

# Web Design: Ministry of Road Transport and Highways using Modern Design Principles

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**Abstract**—In an era driven by digital transformation, government agencies are increasingly challenged to enhance the accessibility, usability, and effectiveness of their online presence. This report explores the process and outcomes of redesigning the website of the Ministry of Road Transport and Highways with a focus on user-centric design principles. The study employs a mixed-methods approach, integrating user experience research, usability testing, and design thinking methodologies. Key considerations include improving navigation, enhancing visual appeal, optimizing content delivery, and ensuring compliance with accessibility standards. The redesigned website aims to facilitate citizen engagement, streamline access to services, and foster transparency in governance. Findings demonstrate the significance of user-centered design in enhancing government websites to better serve diverse user needs. This research contributes valuable insights and practical recommendations for government agencies seeking to optimize their online platforms for improved citizen interaction and service delivery.

**Keywords**—user-centric design, navigation, visual appeal

## I. INTRODUCTION

In today's world, the digital landscape serves as a primary interface between governments and citizens, the design and functionality of government websites play a crucial role in facilitating efficient service delivery and fostering public engagement. The Ministry of Road Transport and Highways (MoRTH) website, a vital platform for disseminating information and providing essential services related to India's road infrastructure, has been recognized for its significant potential in improving citizen access and interaction. However, the website's existing design faced several critical usability challenges, including inconsistent visual elements, suboptimal feature placement, and redundant options, which collectively hindered its effectiveness and user experience.

The MoRTH website's original design exhibited issues that impeded its usability and overall aesthetics. One of the foremost concerns was the inconsistency in font styles, color schemes, and icon usage throughout the website. This lack of uniformity not only affected the site's visual appeal but also contributed to user confusion and disengagement. In addition, the placement of essential features and navigation elements was not optimized, leading to difficulties in locating vital information or accessing key services promptly. Redundant options and outdated functionalities further compounded the usability challenges, creating a less-than-optimal experience for users seeking critical services or information related to road transport and highways.

Recognizing the imperative to address these usability issues, our research endeavors to redesign the MoRTH website with a strong emphasis on enhancing user experience, visual consistency, and functional efficiency. The primary objective of this redesign initiative is to create a website that is intuitive, accessible, and user-centric, ultimately empowering citizens with seamless access to information, services, and resources related to road transport and highways.

This paper outlines the comprehensive process and outcomes of redesigning the MoRTH website, employing a strategic blend of user experience research, usability testing, and design thinking methodologies. Our approach involves a meticulous analysis of user needs and behaviors, followed by iterative design iterations aimed at addressing identified usability challenges and enhancing overall site performance. The redesigned website aims to mitigate existing issues by implementing a cohesive visual identity, optimizing feature placement, streamlining navigation, and eliminating redundant functionalities.

By documenting our redesign process and outcomes, this research contributes valuable insights to the field of government website design, particularly within the context of improving public service delivery and citizen engagement. The findings and recommendations presented herein are intended to inform and guide future efforts aimed at enhancing the usability and effectiveness of government websites, thereby fostering greater transparency, accessibility, and responsiveness in governance.

In the subsequent sections of this paper, we delve into the specific methodologies employed, challenges encountered, design decisions made, and the impact of our redesigned MoRTH website on user experience and overall usability.

## II. SURVEY AND DATA COLLECTION

### 1. METHODOLOGY

The decision to redesign the Ministry of Road Transport and Highways (MoRTH) website was part of a concerted effort to address long-standing issues pertaining to user experience and usability within digital government platforms. Stemming from a collective recognition of the navigational and design challenges prevalent across various governmental websites, the decision to target such platforms for enhancement was both strategic and imperative. Government websites, serving as primary conduits for citizen-state interactions, wield significant influence in shaping public perceptions of administrative efficacy, transparency, and accessibility. However, a prevailing trend has seen these online interfaces marred by labyrinth-like navigation structures, ambiguous or complex terminologies and outdated design paradigms, resulting in suboptimal user experiences and hindered information access for individuals seeking governmental services or information.

