.6: Sign-in and Home page

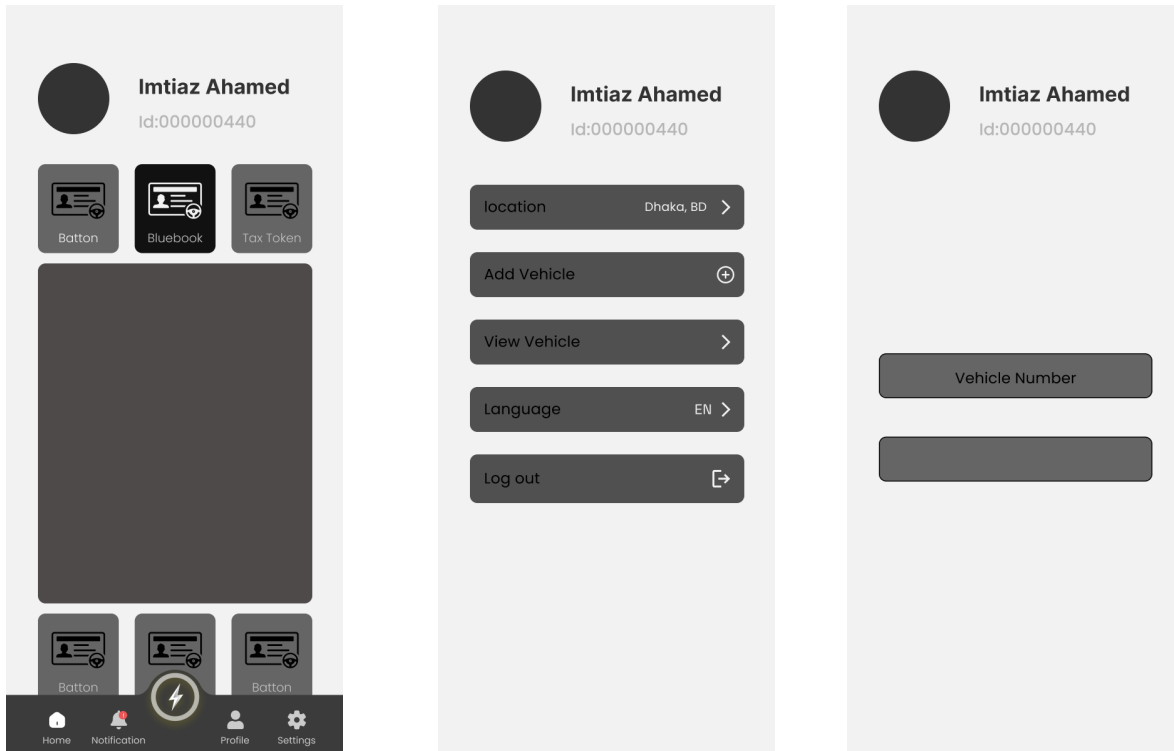


Figure 4.12.7: Profile and Add Vehicle

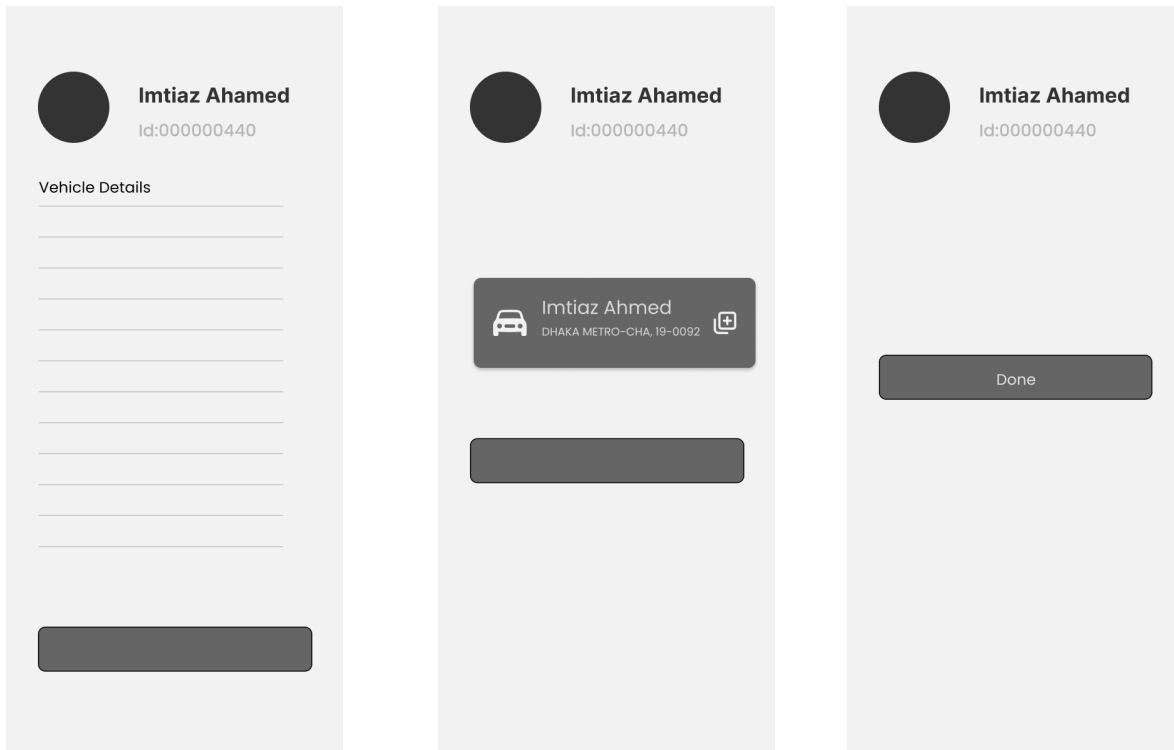


Figure 4.12.8: Vehicle Details and add

4.13 User Interface Design

Mid-fidelity designs bridge the gap between basic wireframes and high-fidelity prototypes. They include more detailed layout structures, content, and interactions, but still avoid final design elements like color schemes and images. For BRTA Smart Paper, mid-fidelity designs were instrumental in refining user flows and interactions. These designs allowed for more comprehensive user testing and feedback, ensuring that the app's functionalities, such as digital document storage, real-time verification, and notification systems, were effectively integrated and intuitive. Mid-fidelity designs help validate design choices and guide the designment towards a more polished and user-friendly product.

