Modernizing Tech-Auto's Digital Presence: A Full-Stack Website Redesign with E-Commerce Integration

Praxisphase

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Submission Date: 1 September 2025

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List of Abbreviations

AI	Artificial Intelligence
B2B	Business to Business
B2C	Business to Consumer
CTA	Call to Action
CLS	Cumulative Layout Shift
FCP	First Contentful Paint
HTML	Hyper Text Markup Language
IT	Information Technology
KB	Kilobyte
LCP	Largest Contentful Paint
MB	Megabyte
PSI	PageSpeed Insights
SEO	Search Engine Optimization
UX	User Experience

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1 Introduction

In today's digital world, most consumers turn to a company's online presence to help them decide before making a purchase or hiring a service, whether the transaction happens online or in-store. According to the June 2023 Global Consumer Insights Pulse Survey conducted by PricewaterhouseCoopers, 55% of global consumers surveyed ranked search engines, like Google as their top source of pre-purchase information. Followed by 34% who rely on retailers' websites, and 31% who turn to social media [1]. These statistics highlight the critical role a company's digital presence plays in decision-making for consumers. Prospects understand how valuable information is, and having a strong company website, backed up by reviews, detailed product or service descriptions, and clear value propositions sets the biggest companies apart.

Tech-Auto Ltd has been a leading electrical machinery and telematics company since 1999 [2]. However, its website had taken a backseat to other business priorities, resulting in long load-times and not fully reflecting the latest trends in design and technology. Now, as the company seeks to strengthen its international customer base and enter the B2C (Business to Consumer) space, it has recognized the need for a powerful online presence to remain competitive in the engineering and manufacturing industries.

With up to 40% of users abandoning a website if its load time exceeds three seconds [3, p. 17], following best practices to optimize performance is critical. A faster, more responsive website improves user retention, especially when combined with professional design, intuitive navigation, and integrated functionality. Together, these elements play a key role in strengthening Tech-Auto's competitive positioning in both B2B (Business to Business) and B2C (Business to Consumer) markets.

This work has the aim not only to identify the underlying causes of key performance issues – such as long loading times, low traffic and high dropout rates – but also to modernize Tech-Auto's digital presence through a full-stack website redesign. The goal is to ensure the website properly aligns with current market and design trends, while keeping industry best practices in sight. Simultaneously, the introduction of an e-commerce platform has the objective of helping the company broaden its horizons and launch into the B2C world.

The project encompassed performance diagnostics, mockup and UX designs, and both front- and backend development within a WordPress-based environment, along with the integration of e-commerce functionality. The result is intended to be a scalable, visually modern, and user-friendly platform that accurately reflects Tech-Auto's current brand, vision and mission.

This work documents the entire process, from the initial planning and research phase all the way to the final deployment. It provides a structured overview of the project's context, methodology, and implementation, and concludes with an evaluation of the results and lessons learned.

2 About Tech-Auto

Established in 1999, Tech-Auto is an Ireland-based company that specializes in the development and distribution of electrical machinery, vehicle telematics systems and automation technologies. With over two decades of expertise and a strongly committed team, Tech-Auto has built a strong reputation across many industries in Ireland and overseas [2].

Through the combination of electronics, mechanical systems, and software development, the Tech-Auto team has been able to help several companies in the transportation industry. Offering a broad range of services from vehicle lighting systems, Printed Circuit Board (PCB) design and manufacturing, to closed loop monitoring systems, Tech-Auto has enabled emergency services and logistics firms to improve productivity and reduce operational costs.

Tech-Auto has assembled a team of highly qualified and engaged professionals, which has created a very collaborative and dynamic environment. These interdisciplinary capabilities, combined with the increasing demand for connected and automated systems, create opportunities to expand into B2C markets and strengthen its international customer base beyond the traditional B2B focus.

3 Problem Statement & Motivation

3.1 Personal Motivation

First introduced in 1969 by an engineer at Yaskawa Electric, mechatronics was originally defined as the combination of *mecha*nical and elec*tronic* engineering. Since then, mechatronics has continued to evolve into an interdisciplinary and synergistic field encompassing many other areas such as information technology (IT), artificial intelligence (AI) and robotics [4, p.2], as illustrated in Figure 3-1.

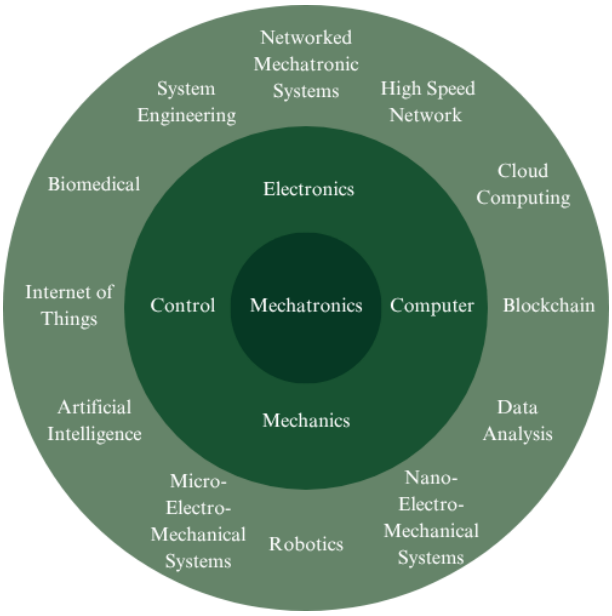


Figure 3-1 Core Fields of Mechatronics
Source: Adapted from [4, p. 212]

This ability to integrate knowledge from multiple disciplines and transform an idea for software or machinery into a market-ready product was a key factor in my decision to pursue mechatronics engineering. Over the course of my studies, my interests in the programming side of the field intensified. Hence, when the time came to contribute my knowledge and abilities to a company in the engineering world, I was determined to undertake an internship with a strong computational focus.

From my initial interactions with Tech-Auto, I was impressed by the interdisciplinary expertise of its team, as well as their welcoming and collaborative environment. The company offered

not only the opportunity to work with highly skilled professionals, but also the flexibility to apply my skills across various domains, particularly programming and system development.

3.2 Project Context & Challenges

In today's digital world, a company's website serves as its modern testament. It not only shows the company's offerings and core values but also communicates brand identity and helps build credibility and trust among potential customers. It is, in a few words, the first impression any visitor would have of a company. As such, it is essential to ensure the website reflects the company's current offerings, goals, and overall brand presence.

Tech-Auto's primary motivation behind a website redesign originated from the objective of strengthening its international customer base and expanding into the B2C market. However, upon closer inspection, it was clear that some additional underlying issues had not yet been identified and were still crucial before the expansion. By running a more structured evaluation with assistance of Forbes' website redesign guide [5], further deficiencies within the site were identified, as can be seen in Table 3-A. In the next chapters, we will go into further detail as to why each indicator is important and how Tech-Auto currently aligns with each.

Indicator	**Tech-Auto's Evaluation**
Outdated design	✓ Pre-redesign website design has remained unchanged since 2020
Poor user experience	✓ Navigation and clarity issues made offered services difficult to understand
Low conversion rates	✓ Nearly no contact form submissions received
Not mobile-friendly	✓ Layout not optimized for mobile browsing
Slow load times	✓ Load times significantly above industry standards
Inadequate Search Engine Optimization (SEO) performance	✓ SEO has not been a focus for the company
Rebranding	✓ Aiming for wider international reach and service expansion

Table 3-A Redesign Need Assessment: Tech-Auto's Website Evaluation

Source: Adapted from [7]; author's own evaluation

3.2.1 Outdated Design

The internet evolves at a rapid pace. Design trends, user expectations, and interface standards can change in a matter of months, making it incredibly challenging for brands to catch up and remain relevant. Therefore, most brands aim for timeless designs that clearly and effectively communicate their value.

Based on snapshots archived in the Wayback Machine [6], Tech-Auto's website has maintained the same layout and design since October 2020. While there is no universal rule on how often a website should undergo a redesign, certain visual indicators in Tech-Auto's pre-redesign website suggest the version is no longer aligned with modern best practices.

As seen in Figures 3-2 and 3-3, the pre-redesign website utilizes a minimal, heavily templated layout with limited visual hierarchy. It relies heavily on stock images, which do not properly reflect Tech-Auto's services nor identity, giving the site a generic and unauthentic feel. These factors, alongside the lack of clarity in the site's content, weaken the site's ability to make a strong first impression to potential customers visiting the site.