#### *A. Literature Review*

The process began with a thorough literature review, which encompassed an examination of existing research and scholarly discourse pertaining to governmental website usability, user experience design, and best practices in digital governance. This foundational step served to contextualize the project within the broader landscape of digital governance and provided valuable insights into prevailing trends, challenges, and potential solutions.

#### *B. Survey Design*

In response to these systemic deficiencies, a comprehensive survey was initiated to discern the extent of user dissatisfaction and ascertain the specific pain points afflicting visitors to government websites. The survey, tailored to gauge user sentiments regarding navigation ease and design efficiency, sought to capture a diverse range of perspectives from individuals interfacing with governmental digital platforms. Through meticulous data collection and analysis, patterns of frustration and discontent began to emerge, highlighting a pronounced demand for substantive improvements in the usability and accessibility of government websites. The survey was meticulously crafted to elicit responses pertaining to navigation ease, design efficiency, and overall user experience, thereby facilitating a nuanced understanding of user sentiments and preferences.

#### *C. Data Collection*

The survey instrument was disseminated among a diverse cohort of respondents, encompassing individuals from varying demographics and utilities. Through online platforms and targeted outreach efforts, a robust dataset comprising a diverse range of user perspectives was compiled, enabling comprehensive analysis and interpretation of survey responses.

## 2. SURVEY METRICS

Among the many government websites that were analyzed, it was observed that the Ministry of Road Transport and Highways (MoRTH) website stood out as needing attention. This was because many people, especially college students trying to get driver's licenses and register vehicles, had a hard time using it. They faced lots of problems and felt frustrated with the website. Their experiences showed us that the MoRTH website really needed to be improved. Their feedback emphasized how important it was to fix the website's issues and make it easier to use. The following metrics were assessed:

#### *A. User Feedback*

A common theme emerging from the survey responses was the pronounced frustration experienced by users when navigating the MoRTH website. Respondents highlighted difficulties in locating desired services, cumbersome navigation pathways, and a general lack of intuitive design features, which collectively impeded their ability to efficiently access information and complete tasks.

#### *B. Rating Metrics*

On a scale of 1-10, users rated the ease of navigation and efficiency of the website design. The average ratings provided a quantitative measure of user satisfaction, with lower scores indicative of greater dissatisfaction and higher scores reflective of improved user experiences.

### *C. Challenges*

Specific challenges identified through the survey included cluttered layouts, excessive steps required to perform actions, mobile unresponsiveness, slow loading speeds, and the presence of redundant elements within the website interface. These factors collectively contributed to user frustration and detracted from the overall usability of the platform.

### *D. Desired Improvements*

Respondents expressed a clear desire for improvements in various aspects of the website, including easier navigation, enhanced mobile responsiveness, improved visual appeal, more organized design layouts, streamlined processes, and the removal of redundant elements. These recommendations underscored the need for substantive redesign efforts aimed at optimizing the user experience and enhancing the overall usability of the MoRTH website.

While the website is commonly used for various services related to driver's licenses, vehicle registration, and appointments, notable areas for improvement were observed.

## III. PROPOSED DESIGN

### 1. Planning

The planning phase served as the foundational bedrock upon which the redesign project was built, leveraging insights gleaned from a comprehensive review of existing literature on user interface (UI) design principles and best practices. Drawing from a diverse array of scholarly sources, books and academic notes, the project team gained invaluable insights into the fundamental tenets of effective UI design, ranging from color theory and typography to layout optimization and navigation hierarchy. This rigorous exploration of theoretical frameworks provided the necessary scaffolding for subsequent analysis and decision-making processes.

Furthermore, a meticulous examination of the MoRTH website itself offered critical insights into the specific usability challenges that needed to be addressed. Issues such as inconsistent color schemes, cumbersome navigation pathways, and inefficient use of space emerged as primary pain points, underscoring the imperative for substantive redesign efforts. Through this process of introspection and assessment, a roadmap for the redesign project began to take shape, informed by a deep understanding of user needs and design best practices.

### 2. Implementation

The implementation phase of the redesign initiative was characterized by a systematic and iterative approach to translating conceptual ideas into tangible design solutions. At the forefront of this phase was the imperative to address the identified usability challenges and implement solutions that would enhance user experience across various touchpoints.