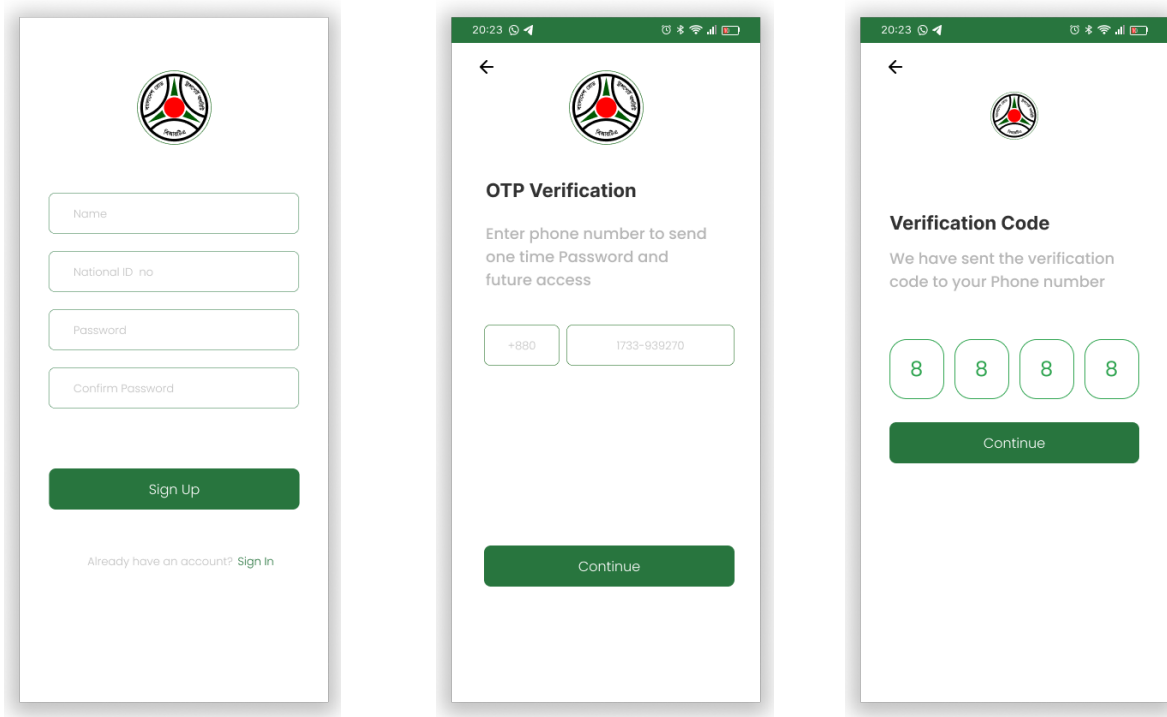


Figure 4.13.1: Initial Sign-up Page Mid-fidelity

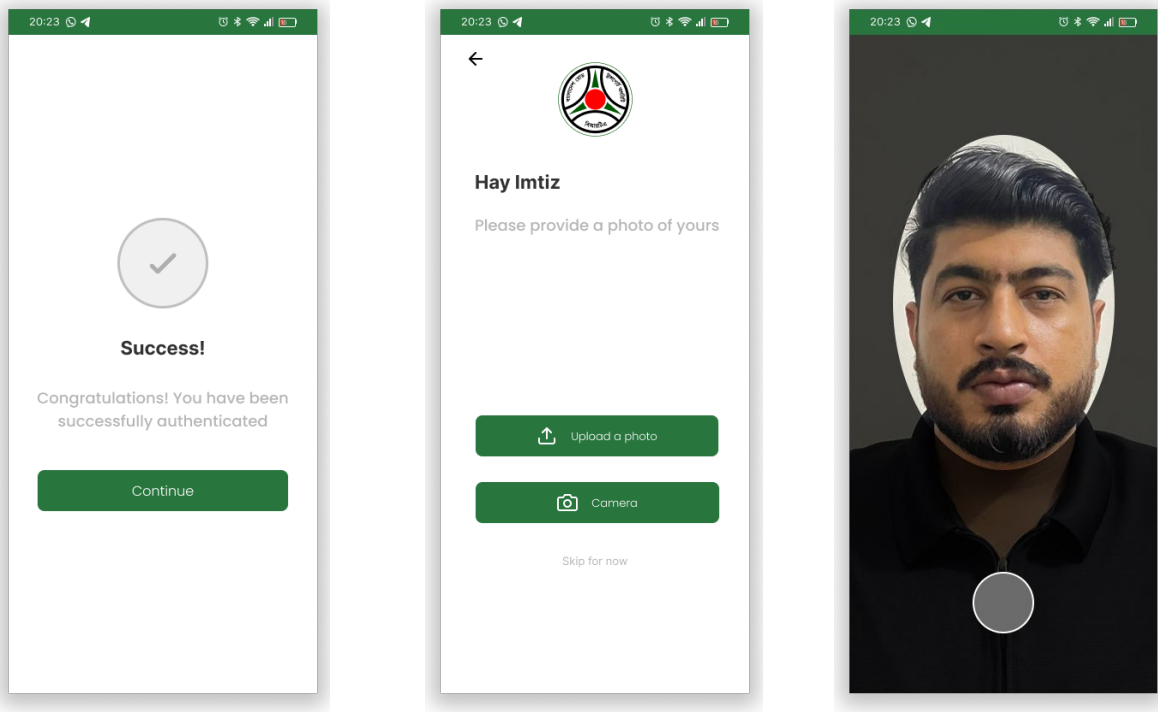


Figure 4.13.2: Adding the user details

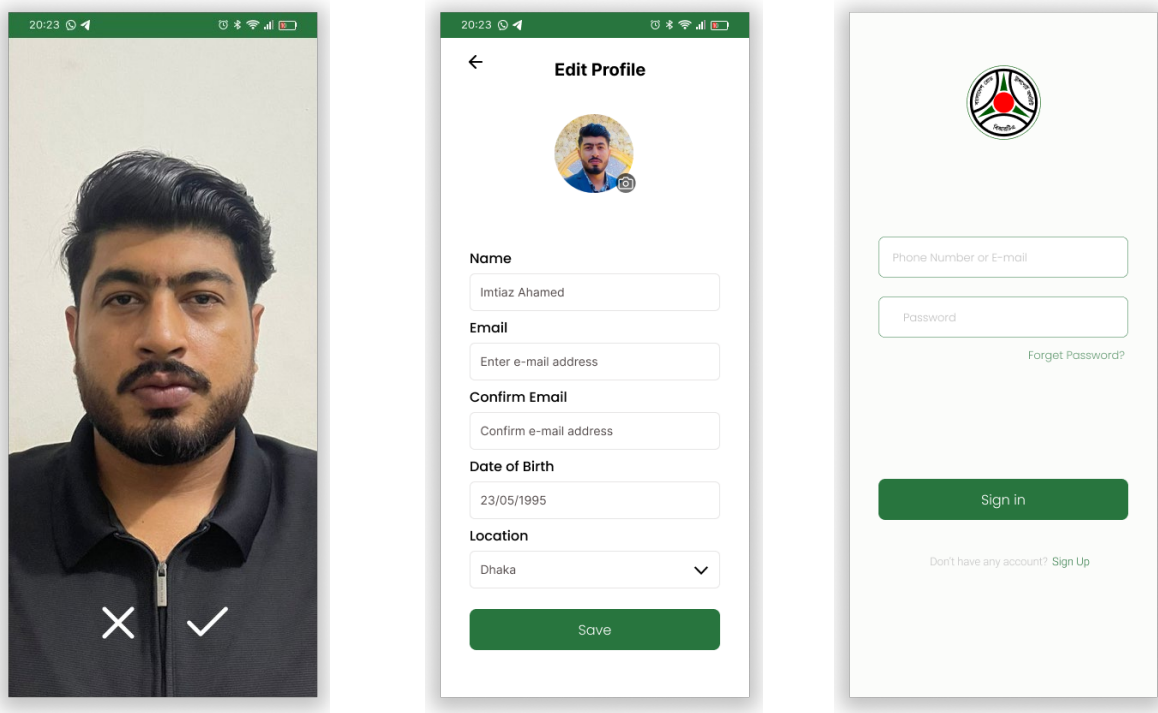


Figure 4.13.3: User details and Sign-in