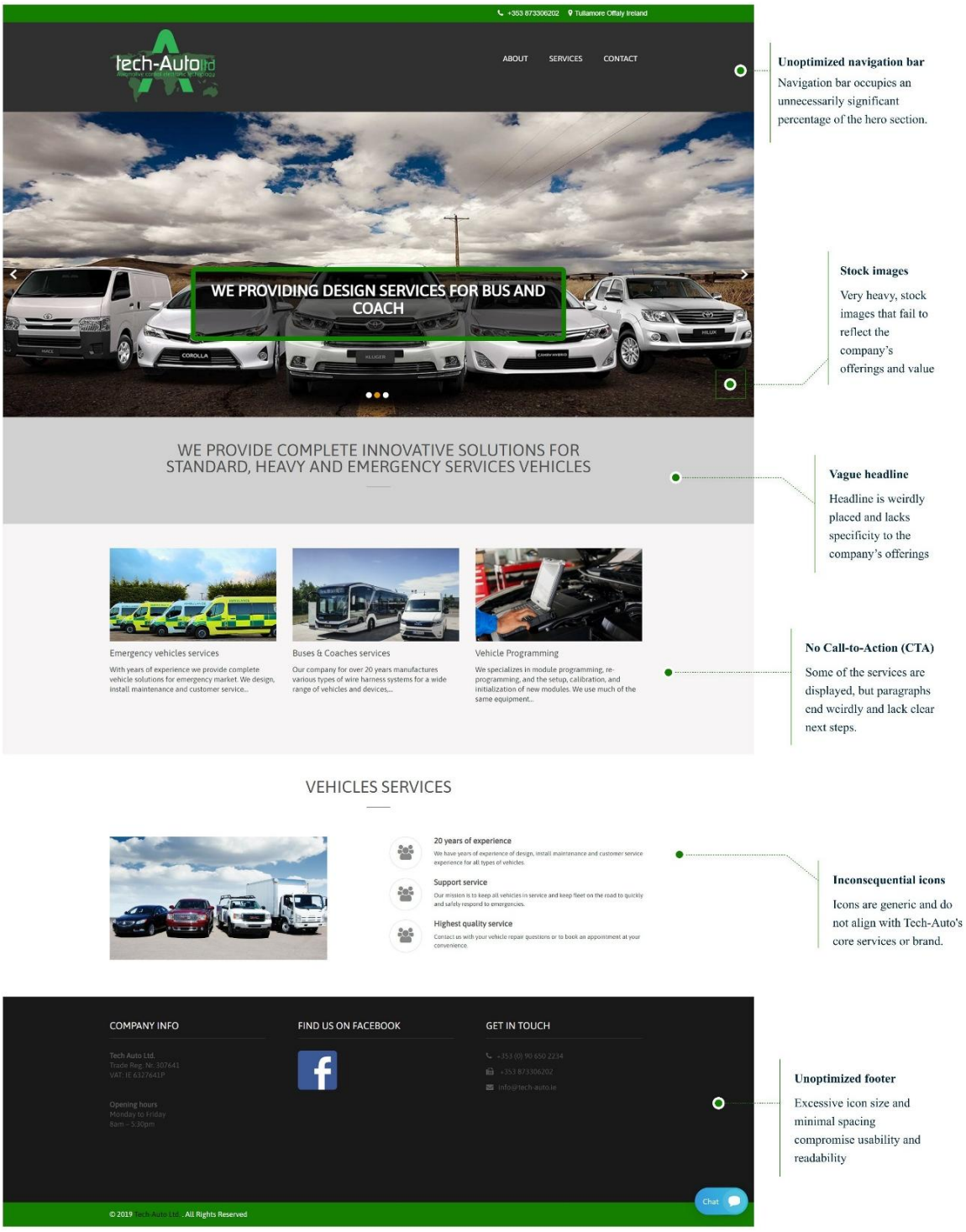


Figure 3-2 Analysis of Tech-Auto's Pre-redesign Homepage
Source: Screenshot from tech-auto.ie, annotated by author (own creation)

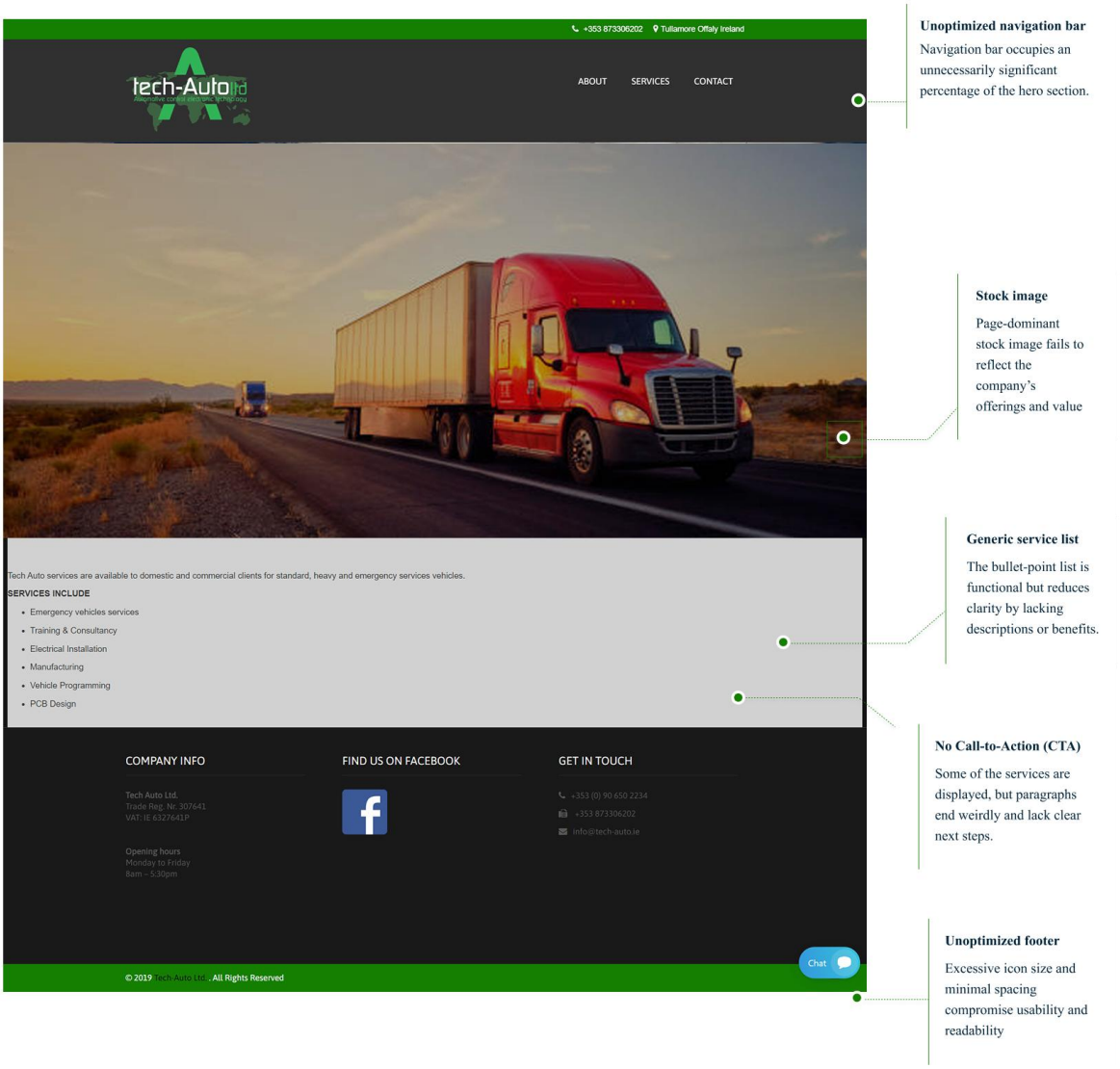


Figure 3-3 Analysis of Tech-Auto's Pre-redesign Services Page
Source: Screenshot from tech-auto.ie, annotated by author (own creation)

3.2.2 Poor User Experience

As the name suggests, User Experience (UX) encompasses the overall *experience* of a person, the *user,* when interacting with a product, system, or service. Drawing from design, psychology, engineering, and business, UX focuses on understanding user's needs. This understanding enables businesses to develop user-centered products, systems, or services, which translate into happier customers and higher conversion rates [7].

Table 3-B summarizes the main UX strengths and weaknesses of Tech-Auto's homepage, services, and contact pages. Screenshots of these pages can be found in Appendix A.