One of the primary interventions undertaken was the establishment of a consistent color scheme throughout the website, rectifying the previous inconsistency that detracted from visual cohesion. By harmonizing color palettes and ensuring visual continuity across different components of the website, a more cohesive and aesthetically pleasing user experience was achieved. Additionally, efforts were made to streamline navigation pathways and optimize layout structures to minimize cognitive load and enhance usability.

Another significant enhancement involved the optimization of mobile responsiveness, recognizing the increasing prevalence of mobile devices as primary access points for web content. By prioritizing the mobile user experience and implementing design solutions tailored to smaller screens, such as collapsible menus and responsive layouts, the redesigned MoRTH website was able to cater to a broader audience while ensuring consistency and functionality across devices.

### 3. Improvements

In addition to addressing identified usability challenges, the redesign project also sought to introduce novel design elements and features aimed at further enhancing user experience and accessibility. For instance, the introduction of light and dark mode options provided users with greater flexibility and personalization, catering to diverse preferences and ambient lighting conditions.

Furthermore, the redesign effort prioritized the simplification of complex navigation structures, with a particular emphasis on establishing clear hierarchies of information and prioritizing essential elements. By revising the placement of key features, such as notifications, and optimizing the top navbar for intuitive access to critical functionalities, the redesigned website aimed to streamline user interactions and facilitate seamless information retrieval.

Moreover, the proposed design advocated for the adoption of modern web development frameworks, such as React.js, to ensure scalability, performance, and maintainability over time. By leveraging the capabilities of React.js, including single-page lazy loading and component-based architecture, the redesigned MoRTH website was poised to deliver enhanced responsiveness, faster loading times, and a more immersive user experience.

Iterative improvements also include adapting to smaller mobile screens by modifying font sizes, resizing navbar and menu options, creating hamburger menus and doing away with elements that cause cluttering on smaller screens. Critical design and functional flaws were identified in the existing MoRTH website which were fixed in the proposed design.

#### IV. RESULTS AND CONCLUSION

**Laptop Website Prototype:**

<https://www.figma.com/proto/7XuwV4MEFkL8vDSOVXcirO/Vehicle-Registration-Page?type=design&node-id=160-2&t=oyKZZM3NKdfUSG0h-1&scaling=scale-down&page-id=0%3A1&starting-point-node-id=160%3A2&mode=design>

**Phone Website Prototype:**

<https://www.figma.com/proto/7XuwV4MEFkL8vDSOVXcirO/Vehicle-Registration-Page?type=design&node-id=215-220&t=k3QWGym3A7jliyzf-1&scaling=contain&page-id=97%3A94&starting-point-node-id=215%3A220&mode=design>

**Github Repository:** <https://github.com/rhymasharma/MoRTH-Website-Redesign-Project>

**Demo Video:** [https://drive.google.com/drive/folders/1ICz\\_FZvZ-\\_os4oLK12VWMmewY5EehuHX?usp=drive\\_link](https://drive.google.com/drive/folders/1ICz_FZvZ-_os4oLK12VWMmewY5EehuHX?usp=drive_link)

A survey was conducted to analyze the degree of improvement of the improved design, as opposed to the current design. The survey results provide valuable insights into the user experience of the MoRTH website. The following results were obtained:

- **Ease of Navigation:** The average rating for the ease of navigation on the MoRTH website was **5 out of 10**.
- **Most Used Services:** The most commonly used services on the website were **Driver's and Learner's License Registration** and **Booking Online Test/Appointment**, as shown in Figure 1.
- **Efficiency of Design:** The average rating for the efficiency of the existing website design was **4.81 out of 10**.
- **Frustrations and Challenges:** The **cluttered layout** and the **over-abundance of steps to perform a single action** on the website was highlighted as a common frustration, as shown in Figure 2.
- **Desired Changes:** Respondents emphasized the need to reduce steps for an operation, closely followed by the requirement for navigation to be made easier, as shown in Figure 3.

After inculcating user suggestions into our design, a feedback survey of over a hundred individuals was conducted to solicit user feedback and gauge perceptions of usability, design, and navigability. Based on user feedback, recommendations for improvement include simplifying navigation, enhancing mobile responsiveness, improving visual appeal, organizing the design more effectively, streamlining processes to reduce the number of steps, and eliminating redundant elements.