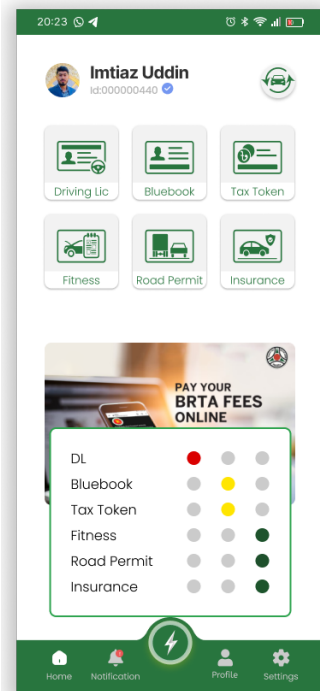
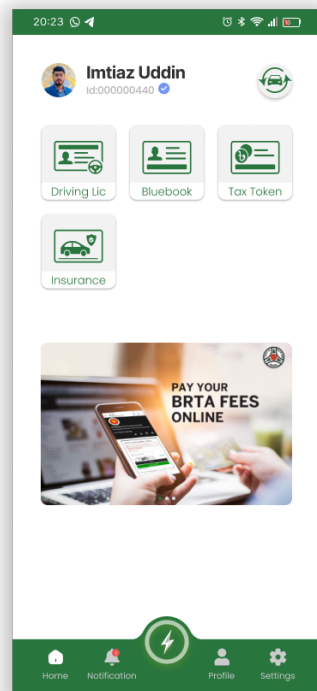
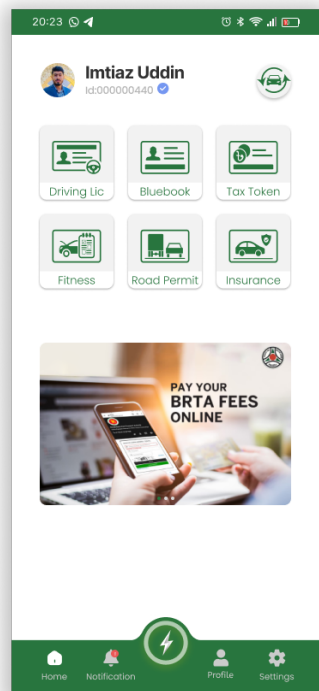


Figure 4.13.4: Home

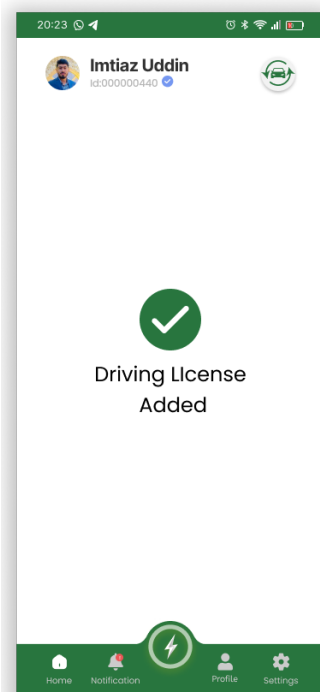
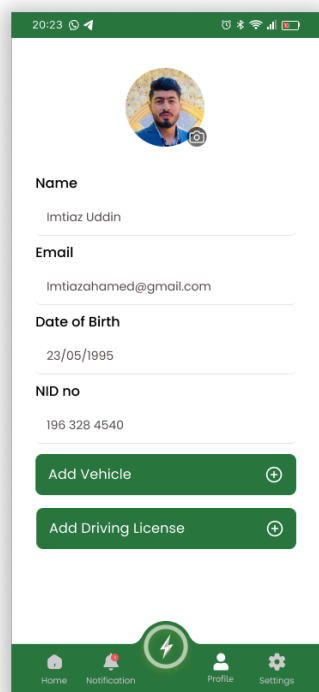