Page	Strengths	Weaknesses
Home	✓ Clear services categories ✓ Simple navigation bar ✓ Credibility emphasis ("over 20 years of experience")	× Generic visuals × Unclear call-to-action (CTA) × Vague wording
Services	✓ Clear service breakdown	× Text heavy × Lack of visual cues × Poor hierarchy and spacing × Missing CTA or link to service page
Contact	✓ Display of company contact info ✓ Company legitimacy (displays registration number and VAT ID)	× Heavy form at the bottom of the page × Missing value propositions

Table 3-B UX Strengths and Weaknesses of Tech-Auto's Website
Source: Author's own evaluation

The pre-redesign Tech-Auto website does a good job by keeping things simple. Navigating through the site is intuitive, thanks to their simple layout; and the display of their services, contact information, and legitimacy is clear. However, the UX relies heavily on generic visuals, heavy text, and is missing visual hierarchy and trust signals. These shortcomings can make it difficult for users to understand the company's offerings or what steps to take next, leading to lost opportunities for engagement and conversion.

3.2.3 Low Conversion Rates

Conversion rate is a key metric commonly used in digital marketing, which helps assess how effectively a website's traffic converts. These conversions can be anything from making a purchase to filling out a form, depending on the company's objectives [8]. In simple words, it helps companies estimate how many of their website's visitors are taking meaningful action or simply leaving the site.

Using Equation (3.1) and the available data for the year 2024 (illustrated in Figures 3-4 and 3-5), Tech-Auto's conversion rate can be calculated as follows:

$$Conversion\ Rate = \frac{Total\ Conversions}{Total\ Visitors} = \frac{5}{197} \approx 2.54\% \quad (3.1)$$

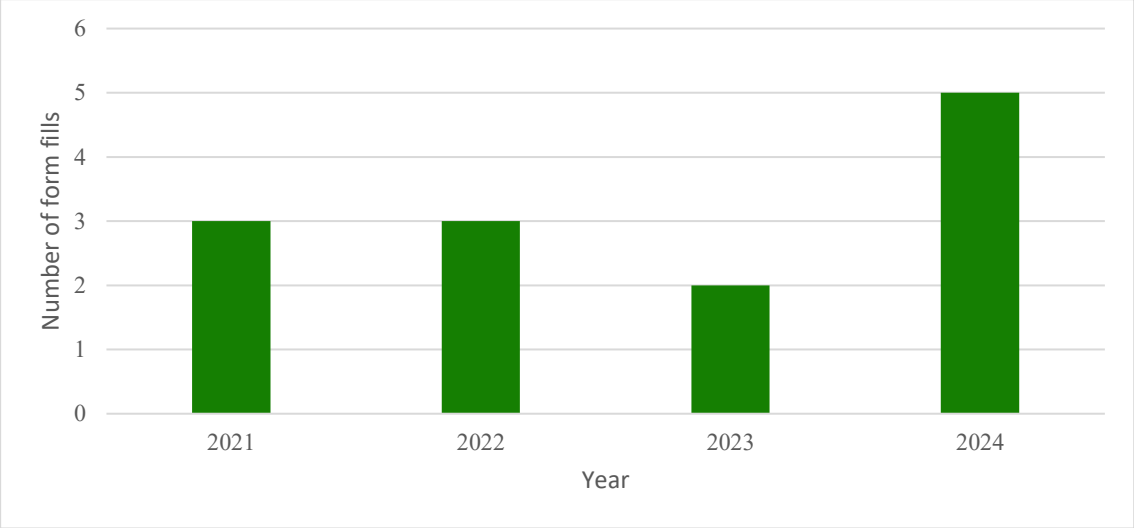
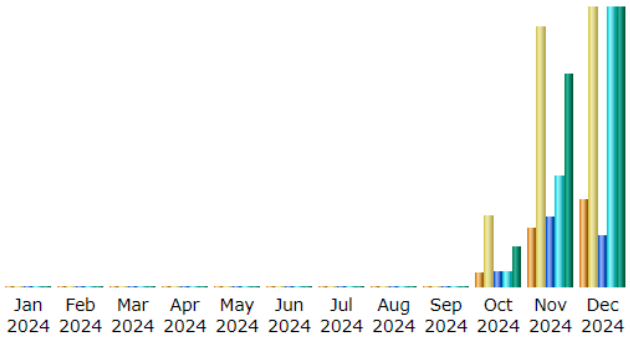


Figure 3-4 Tech-Auto's Yearly Conversions
Source: Author's own visualization based on Tech-Auto's cPanel analytics.



Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2024	0	0	0	0	0
Feb 2024	0	0	0	0	0
Mar 2024	0	0	0	0	0
Apr 2024	0	0	0	0	0
May 2024	0	0	0	0	0
Jun 2024	0	0	0	0	0
Jul 2024	0	0	0	0	0
Aug 2024	0	0	0	0	0
Sep 2024	0	0	0	0	0
Oct 2024	18	87	201	203	35.05 MB
Nov 2024	72	317	876	1,355	181.48 MB
Dec 2024	107	340	640	3,428	237.84 MB
Total	197	744	1,717	4,986	454.38 MB

Figure 3-5 Tech-Auto's Website Traffic Overview (2024)
Source: Screenshot from Tech-Auto's cPanel analytics

Although a 2.54% conversion rate is not particularly low by some standards, it falls well below the 2024 industry average of 6.6% across all sectors [9], suggesting the pre-redesign website is not fully capitalizing on the traffic it receives. Likely due to vague service descriptions, lack of trust signals, and limited or missing CTAs. This indicates a clear opportunity for optimization, especially considering the company's desire to increase inbound leads through its website.

3.2.4 Not Mobile-Friendly

A website is considered mobile-friendly, when its layout and functionality can adapt to smaller screens, while ensuring users can navigate and interact with it easily. With more and more users browsing and online shopping from smartphones and tablets daily, mobile responsiveness has evolved from a “nice-to-have” to a must for all businesses.

According to Statista, a recognized global provider of market and consumer data, 61.85% of website traffic worldwide comes from mobile devices [10]. Thus, having an optimized mobile-friendly website can help business improve their brand recognition, engagement and conversion rates.

Tech-Auto’s pre-redesign website, however, is not optimized for mobile use. While the desktop version works effortlessly, the layout does not smoothly adjust for smaller screens. Text overlaps, buttons are difficult to click, and images do not properly resize, making it challenging for mobile users to interact with the site. Although improving mobile responsiveness falls outside the scope of this redesign, it has been identified as a high priority for future updates.

3.2.5 Slow load times

We live in a fast-paced world. Individuals want results and answers the second they think about something, so much so that just a 2-second delay in page load time can increase bounce rates by over 30% [11]. Therefore, the faster a website is, the better.

With 63.6% of worldwide users using Chrome [12], Google has a particularly strong and vast amount of data to identify performance trends and industry standards in the software development world. This data helps developers and engineers know what the trends and industry averages are, to ensure their businesses are following best practices and providing users with the best experience to convert.

As such, Table 3-C helps us evaluate Tech-Auto's load times in comparison to Google's PageSpeed Insights (PSI) [13]. Tech-Auto's load times were evaluated with Google's Lighthouse tool. The detailed results can be found in Appendix B, alongside further information on PSI's metrics.

Metric	Good	Needs Improvement	Poor	Tech-Auto
First Contentful Paint (FCP)	[0, 1800ms]	(1800ms, 3000ms]	over 3000ms	1200ms (Good)
Largest Contentful Paint (LCP)	[0, 2500ms]	(2500ms, 4000ms]	over 4000ms	3800ms (Needs improvement)
Cumulative Layout Shift (CLS)	[0, 0.1]	(0.1, 0.25]	over 0.25	0.046 (Good)
Speed Index	[0, 3400ms]	(3400, 5800ms]	over 5800ms	14200ms (Poor)

Table 3-C Tech-Auto's PageSpeed Metrics Compared to Google Standards
Source: Metrics from [13]; Tech-Auto results based on author's own Lighthouse audit.

As we can see, both the FCP and CLS fall under the "Good" category. Based on PSI's standards, however, for a website to pass the Core Web Vitals assessment – which gives developers a quantitative understanding of whether the experience of their site is "Good", "Needs Improvement", or is "Poor" – both the LCP and CLS should fall under the "Good" category [13]. Since Tech-Auto's LCP exceeds the recommended 2.5 seconds threshold, the pre-redesign site ultimately does not pass the Core Web Vitals assessment.