The response to the newly redesigned MoRTH website was overwhelmingly positive, with users expressing high levels of satisfaction and appreciation for the improvements made. Nearly all respondents lauded the enhanced user experience, citing improvements in navigation ease, visual aesthetics, and overall usability. An average rating of **9.055 out of 10** was given by reviewers, with any new suggestions focusing on the mobile design and responsiveness of the design, emphasizing the need for the mobile design to be made more compact. However, the frequency of these suggestions was 2 in every 50 responses.

In conclusion, the proposed design for the MoRTH website represents a holistic and user-centric approach to website redesign, underpinned by a synthesis of research-driven insights, design best practices, and innovative solutions. By addressing usability challenges, enhancing accessibility, and embracing modern web development technologies, the redesigned MoRTH website is poised to set a new standard for excellence in digital governance and user experience.

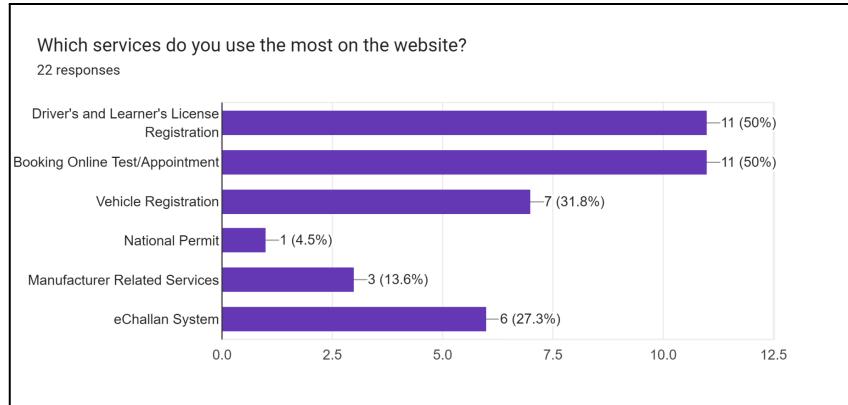


Figure 1— Most used services on MoRTH Website

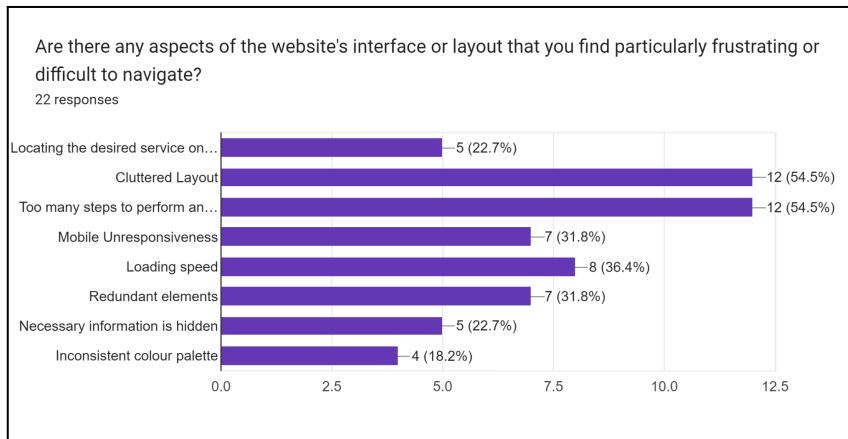


Figure 2—Inconvenience of MoRTH Website

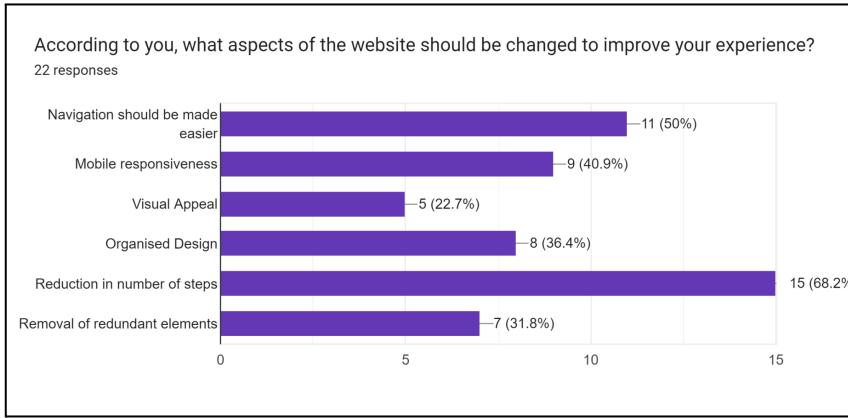


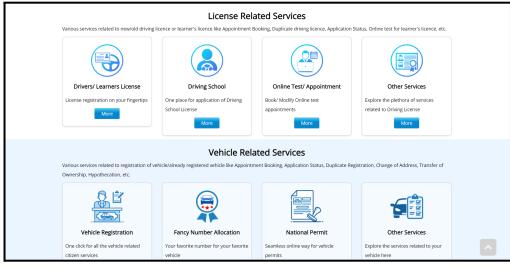
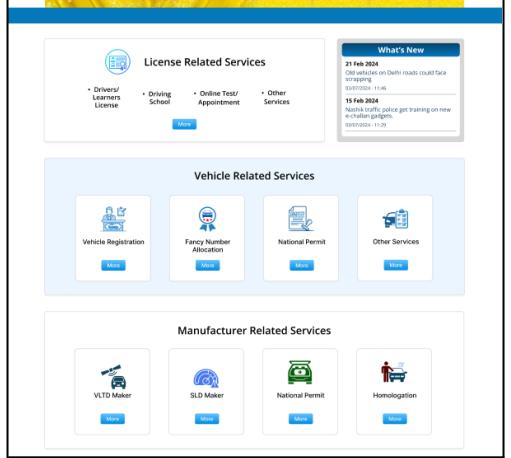
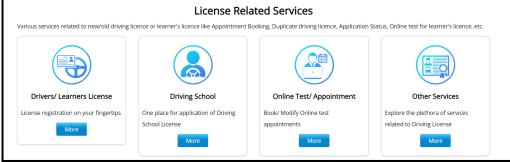