Figure 4.13.5: Profile and driving License add

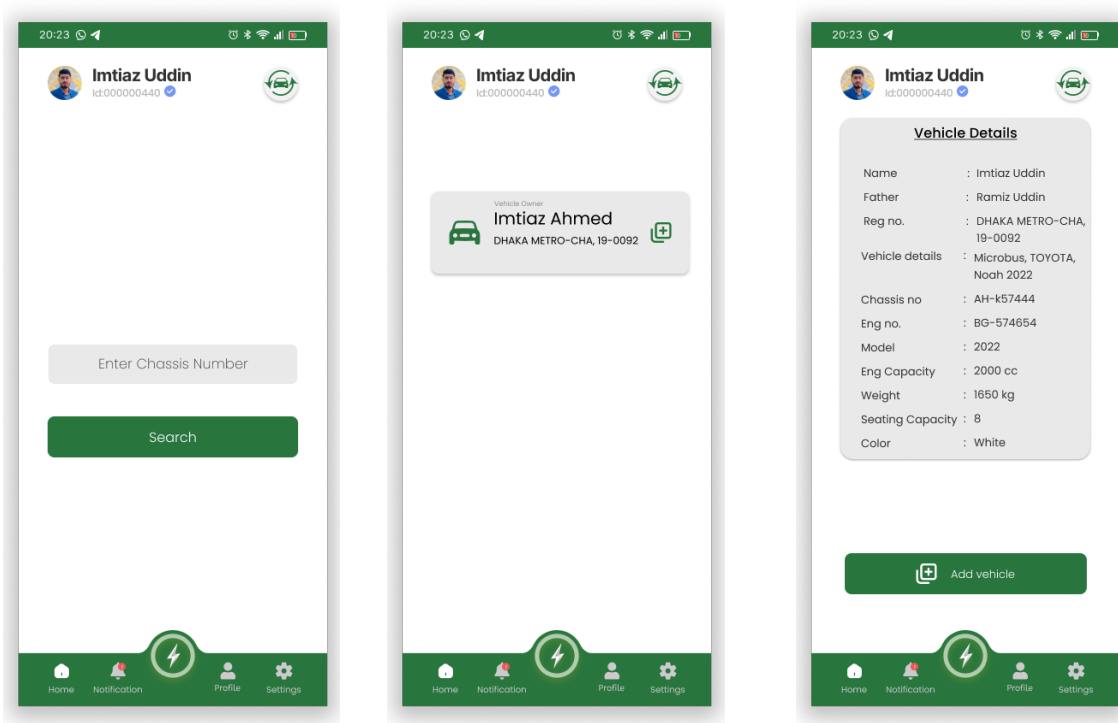


Figure 4.13.6: Add Vehicle

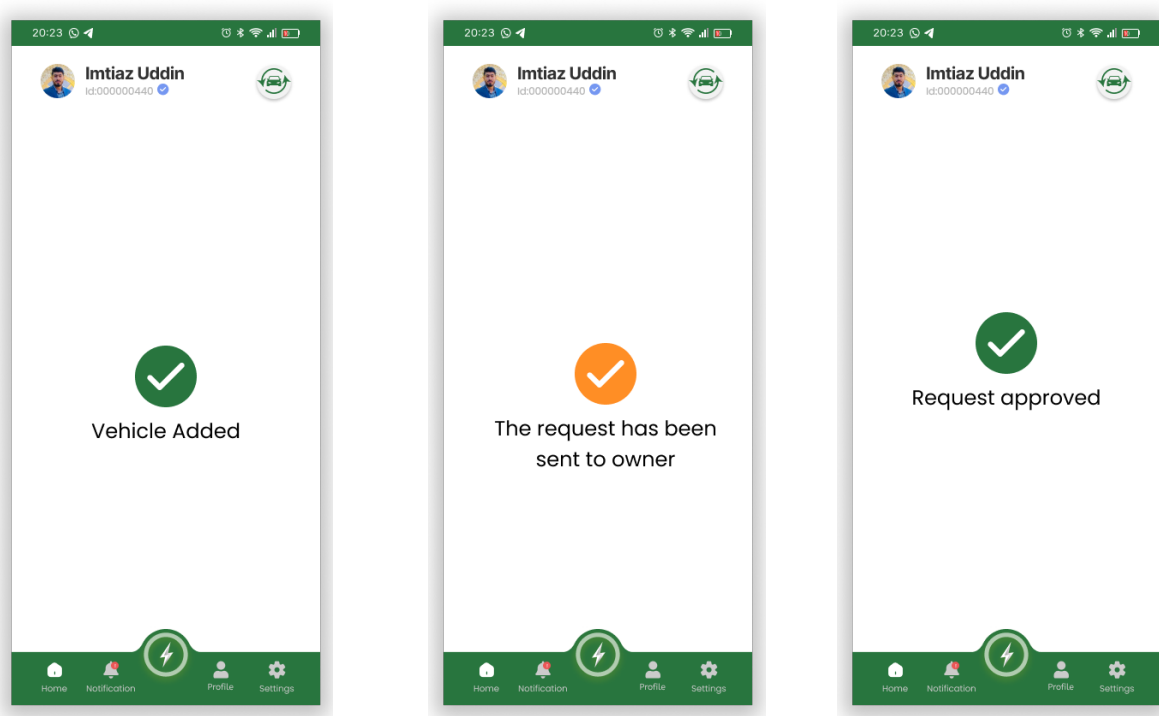


Figure 4.13.7: access request sent

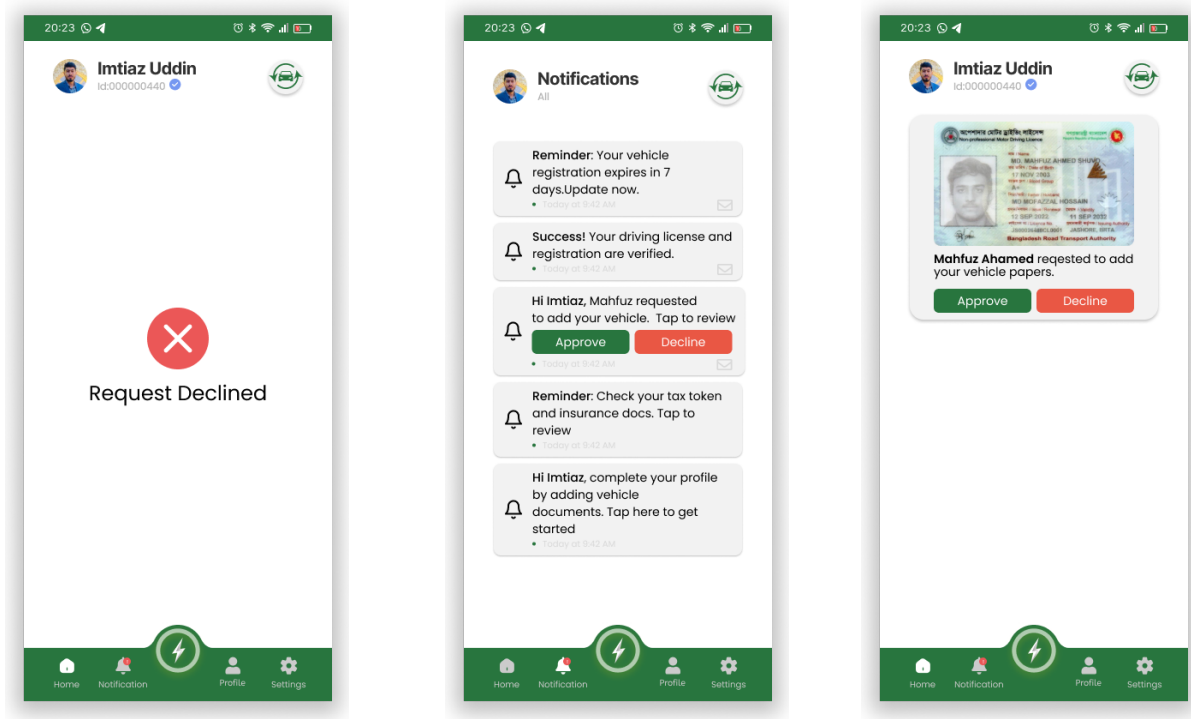