Furthermore, Tech-Auto's overall performance score – which combines multiple Lighthouse metrics to reflect the experience users have when loading and interacting with the site – is 67. Placing the site in the "Needs Improvement" range, these results additionally confirm there are improvements to be made to enhance the site's performance and general speed.

Website speed is not just a technical metric. It has real impact on how people use a site and whether they convert. For Tech-Auto, a slow site means potential customers might click away before seeing what the company offers, lowering the chances of getting leads or making sales.

3.2.6 SEO Performance and Rebranding

Search Engine Optimization (SEO) has the goal of improving a website's visibility in search engines, such as Google, to allow users to find the site and increase traffic. These improvements can be in the shape of descriptive URLs, easy-to-read text and snippets, among others [14]. The better optimized a site is, the higher it appears in search results, making it easier for potential customers to find a business relevant to what they are searching for.

Until recently, SEO had not been a priority for Tech-Auto, however thanks to the research and analysis conducted in this work, its importance has been highlighted. Although not a core focus of the current redesign project, strengthening SEO will be an essential step in future development phases as the company advances toward a broader digital strategy.

This strategy also includes a rebranding to better reflect the company's vision and expertise, which focuses on three main objectives:

1. International expansion: shift the company's identity from being primarily recognized as "Ireland-based" to establish itself as a global supplier of electrical machinery and telematics solutions.
2. Highlighting product innovation: shift the website's focus to Tech-Auto's Closed Loop Fleet Management Solutions and platform, which are currently underrepresented despite being among the company's core offerings.
3. E-commerce integration: introduce a platform to sell advanced control systems, vehicle lighting, electrical supplies, among other products directly to consumers.

Focusing on both SEO optimization and strategic rebranding is essential to strengthen Tech-Autos digital presence in the long term and ensure it aligns with their innovative offerings.

Overall, these findings help provide a clearer picture of the challenges limiting Tech-Auto's current digital performance. Issues such as an outdated design, poor user experience, and slow load times affect how users see the company and make it harder to attract and convert leads. As the company moves into competitive international and B2C markets, addressing these challenges is essential to ensure that the website becomes a strong, scalable tool capable of fully supporting Tech-Auto's bigger business goals.

3.3 Project Objectives

This project has the main goal of modernizing Tech-Auto's digital presence, by delivering a fully redesigned, performance-optimized website with integrated e-commerce features. The new site aims to follow the latest design, usability, and technical best practices while showcasing the company's expertise and strategic goals.

More specifically, the project aims to:

- Improve performance and loading speed to meet or exceed industry standards, enhancing user satisfaction and keeping visitors engaged.
- Redesign the website's UI/UX to ensure clarity, easier navigation, and a professional visual style that matches Tech-Auto's brand.
- Introduce an e-commerce platform to expand the company's reach into the B2C market.
- Establish a scalable foundation for future improvements, including mobile optimization, stronger SEO, and advanced automation.

By meeting these objectives, the project will transform Tech-Auto's website into a competitive, future-ready platform that drives growth and supports expansion into new markets.

4 Project Implementation

4.1 Planning and Preparation

As with any new project or work, the first weeks are all about learning. Becoming acquainted with the company and colleagues, as well as understanding what the company offers and envisions. Alongside this social introduction, I had the opportunity to review the technological framework supporting the pre-redesign website to understand existing tools, configurations, and limitations.

Once I had a clearer picture of their operations and goals, I conducted an initial evaluation of the website. This audit included a manual review, as seen in Figures 3-2 and 3-3, to identify potential design flaws contributing to conversion leaks [15], as well as a technical review using Google's Lighthouse tool. The results highlighted both design and performance issues affecting Tech-Auto's conversions and user experience, including unclear wording, outdated design elements, large image sizes, and excessive plug-in usage.

The findings were presented to the team to establish priorities, align the creative direction, and strategize the necessary changes to optimize the site before commencing any design or development. This collaborative approach ensured a shared project vision amongst all team members, enabling a more cohesive and efficient execution.

4.2 Design and Development Process

4.2.1 Sitemap Creation

Once the goals and priorities were properly outlined, the next step was creating a sitemap. A sitemap is a diagram that provides a visual representation of how a website's pages are organized and connected [16], as depicted in Figure 4.1.

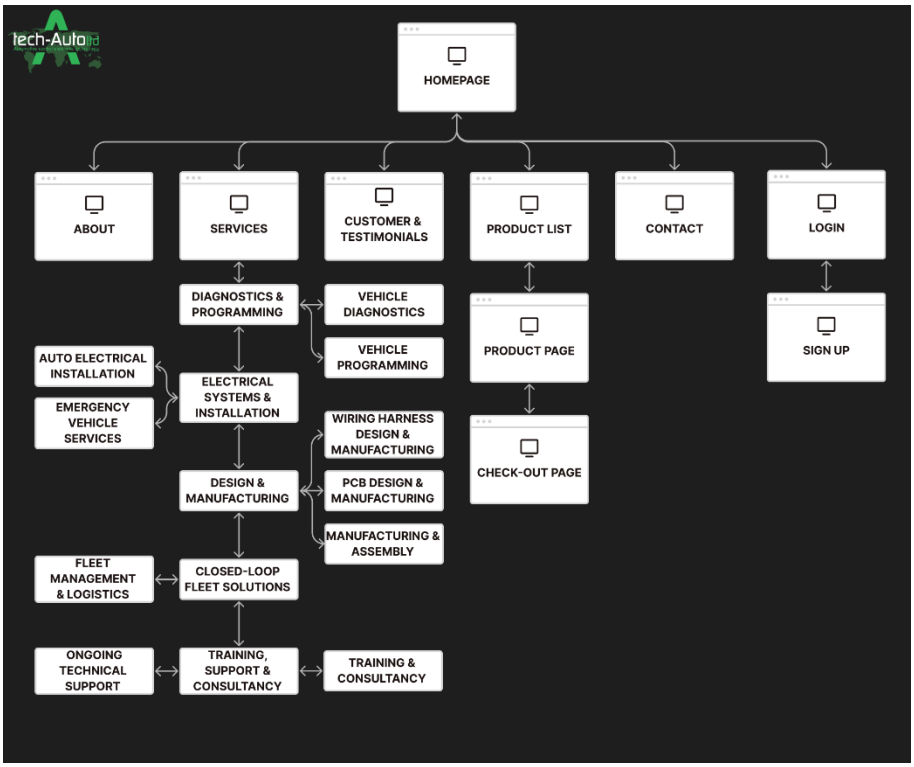


Figure 4-1 Tech-Auto's Sitemap
Source: Author's own creation

For this project, creating a sitemap ensured the site's navigation would remain logical, intuitive and easy for users to follow. It also acted as a navigation blueprint during development, helping maintain consistency and minimize deviation risks.

4.2.2 Mockup Development

Another important step before the development stage was the creation of mockups. Mockups are static visual models of a website that present a realistic preview of the final design. They play a crucial role in web design projects, since they allow designers, developers, and stakeholders to have a clear visual of the end project layout, experiment with visual aspects, and keep costs and errors low [17].

In order to create the mockups for the new Tech-Auto website, I utilized Figma, a cloud-based design tool for building interfaces, prototypes, and other visual assets [18]. The designs covered all major pages and included proposed layouts, wording, and media, which can be found in Appendix C. Through iterative reviews with the Tech-Auto team, the designs were refined until they met both the functional specifications and the desired aesthetic standards.

4.2.3 WordPress and Gutenberg

After finalizing the mockups, the development phase of the project could begin. The pre-redesign website lived in WordPress, an open-source content management system (CMS) used to create, manage, and publish websites with a wide range of themes, plugins, and customization options [18]. Therefore, being the company's preferred software, the redesigned website would be developed there as well.

To avoid disrupting the existing site, all work was initially conducted in a dedicated staging environment under the subdomain dev.tech-auto.ie. This setup allowed for unrestricted testing and implementation of design elements, functionality, and performance optimizations without impacting the live domain.

To build the main layout, WordPress' block-based editor Gutenberg [19] was used. This editor has built-in content blocks, which allowed the building of the main layout, however these blocks have limitations in terms of layout and functionality. Therefore, custom HTML (Hyper Text Markup Language) blocks as well as the code editor, were used for a more dynamic result. Figure 4-2 shows an example of how the homepage was built with a combination of blocks and custom HTML, while Figure 4-3 shows the live site with green circles around the sections written purely with code, ensuring it assimilates the previously discussed mockups.