Figure 3— Scope of improvement of MoRTH Website

**We have also incorporated the feedback as was discussed in classroom and have included the following:**

1. **A discussion of why redesigning the MoRTH website is important to us**
2. **Created a Github repository with all the files related to this project**
3. **Conducted a survey amongst users of MoRTH website to identify pain points and match expectations**
4. **Fixed font size and alignment issues**
5. **Compared the existing design with the proposed design through survey as discussed below**

## Comparison of existing design with proposed design

A. Table 1 — Comparing Laptop Website

BASIS OF COMPARISON	EXISTING DESIGN	PROPOSED DESIGN
Parivahan Home Page  Problems: <ul style="list-style-type: none"><li>• Cluttered</li><li>• Misaligned</li><li>• Non Uniform Colors</li><li>• ‘What’s New’ notifications placed at the bottom</li><li>• Inefficient Navbar</li></ul>	 	 
License Related Services  Problems: <ul style="list-style-type: none"><li>• Non uniform size</li><li>• All cards navigate to same website</li></ul>		
Footer Section  Problems: <ul style="list-style-type: none"><li>• Non uniform on every page</li><li>• Black text on black background</li><li>• Cluttered</li></ul>		
Sarathi Parivahan Website Navbar  Problems: <ul style="list-style-type: none"><li>• Inconsistent colors</li><li>• Misaligned</li><li>• Differs from rest of the website</li></ul>		