Figure 4.13.8: Notifications

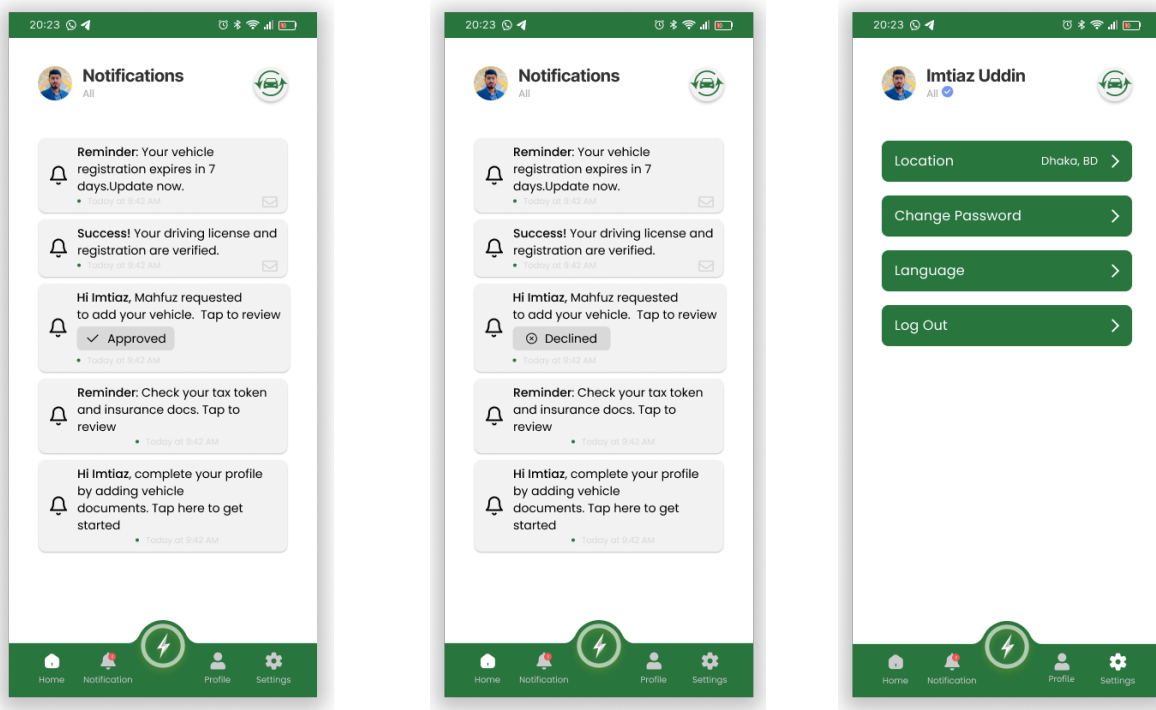


Figure 4.13.9: Approved and declined

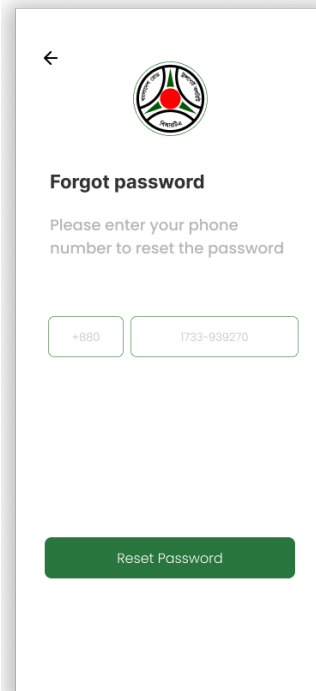
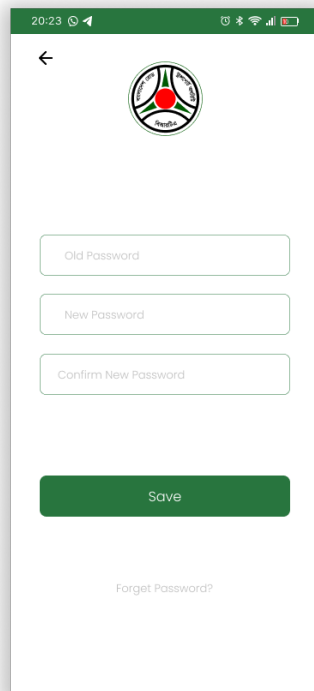
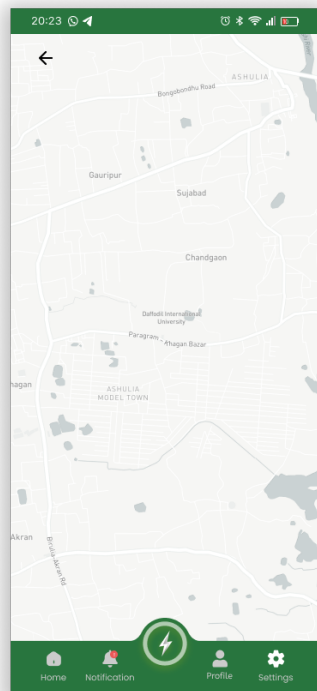