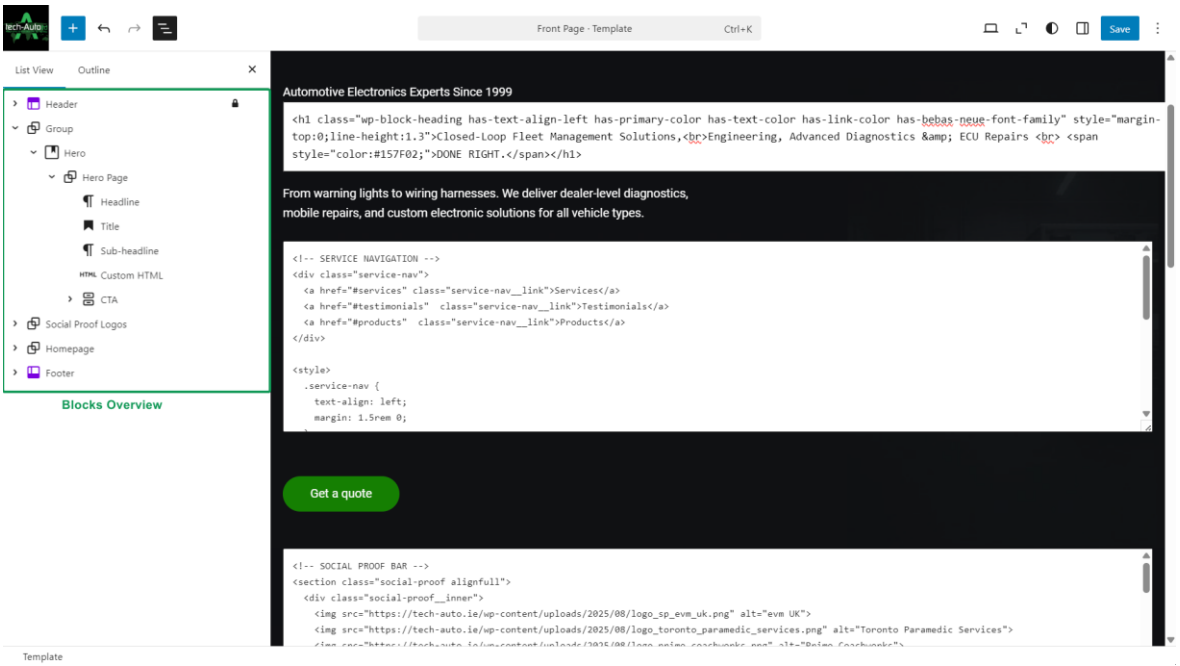


Figure 4-2 Example of Custom HTML Usage in Website Editor
Source: Author's own creation

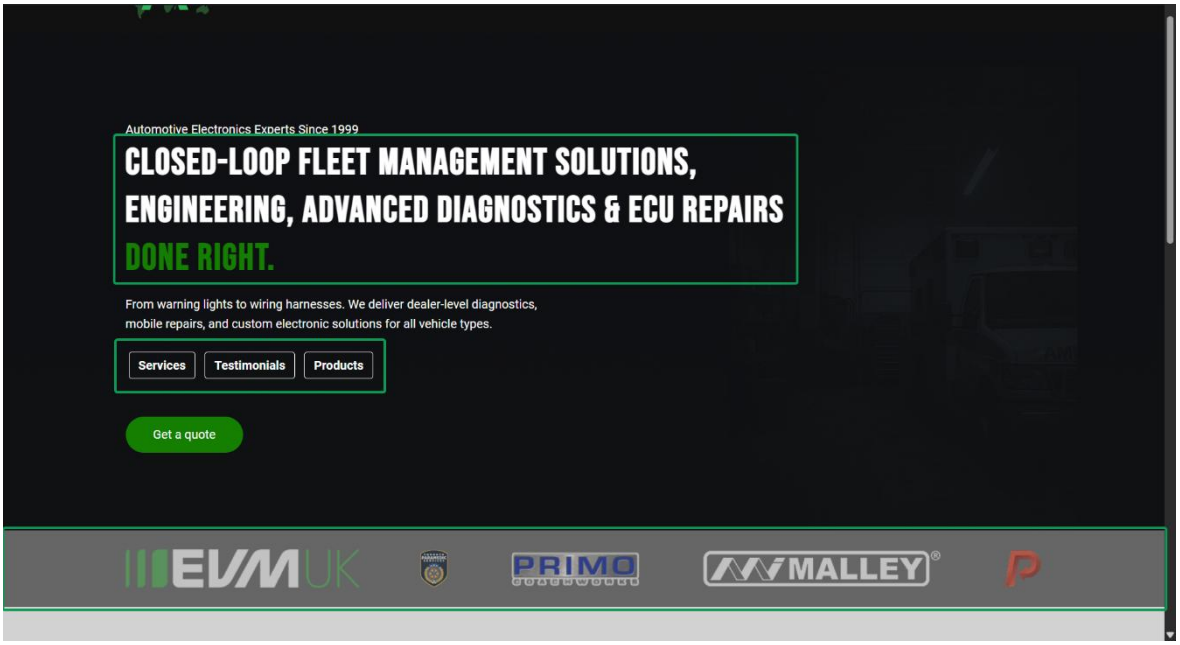


Figure 4-3 Example of Custom HTML Usage in Live Website
Source: Author's own creation

4.2.4 Custom Code and Plugin Management

The implementation of custom HTML played a vital part in this project. It eliminated the need for third-party plugins – which reduced the website's disk usage and shortened load times – and enabled the integration of visual design and customization options beyond the constraints of the standard WordPress editor blocks. Some examples of the custom HTML used for objects such as a testimonial slider, and custom visuals can be found in Appendix E.

Although plugins were mostly avoided, there were two crucial parts of the website that required their usage. In order to create a secure contact form that sends quote requests filled by users directly to the company's email, Fluent Forms [19] was employed. Additionally, for the new B2C integration, WooCommerce [20], the most popular open-source e-commerce plugin, was chosen. Building these features from scratch would have significantly extended the development time and introduced additional security challenges. Consequently, after due research, these plugins were strategically chosen since they inherently address these concerns.

With the site's architecture, design, and functionality in place, the next step was deployment. Once development and internal reviews were completed, the migration process began. This involved creating a full backup of the existing site, removing the previous public_html files,

and transferring the updated files from the staging environment. The staging domain was then deleted, and the main domain was configured to display the new version seamlessly, ensuring uninterrupted availability for visitors.

Following deployment, documentation was prepared to outline the key updates, site structure, and implemented functionalities of the new site. Additionally, a handover session was conducted with Tech-Auto's main developer, providing them with a walkthrough of the site's features and the changes made, ensuring smooth future maintenance and updates.

With the site live, the focus then shifted to ensuring its performance aligned with modern standards. Since speed, responsiveness, and stability directly affect user experience and conversion rates, attention turned to optimization strategies. These included refining code, compressing images, minimizing HTTP requests, and implementing other techniques aimed at delivering a faster, more seamless browsing experience for Tech-Auto's users.

4.3 Performance Optimization

Website performance is a key factor in delivering a positive user experience. It encompasses elements like load time and responsiveness, and influences everything from retention to search rankings to conversion rates [21]. Therefore, the better a website performs, the more likely visitors are to stay and potentially convert.

The optimization strategy for Tech-Auto focused on three main pillars:

1. Reducing media file sizes without compromising quality
2. Minimizing reliance on unnecessary plug-ins
3. Streamlining the site's code and assets

4.3.1 Image Optimization Strategy

One of the main performance issues identified in the initial Lighthouse Audit (Appendix B) was the use of overly large images, many of which exceeded 1 MB (Megabyte). Beyond just file size, the images were often not properly resized for their intended purposes. These inefficiencies contributed significantly to slower loading times.

To address this, the new website intended to properly resize images and remain inside the recommended file size standards displayed in Tables 4-A and 4-B.

Use Case	Format	Notes
Photographs & complex images with many colors	JPG	Balance between file size and image quality. Loses quality when image is compressed.
Detailed graphics & logos	PNG	Larger file sizes, better quality when compressing. Supports transparency.
Logos, icons & graphics	SVG	Vector image format. Size scaling without quality loss. Small file sizes.
Simple animations	GIF	Lossless compression. Smaller file sizes.