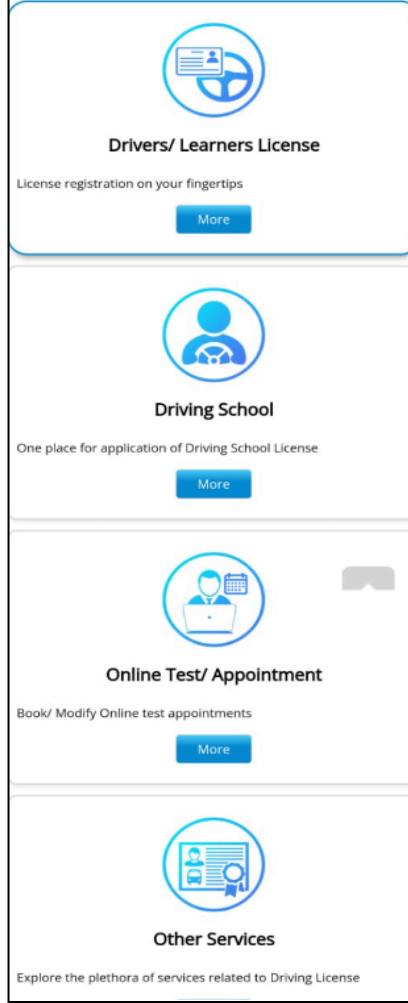
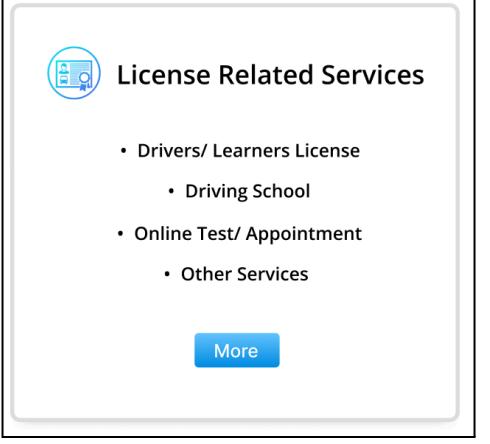
## Vehicle Registration Page - Delhi

Problems:

- All important links appear in a bright yellow popup
- To view these links again, website has to be reloaded from the home page
- Page only contains instructions
- Placement of instructions and background picture is overlapping

B. Table 2 — Comparing Mobile Website

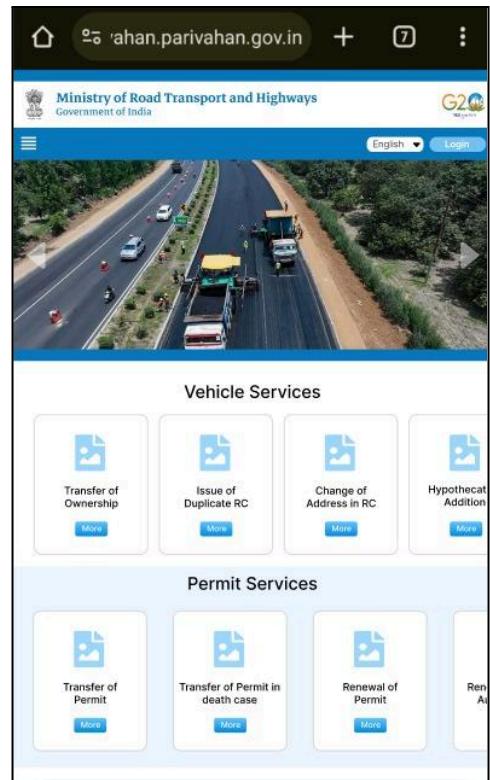
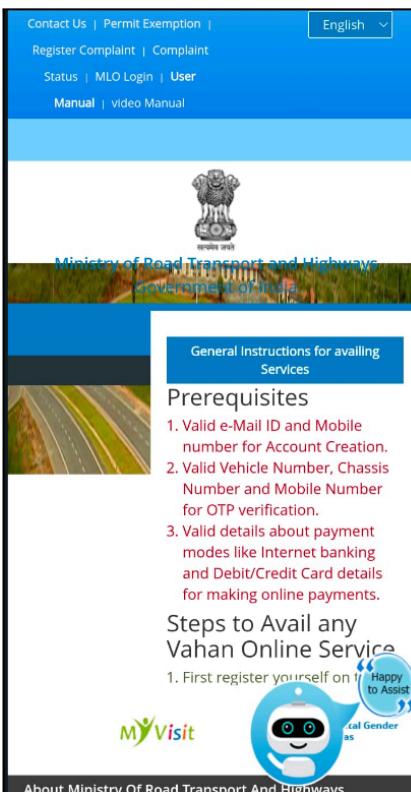
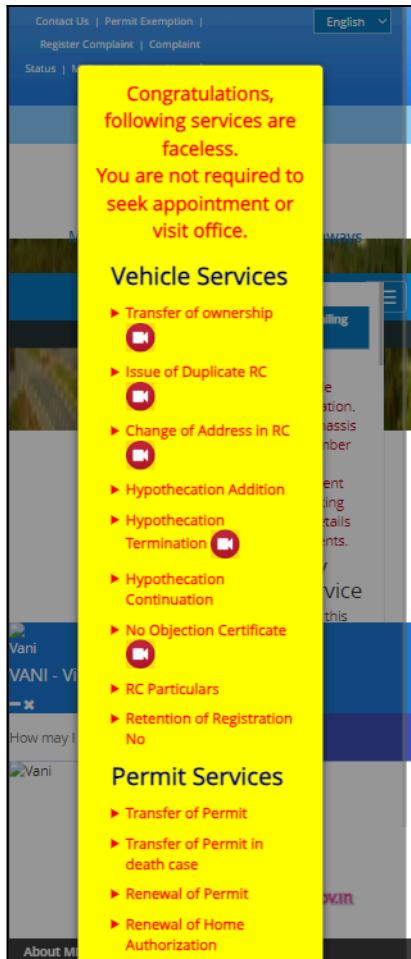
BASIS OF COMPARISON	EXISTING DESIGN	PROPOSED DESIGN
<p>Parivahan Home Page</p> <p>Problems:</p> <ul style="list-style-type: none"> <li>• Cluttered</li> <li>• Misaligned</li> <li>• Non Uniform Colors</li> <li>• ‘What’s New’ notifications placed at the bottom</li> <li>• Too much scrolling</li> </ul>		