Figure 4.13.10: Settings

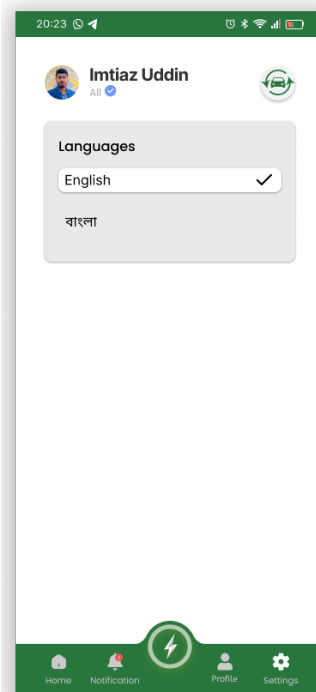
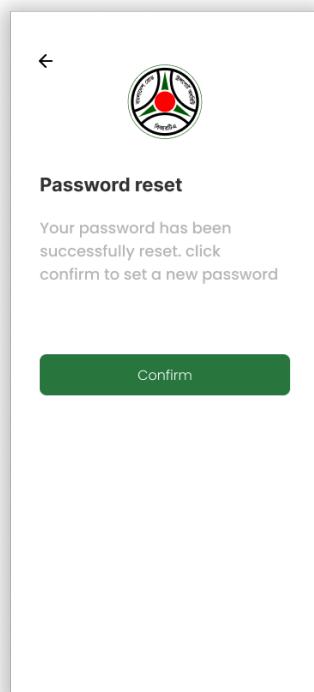
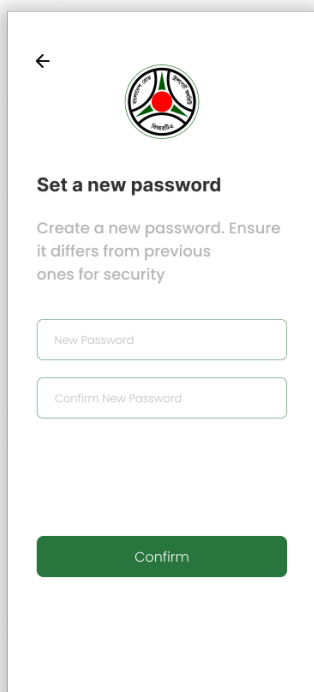


Figure 4.13.11:Settings

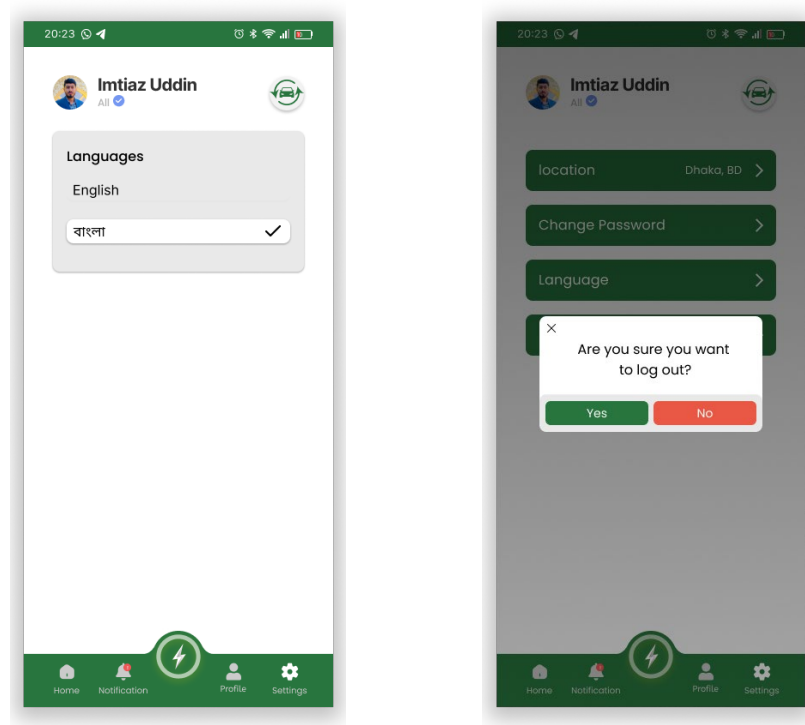


Figure 4.13.12: Log out

CHAPTER 5

Implementation & Testing

5.1 Prototyping

Prototyping is a crucial stage in the design process where preliminary versions of the app are created to test and refine its features and functionality. These prototypes, ranging from low to high fidelity, help visualize the user interface and interaction flow. By allowing stakeholders and users to interact with these early models, feedback can be gathered to identify potential issues and make necessary adjustments. For BRTA Smart Paper, prototyping was essential in ensuring the app's design met user needs effectively, paving the way for a polished final product.