Table 4-A Recommended Image Formats for Different Web Use Cases
Source: Author's own creation based on [22].

Image type	Target file size	Recommended width (W) and height (H)
Background	< 20 MB	W: 2560 pixels H: 1400 pixels
Hero	< 10 MB	W: 1280 – 2500 pixels H: 720 – 900 pixels
Logo	< 1 MB	W: 100 pixels H: 100 pixels
Content (i.e. products)	< 300 KB	W: 2048 pixels H: 2048 pixels

Table 4-B Recommended File Sizes and Dimensions for Web Images
Source: Author's own creation based on [22].

Following these guidelines, all images on the new website were optimized. This simple change had an immediate impact on the Largest Contentful Paint (LCP) score, reducing it by more than one second compared to the original site. The full Lighthouse report for the new site can be found in Appendix D.

4.3.2 Reducing Plug-In Dependency

Although plugins can make website building much easier for non-developers, they can also negatively affect loading speeds. Plugins require additional files, such as CSS stylesheets for appearance or JavaScript interactive features, to be downloaded to user's browsers when they visit a website. Therefore, using excessive, unoptimized, or poorly coded plugins can significantly add to the total page size, the number of HTTP requests, and subsequentially load times [22].

The pre-redesign Tech-Auto website relied on multiple plug-ins, some of which were used for features that could be directly built with HTML, CSS, or JavaScript, significantly increasing the website's speed. In the redesign, plugins were deliberately kept to a minimum. Only two were kept due to their essential functionality and adherence to high security standards:

- Fluent Forms, to provide secure, customizable contact and quote forms.
- WooCommerce, to support the planned eCommerce integration.

All other interactive elements, such as sliders, were custom-coded (Appendix E) to reduce the number of HTTP requests and prevent unnecessary scripts from loading on pages where they were not needed, resulting in faster load times and a more efficient site overall.

4.3.3 Before-and-After Performance Results

The effectiveness of these optimizations was measured using Google Lighthouse before and after the redesign. Table 4-C draws a comparison overview between the two, while the complete reports can be found in appendixes B and D.

Metric	**Good**	**Needs Improvement**	**Poor**	**Tech-Auto**	
				Pre-redesign	**Post-redesign**
FCP	[0, 1800ms]	(1800ms, 3000ms]	over 3000ms	1200ms (Good)	900ms (Good)
LCP	[0, 2500ms]	(2500ms, 4000ms]	over 4000ms	3800ms (Needs improvement)	1300ms (Good)

CLS	[0, 0.1]	(0.1, 0.25]	over 0.25	0.046 (Good)	0 (Good)
Speed Index	[0, 3400ms]	(3400, 5800ms]	over 5800ms	14200ms (Poor)	1600ms (Good)
Performance Score	90-100	50-89	0-50	67 (Needs improvement)	89 (Needs improvement)

Table 4-C Google Lighthouse results before and after optimization
Source: Author's own Lighthouse audits

Following the redesign, four of the five key performance metrics now fall within the "Good" range, marking a substantial improvement in Tech-Auto's website performance. These improvements are the result of the discussed targeted optimizations, including image size reduction, decreased plug-in dependency, and cleaner, more efficient code. While the overall performance score of 89 still falls below the "Good" category, the site now successfully passes the Core Web Vitals assessment, confirming that it meets the essential standards for delivering a fast, stable, and responsive user experience. As a result, Tech-Auto is now better positioned to engage visitors, lower bounce rates, and ultimately enhance its potential for conversions.

5 Reflection, Learnings & Outcome

This project proved to be a highly valuable and enriching experience, marking my first opportunity to lead a full-stack website redesign from start to finish. I was able not only to improve my technical capabilities, but also to apply my creativity, problem-solving, and collaboration skills.

From a technical standpoint, I had the opportunity to work with tools and concepts I had not explored in depth previously. Google's Lighthouse audits, for example, offered valuable insights into performance optimization, uncovering issues beyond the obvious, such as large image files. This process allowed me to gain a stronger understanding of WordPress optimization, particularly how overlooked factors such as unoptimized code or excessive plug-in usage can directly affect site speed and the overall user experience.

One of the biggest significant challenges I had to face came during the migration process. While the transition from the development domain (dev.tech-auto.ie) to the live environment initially seemed smooth, a font display issue emerged across multiple template-based pages. After extensive troubleshooting, I traced the problem to hard-coded domain references within certain files. Once identified, I was able to resolve the issue efficiently with the help of a tool provided by my advisor. This experience not only expanded my technical skill set but also reinforced the importance of thorough post-migration testing.

The optimization efforts delivered strong and clear results: four out of five key performance metrics now fall within Google's "Good" range, and the site successfully meets Core Web Vitals standards. While it is still too early to assess the redesign's impact on conversion rates, these improvements provide a strong foundation for better user engagement and lead generation.

On the e-commerce side, the necessary pages and WooCommerce configurations were completed. However, the online store launch is pending due to finalizing shipping logistics. The setup is ready, and I have provided detailed instructions to the responsible team member to ensure a smooth activation when the time comes.

For future development, I have recommended that Tech-Auto focuses on further improving SEO performance and mobile optimization. Although these tasks go beyond the scope of this project, they would make a logical next step in the company's digital strategy. Even though my direct involvement with Tech-Auto concludes with this redesign, I am confident that the foundations established during this project will contribute to the company's long-term goals and help strengthen its position in an increasingly competitive global market.

In closing, this project was far more than a technical exercise. It was an opportunity to grow as an engineer, collaborator, and problem-solver. It allowed me to contribute tangible value to a real company, see the direct impact of my work, and navigate the kind of real-world challenges that no classroom can fully replicate. The experience reinforced the importance of adaptability, clear communication, and thoughtful decision-making in every stage of a project. Most importantly, it confirmed my passion for combining engineering and technology to create solutions that are both functional and meaningful. As I move forward in my career, the skills, insights, and confidence gained through this redesign will serve as a foundation for tackling even more complex and ambitious projects.

Appendix

Appendix A: Tech-Auto's Pre-redesign Home, Services and Contact Pages

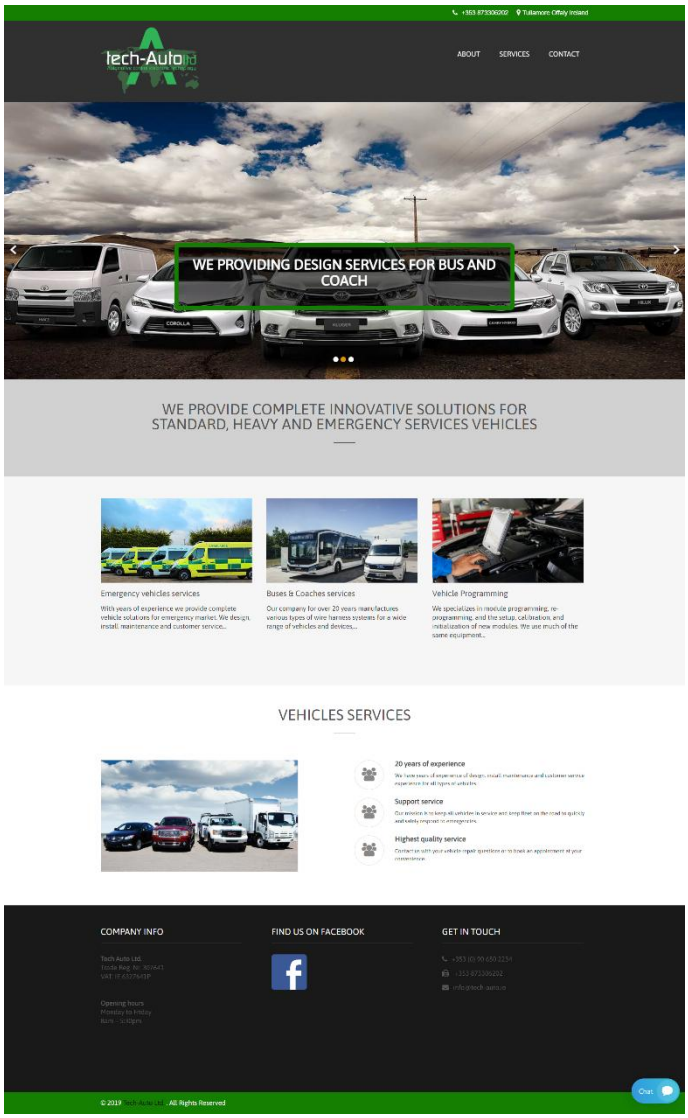


Figure A-1 Tech-Auto's Pre-redesign Homepage
Source: Screenshot of Tech-Auto's website (pre-redesign), captured by author on June 9, 2025