<p><b>License Related Services</b></p> <p>Problems:</p> <ul style="list-style-type: none"> <li>• Non uniform size</li> <li>• All cards navigate to same website</li> </ul>	<p><b>License Related Services</b></p> <p>Various services related to new/old driving licence or learner's licence like Appointment Booking, Duplicate driving licence, Application Status, Online test for learner's licence, etc.</p>  <p><b>Drivers/ Learners License</b> License registration on your fingertips <a href="#">More</a></p> <p><b>Driving School</b> One place for application of Driving School License <a href="#">More</a></p> <p><b>Online Test/ Appointment</b> Book/ Modify Online test appointments <a href="#">More</a></p> <p><b>Other Services</b> Explore the plethora of services related to Driving License</p>	 <p><b>License Related Services</b></p> <ul style="list-style-type: none"> <li>• Drivers/ Learners License</li> <li>• Driving School</li> <li>• Online Test/ Appointment</li> <li>• Other Services</li> </ul> <p><a href="#">More</a></p>																												
<p><b>Footer Section</b></p> <p>Problems:</p> <ul style="list-style-type: none"> <li>• Non uniform on every page</li> <li>• Black text on black background</li> <li>• Cluttered</li> </ul>	 <p>data.gov.in  MORTH  India.gov.in </p> <table border="1"> <thead> <tr> <th>Terms and Policies</th> <th>About</th> <th>Resources</th> <th>Need Help</th> </tr> </thead> <tbody> <tr> <td>Privacy Policy</td> <td>About Us</td> <td>Fees and User Charges</td> <td>Contact Us</td> </tr> <tr> <td>Hyperlink Policy</td> <td>Sitemap</td> <td>Act, Rules and Policies</td> <td>Frequently Asked Questions</td> </tr> <tr> <td>Website Policies</td> <td>Terms of Use</td> <td>Permit Fees and Period</td> <td>Raise a concern</td> </tr> <tr> <td>Content Policies</td> <td>MORTH</td> <td>Manual</td> <td>Calendar Web Information Manager</td> </tr> <tr> <td>Contingency Plan</td> <td>CMVR</td> <td>Homologation</td> <td></td> </tr> <tr> <td></td> <td>1989</td> <td></td> <td></td> </tr> </tbody> </table> <p>QR Code for <a href="https://parivahan.gov.in/">Parivahan</a></p> <p><a href="https://parivahan.gov.in/">https://parivahan.gov.in/</a></p> <p> This Website belongs to Ministry of Road Transport &amp; Highways (MORTH) Government of India</p> <p>related-services</p> <p>Designed, Developed and Hosted by: NIC, Government of India © 2023. All Rights Reserved.</p>	Terms and Policies	About	Resources	Need Help	Privacy Policy	About Us	Fees and User Charges	Contact Us	Hyperlink Policy	Sitemap	Act, Rules and Policies	Frequently Asked Questions	Website Policies	Terms of Use	Permit Fees and Period	Raise a concern	Content Policies	MORTH	Manual	Calendar Web Information Manager	Contingency Plan	CMVR	Homologation			1989			<p><b>Contact Us</b></p> <p><b>Vehicle Related:</b> For any technical problems related to Vehicle registration, fitness, Tax, Permit, Fancy, Dealer etc you may contact:- Email : helpdesk-vahan@gov.in Phone: +91-120-492505 (Timings: 6:00 AM - 10:00 PM)</p> <p><b>License Related:</b> For any technical problems related to Learner License, Driving License etc you may contact:- Email: helpdesk-sarathi@gov.in Phone: +91-120-2459169 (Timings: 6:00 AM - 10:00 PM)</p>  <p>This site is designed, hosted and maintained by National Informatics Centre (NIC), MINISTRY OF ROAD TRANSPORT AND HIGHWAYS, Government of India.</p>
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Problems:

- All important links appear in a bright yellow popup
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**General Instructions for availing Services**

**Prerequisites**

1. Valid e-Mail ID and Mobile number for Account Creation.
2. Valid Vehicle Number, Chassis Number and Mobile Number for OTP verification.
3. Valid details about payment modes like Internet banking and Debit/Credit Card details for making online payments.

Online payment in Vahan e-Services involves Payment Gateway and third-party banks in addition to Vahan application. In case of delayed response by banks or payment gateway, the transaction remains pending. User needs to wait for stipulated waiting period (1-2 hours, which varies from state-to-state) and then use the "Check Pending" option to find the latest status and print the receipt, if already successful.

**Steps to Avail any Vahan Online Service**

1. First register yourself on this portal using your e-mail ID and mobile number.
2. An activation link along with OTP will be sent to your entered email ID to activate user ID.
3. By clicking activation link you can activate user ID and set the password.
4. After activating user you can avail vehicle related services through "ONLINE SERVICES" menu
5. Enter valid Vehicle Registration Number and click on Generate OTP
6. Select the Service to be availed by clicking the respective Service
7. Enter further details as per the form displayed e.g. Data Entry, Insurance Details, Appointment Details, documents upload & Fee payment.
8. Book Appointment (if applicable) to visit RTO for verification process
9. Once Payment Done, Print Receipt.
10. Visit to Respective RTO with required documents except for the services Pay your tax, RC Particulars

This Website is best viewed and compatible with Google Chrome, Mozilla Firefox & Internet Explorer web browsers in Microsoft Windows/Android platform.

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## V. FUTURE SCOPE

The redesign of the Ministry of Road Transport and Highways (MoRTH) website marks a significant stride towards enhancing user experience and accessibility, with potential implications that extend far beyond its initial implementation. Looking ahead, there are several avenues for further development and collaboration aimed at optimizing the website's effectiveness in serving citizens. One avenue involves systematically redesigning additional pages and sections of the website to uphold established design principles and ensure consistency, usability, and accessibility across all areas. Moreover, ongoing improvements can include integrating more statistical data related to road transport and highways into the website through interactive visualizations, fostering greater transparency and informed decision-making. The need for a responsiveness-centered approach is prevalent, with mobile technology becoming the more preferable form of web-browsing for a majority of users.

Additionally, future efforts should prioritize maintaining consistency in navigation structures and engaging government stakeholders in the feedback process to align improvements with policy objectives and citizen needs. Embracing emerging technologies, such as AI and ML, presents further opportunities to enhance user assistance and personalize content recommendations. Through continuous enhancement and stakeholder collaboration, the redesigned MoRTH website will evolve into a dynamic platform that effectively serves citizens' needs and advances the goals of transparent and responsive governance in the realm of road transport and highways.

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