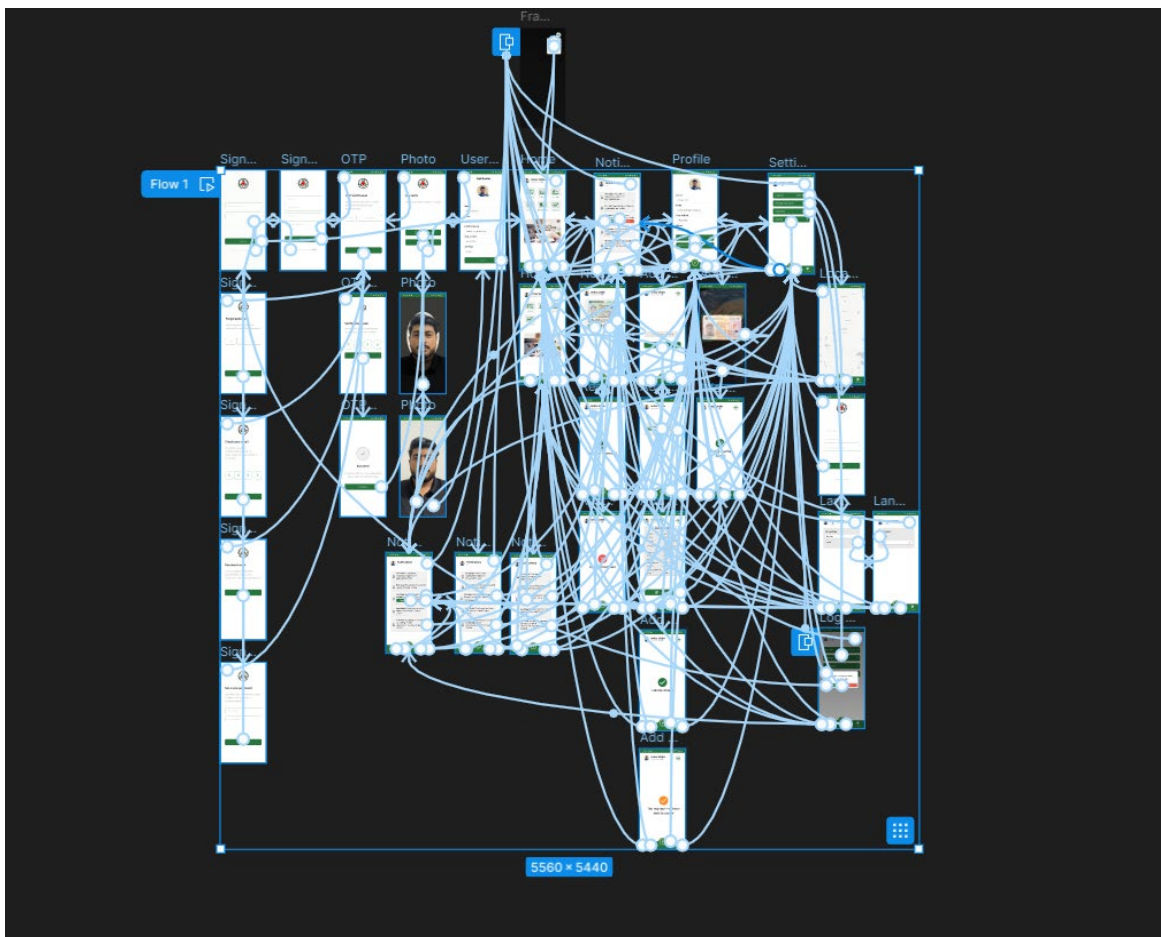


Figure 5.1.1:Prototyping

5.2 Usability Testing

Usability testing is a crucial phase in the design process where real users interact with the app to identify any usability issues. This process involves observing users as they complete specific tasks within the app, gathering feedback on their experiences, and identifying areas for improvement. For BRTA Smart Paper, usability testing ensured that features like digital document storage, real-time verification, and notification systems were intuitive and easy to use. By testing the app with actual users, we were able to refine the design, enhance user satisfaction, and ensure the final product meets user needs and expectations effectively.

Usability testing for BRTA Smart Paper is essential to uncover any challenges users may face, ensuring the app is intuitive and user-friendly for vehicle owners and drivers. It helps identify usability issues early, which can save design time and costs. Improving user satisfaction is key, as it validates that features like digital document storage, real-time verification, and notification systems are functioning smoothly. Additionally, ensuring the app's accessibility guarantees that all users, including those with disabilities, can benefit from it.

Objective: The primary goal of the usability testing was to evaluate the effectiveness, efficiency, and satisfaction of users interacting with the BRTA Smart Paper app.

Preparation:

- **Recruitment of Participants:**
 - We selected a diverse group of participants, including vehicle owners, drivers, and individuals familiar with digital document management.
 - Participants were chosen to represent different age groups, technical proficiency levels, and backgrounds.
- **Test Environment:**
 - The tests were conducted in a controlled environment to ensure consistency.
 - Each participant was provided with a smartphone pre-installed with the BRTA Smart Paper app.
- **Scenarios and Tasks:**
 - We designed realistic scenarios and specific tasks for participants to complete, such as uploading vehicle documents, accessing digital documents, and verifying documents through the app.

Key Usability Testing Participants

Participant 1:

- **Name:** Nayem Hasan
- **Age:** 28
- **Occupation:** Software Engineer
- **Tech Proficiency:** High
- **Feedback:** appreciated the seamless integration of document upload and verification. It is suggested to add more intuitive icons for easier navigation.

Participant 2:

- **Name:** Musa Khan Rally
- **Age:** 31
- **Occupation:** Finance Executive
- **Tech Proficiency:** Medium
- **Feedback:** Found the app useful for managing documents but felt the registration process could be easier. Recommended a more user-friendly interface.

Participant 3:

- **Name:** Kamal Ahmed
- **Age:** 45
- **Occupation:** Private Driver
- **Tech Proficiency:** Low
- **Feedback:** Found the document verification feature very helpful. Suggested adding a tutorial for first-time users.

Testing Procedure:

- **Introduction:**
 - Participants were briefed on the purpose of the test and the tasks they needed to perform.
 - We assured them that the focus was on the app's usability, not their performance.
- **Task Execution:**
 - Participants were asked to perform tasks such as registering an account, uploading documents, and using the document verification feature.
 - Observers noted the time taken to complete each task, any difficulties encountered, and participants' reactions.
- **Think-Aloud Protocol:**

- Participants were encouraged to verbalize their thoughts, frustrations, and satisfaction while performing tasks.
- This provided insights into their cognitive processes and usability issues.
- **Post-Test Interview:**
 - After completing the tasks, participants were interviewed to gather qualitative feedback.
 - Questions focused on their overall experience, any challenges faced, and suggestions for improvement.

Data Analysis:

- **Quantitative Data:**
 - Task completion rates, time on task, and error rates were analyzed to measure the app's efficiency and effectiveness.
 - We calculated metrics such as success rate and average task completion time.
- **Qualitative Data:**
 - Observations and participant feedback were analyzed to identify common usability issues and areas for improvement.
 - Themes were extracted from the think-aloud sessions and post-test interviews.

Findings:

- **Strengths:**
 - Participants found the app intuitive and appreciated the convenience of having all vehicle documents in one place.
 - The document verification process was praised for its simplicity and speed.
- **Areas for improvement:**
 - Some participants experienced difficulty navigating the document upload process.
 - The suggestions included clearer instructions and more intuitive icons.

Conclusion: The usability testing of BRTA Smart Paper revealed that while the app is generally user-friendly and efficient, there are areas that require enhancement to improve the overall user experience. The insights gained from this testing will guide future iterations of the app, ensuring it meets user needs effectively.

5.3 Output

Usability Testing Findings

The usability testing for BRTA Smart Paper aimed to assess the app's user-friendliness and identify areas for improvement. By observing real users as they interacted with the app, we

gathered valuable insights into its performance and functionality. The testing focused on key features such as document upload, real-time verification, and the notification system for renewals. The feedback collected helped us pinpoint specific strengths and weaknesses, ensuring that the final product effectively meets the needs and expectations of vehicle owners and drivers. Here are the key findings:

Key Findings:

1. Ease of Use:

- Users found the interface intuitive and straightforward, but some experienced initial confusion with the document upload process. Simplifying the upload steps could enhance user experience.

2. Verification Process:

- The quick check feature was highly appreciated, though a few users reported delays in verification times. Optimizing backend processes could address this.

3. Notification System:

- Participants valued the notification system for document renewals, but some requested more customizable notification settings. Providing options for frequency and types of notifications can improve satisfaction.

4. Accessibility:

- Most users found the app accessible, but feedback indicated that font sizes and contrast levels could be improved for better readability. Implementing adjustable font sizes and enhancing contrast will cater to users with visual impairments.

5. Overall Satisfaction:

- Overall, users were satisfied with the app's functionality and found it beneficial for managing vehicle documents. Continuous improvements based on user feedback will ensure the app remains effective and user-friendly.

These findings highlight areas for enhancement to ensure BRTA Smart Paper meets user needs and expectations effectively.