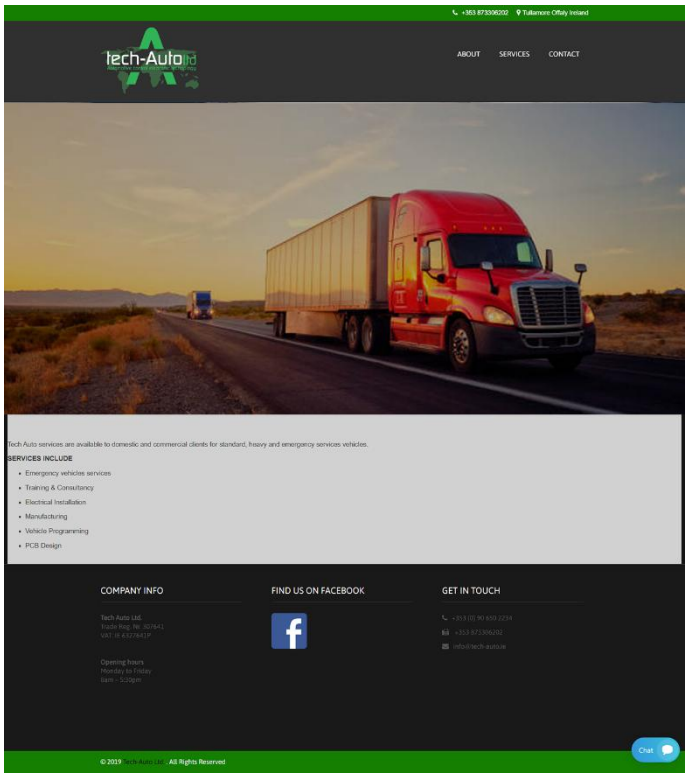


Figure A-2 Tech-Auto's Predesign Services Page
Source: Screenshot of Tech-Auto's website (pre-redesign), captured by author on June 9, 2025

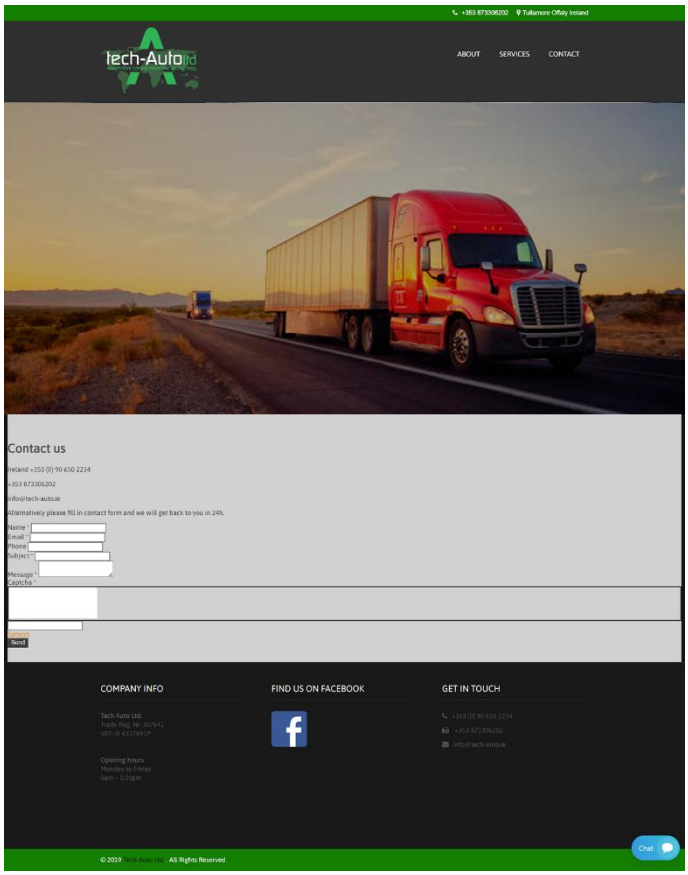
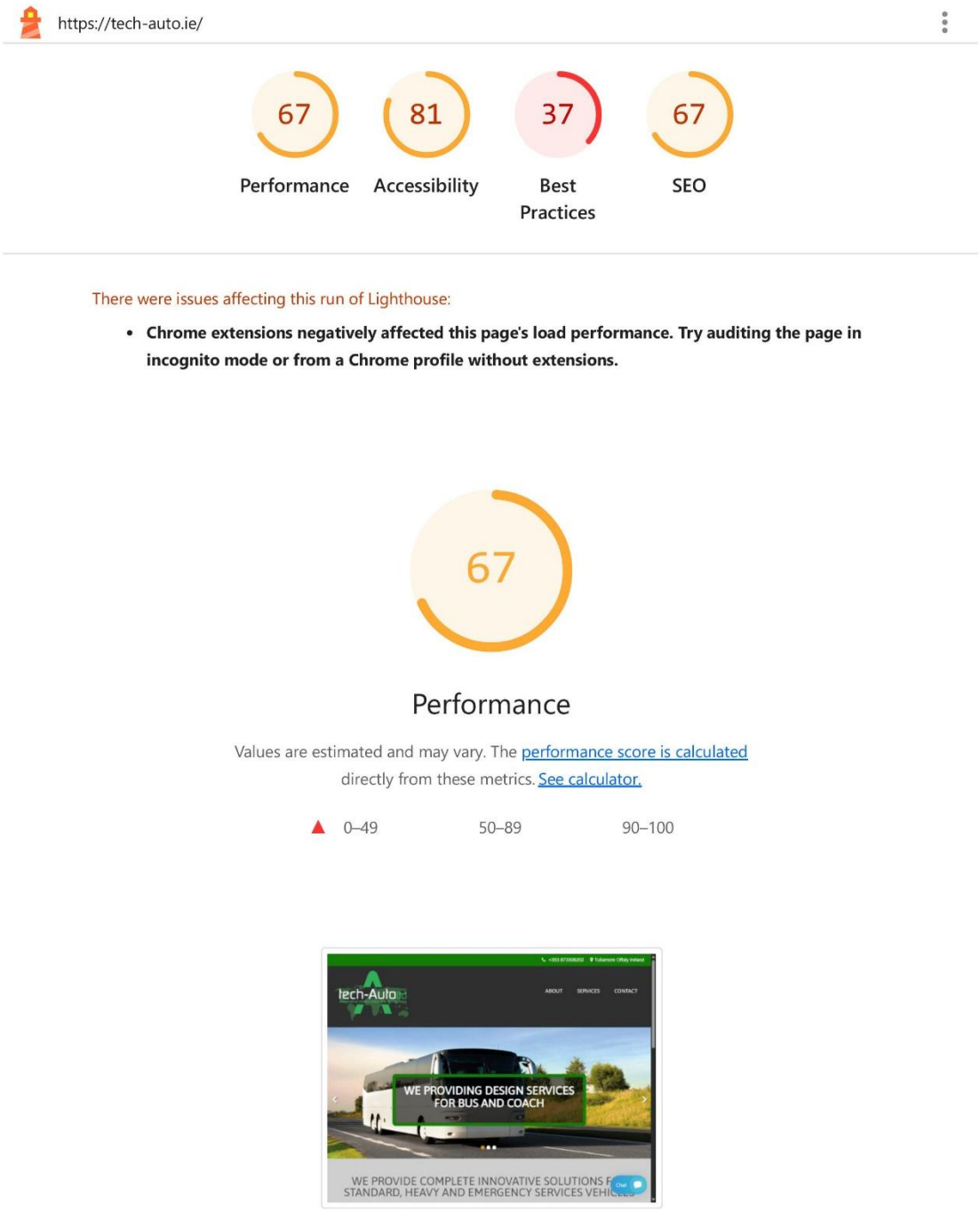


Figure A-3 Tech-Auto's Predesign Services Page
Source: Screenshot of Tech-Auto's website (pre-redesign), captured by author on June 9, 2025

Appendix B: Tech-Auto's Pre-redesign Lighthouse Results



1.2 s

3.8 s

Total Blocking Time

50 ms

Cumulative Layout Shift

0.046

▲ Speed Index

14.2 s

View Treemap

Later this year, insights will replace performance audits. Learn more and provide feedback here.