CHAPTER 6

Impact on Society, Environment, and Sustainability

6.1 Impact on Society:

BRTA Smart Paper significantly enhances the convenience and security of vehicle document management. By allowing users to store and verify documents digitally, it reduces anxiety and legal complications for vehicle owners and drivers. The app fosters a culture of compliance and accountability, ensuring that users always have their documents accessible. Additionally, it reduces the risk of document loss or damage, streamlines interactions with traffic authorities, and supports quick access to critical information during emergencies. This digital solution also promotes public awareness about the importance of maintaining up-to-date vehicle documents. Prototypes also help to identify problems early on, reducing the amount of time and resources needed to finish a product. Additionally, they provide a platform for testing new ideas and concepts, helping to ensure that the final product is successful.

6.2 Impact on Environment

BRTA Smart Paper positively impacts the environment by significantly reducing the reliance on physical paper documents. This transition to digital documentation cuts down on paper consumption, leading to a decrease in deforestation and waste. Additionally, the app minimizes the need for physical transportation for document retrieval and verification, resulting in lower carbon emissions. The reduction in paper and transport requirements contributes to a smaller carbon footprint, promoting environmental sustainability and resource conservation. Furthermore, the app supports eco-friendly practices by encouraging digital over traditional paper-based processes.

6.3 Ethical Aspects

User Privacy and Data Security: BRTA Smart Paper prioritizes the protection of users' sensitive information. Robust encryption and secure authentication processes are implemented to safeguard data from unauthorized access and breaches. The app ensures that all personal and vehicle-related data is handled with the highest level of confidentiality.

Transparency: The app maintains transparent data usage policies, clearly communicating to users how their data will be collected, stored, and used. This transparency builds trust and ensures users are informed about their rights and the app's practices.

Compliance with Legal Standards: BRTA Smart Paper adheres to all relevant legal and regulatory standards for data protection and digital documentation. This compliance ensures that the app operates within the legal framework, protecting both the users and the organization from legal issues.

Ethical Design: The app is designed with ethical considerations in mind, focusing on user experience and accessibility. Efforts are made to ensure that the app is inclusive and usable by all, including individuals with disabilities.

By addressing these ethical aspects, BRTA Smart Paper aims to provide a secure, transparent, and legally compliant solution for digital vehicle document management, fostering trust and reliability among its users.

6.4 Hypothesis Statement

Hypothesis:

We believe that by designing and deploying BRTA Smart Paper, a comprehensive and user-friendly mobile app for digitizing and verifying vehicle documents, we will significantly reduce the stress and inconvenience faced by drivers like Ashraful Islam and Khan Jahan.

Key Points:

1. **User Convenience:** By providing easy access to digital copies of driving licenses, vehicle registrations, and tax tokens, users will no longer worry about forgetting physical documents.
2. **Efficient Verification:** The app will enable quick and reliable document verification during traffic checks, minimizing delays and reducing the risk of fines.
3. **Enhanced Security:** Secure digital storage of documents will protect users from the loss or damage of physical papers.
4. **Market Acceptance:** The app will be well-received by a broad user base, including private car owners, drivers, and fleet managers, due to its intuitive interface and reliable performance.

Expected Outcomes:

- Increased user satisfaction due to reduced anxiety and stress.
- There are fewer instances of fines and legal issues related to missing vehicle documents.
- Higher adoption rates among drivers seeking a modern, efficient solution for document management.

6.5 Sustainability Plan

Long-Term Updates and Maintenance: BRTA Smart Paper will have a dedicated team for regular updates and maintenance to ensure the app remains functional, secure, and aligned with user needs. This will include periodic software updates, security patches, and feature enhancements based on user feedback.

Partnerships and Collaborations: Establishing partnerships with governmental agencies, tech companies, and industry experts will provide the necessary support for the app's infrastructure and scalability. Collaborations will also help in incorporating the latest technological advancements and regulatory requirements.

User Feedback and Iterative Improvements: Continuous user engagement through surveys, feedback forms, and usability testing will be conducted to gather insights and identify areas for improvement. This iterative approach will ensure the app evolves to meet emerging needs and technological trends.

Resource Optimization: Efficient use of resources will be prioritized to minimize environmental impact. This includes optimizing server usage to reduce energy consumption and leveraging cloud services for scalability and efficiency.

Promotion of Digital Literacy: Efforts will be made to promote digital literacy among users, ensuring they are comfortable with the app's features and functionalities. Educational campaigns and support resources will be provided to help users transition from paper-based to digital document management.

Compliance and Ethical Practices: The app will continuously adhere to legal and ethical standards, ensuring user data privacy and security. Regular audits and compliance checks will be performed to maintain high standards of data protection and ethical responsibility.

By implementing this sustainability plan, BRTA Smart Paper aims to provide a reliable, user-friendly, and environmentally friendly solution for digital vehicle document management.

CHAPTER 7

Conclusion and Future Scope

7.1 Conclusion

BRTA Smart Paper represents a significant leap forward in the management of vehicle documents. By digitizing the process, the app provides a convenient, secure, and efficient solution for vehicle owners and drivers. It addresses key pain points such as document accessibility, compliance, and anxiety associated with misplacing physical documents. The app also contributes positively to the environment by reducing paper usage and lowering carbon emissions.

Moreover, BRTA Smart Paper embodies ethical design principles, prioritizing user privacy and data security. The sustainability plan ensures continuous improvement and relevance, supported by regular updates, user feedback, and strategic partnerships. Overall, BRTA Smart Paper is a comprehensive, forward-thinking solution that enhances user experience, promotes environmental sustainability, and fosters a culture of accountability and compliance.

7.2 Scope for Future Improvements

The future scope of BRTA Smart Paper aims to enhance its capabilities and reach. By integrating additional government services, improving features, and expanding geographical availability, the app can offer more value. Upcoming designments will focus on offline access, advanced AI verification, and user education initiatives, ensuring BRTA Smart Paper remains innovative and user-friendly.

Future Scope:

1. Integration with Other Government Services:

Expanding the app's functionality to include integration with other government services such as tax payments, insurance renewals, and vehicle inspections.

2. Enhanced Features:

Incorporating advanced features like AI-based document verification, voice-activated commands, and multi-language support to cater to a broader user base.

3. Geographical Expansion:

Extending the app's availability to other regions and countries, adapting it to meet local regulatory requirements and user needs.

4. Offline Access:

designing capabilities for offline access to essential documents, ensuring users can access their information even without an internet connection.

5. User education and training:

Launching initiatives to educate users on digital literacy, helping them understand and utilize the app's features effectively.

By focusing on these future designments, BRTA Smart Paper can continue to innovate and expand its impact, providing even greater value to users and contributing to a more streamlined and eco-friendly vehicle document management system.

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