Try insights

Show audits relevant to: All FCP LCP TBT CLS

DIAGNOSTICS

- ▲ Reduce initial server response time — Root document took 20,020 ms
- ▲ Largest Contentful Paint element — 3,780 ms
- ▲ Serve images in next-gen formats — Est savings of 1,350 KiB
- ▲ Efficiently encode images — Est savings of 629 KiB
- ▲ Properly size images — Est savings of 985 KiB
- ▲ Eliminate render-blocking resources — Est savings of 90 ms
- ▲ Preconnect to required origins — Est savings of 120 ms
- ▲ Reduce JavaScript execution time — 1.6 s
- ▲ Minimize main-thread work — 2.6 s
- ▲ Reduce unused JavaScript — Est savings of 1,902 KiB
- ▲ Page prevented back/forward cache restoration — 7 failure reasons

- Image elements do not have explicit `width` and `height`
- Minify JavaScript — Est savings of 433 KiB
- Serve static assets with an efficient cache policy — 21 resources found
- Ensure text remains visible during webfont load
- Does not use passive listeners to improve scrolling performance
- Remove duplicate modules in JavaScript bundles — Est savings of 208 KiB
- Avoid serving legacy JavaScript to modern browsers — Est savings of 34 KiB
- Avoid enormous network payloads — Total size was 2,941 KiB
- Avoid large layout shifts — 4 layout shifts found
- Avoid long main-thread tasks — 4 long tasks found
- User Timing marks and measures — 8 user timings
- Avoid chaining critical requests — 86 chains found
- Minimize third-party usage — Third-party code blocked the main thread for 0 ms

More information about the performance of your application. These numbers don't directly affect the Performance score.

PASSED AUDITS (14) Show

Accessibility

These checks highlight opportunities to improve the accessibility of your web app. Automatic detection can only detect a subset of issues and does not guarantee the accessibility of your web app, so manual testing is also encouraged.

NAMES AND LABELS

- Image elements do not have `[alt]` attributes

▲ Document doesn't have a `<title>` element

▲ Links do not have a discernible name

These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive technology, like a screen reader.

CONTRAST

▲ Background and foreground colors do not have a sufficient contrast ratio.

These are opportunities to improve the legibility of your content.

NAVIGATION

▲ Heading elements are not in a sequentially-descending order

These are opportunities to improve keyboard navigation in your application.

ADDITIONAL ITEMS TO MANUALLY CHECK (10) Show

These items address areas which an automated testing tool cannot cover. Learn more in our guide on conducting an accessibility review.

PASSED AUDITS (21) Show

NOT APPLICABLE (31) Show

Best Practices

TRUST AND SAFETY

▲ Does not use HTTPS — 12 insecure requests found

○ Ensure CSP is effective against XSS attacks

○ Ensure proper origin isolation with COOP

- Mitigate clickjacking with XFO or CSP

GENERAL

- Uses deprecated APIs — 1 warning found
- Uses third-party cookies — 23 cookies found
- Browser errors were logged to the console
- Issues were logged in the `Issues` panel in Chrome Devtools
- Detected JavaScript libraries

PASSED AUDITS (9) Show

NOT APPLICABLE (3) Show

SEO

These checks ensure that your page is following basic search engine optimization advice. There are many additional factors Lighthouse does not score here that may affect your search ranking, including performance on Core Web Vitals. Learn more about Google Search Essentials.

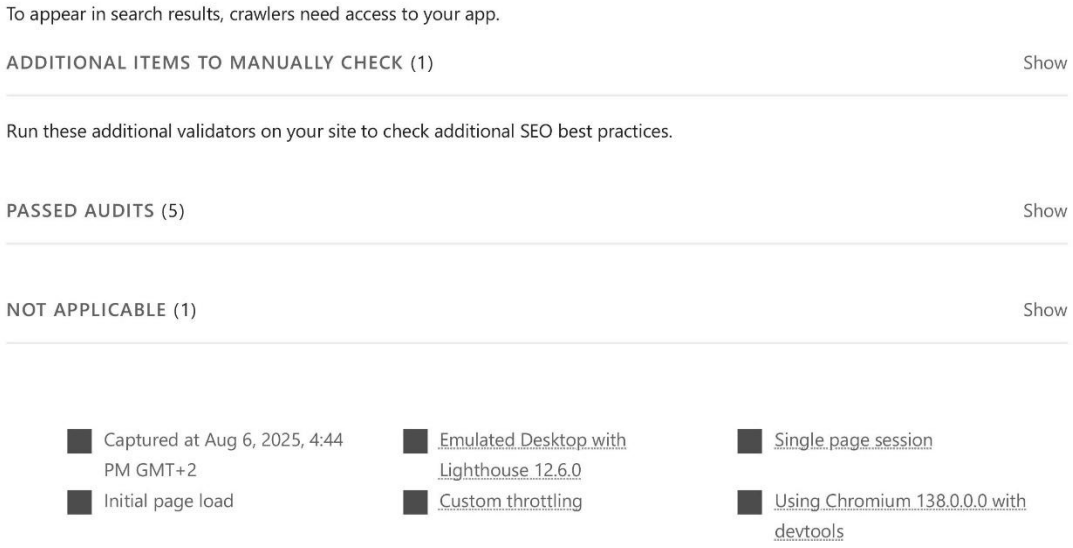
CONTENT BEST PRACTICES

- Document doesn't have a `<title>` element
- Document does not have a meta description
- Image elements do not have `[alt]` attributes

Format your HTML in a way that enables crawlers to better understand your app's content.

CRAWLING AND INDEXING

- Links are not crawlable


To appear in search results, crawlers need access to your app.
ADDITIONAL ITEMS TO MANUALLY CHECK (1)
Show
Run these additional validators on your site to check additional SEO best practices.
PASSED AUDITS (5)
Show
NOT APPLICABLE (1)
Show
Captured at Aug 6, 2025, 4:44 PM GMT+2
Initial page load
Emulated Desktop with Lighthouse 12.6.0
Custom throttling
Single page session
Using Chromium 138.0.0.0 with devtools
Generated by Lighthouse 12.6.0 | File an issue

Appendix C: Tech-Auto's Final Mockups

Figure C-1 Tech-Auto Homepage Mockup
Source: Author's own creation

Figure C-2 Tech-Auto About Page Mockup
Source: Author's own creation

Figure C-3 Tech-Auto Services Page Mockup
Source: Author's own creation

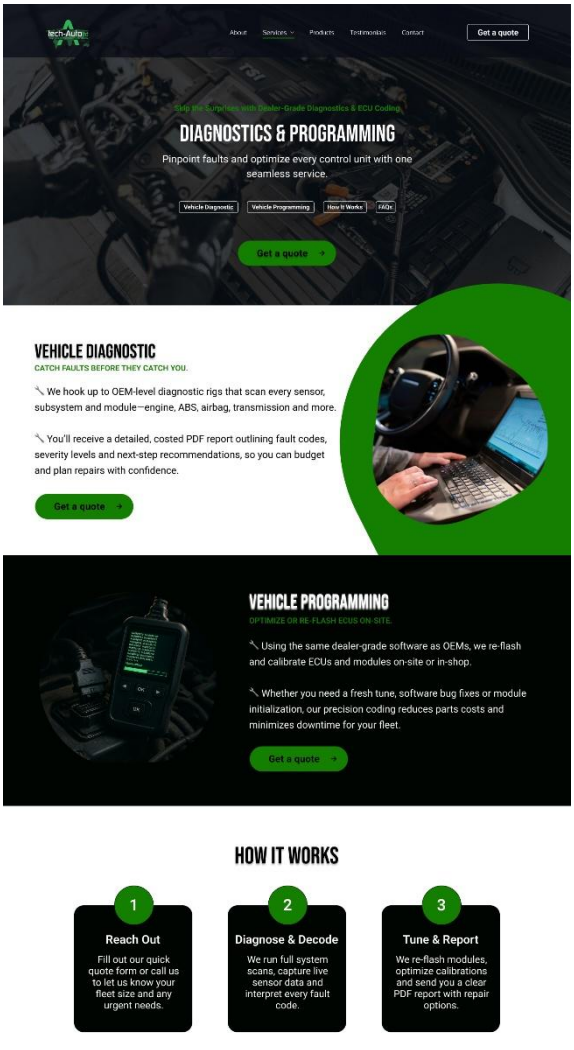


Figure C-4 Tech-Auto Diagnostics & Programming Page Mockup
Source: Author's own creation

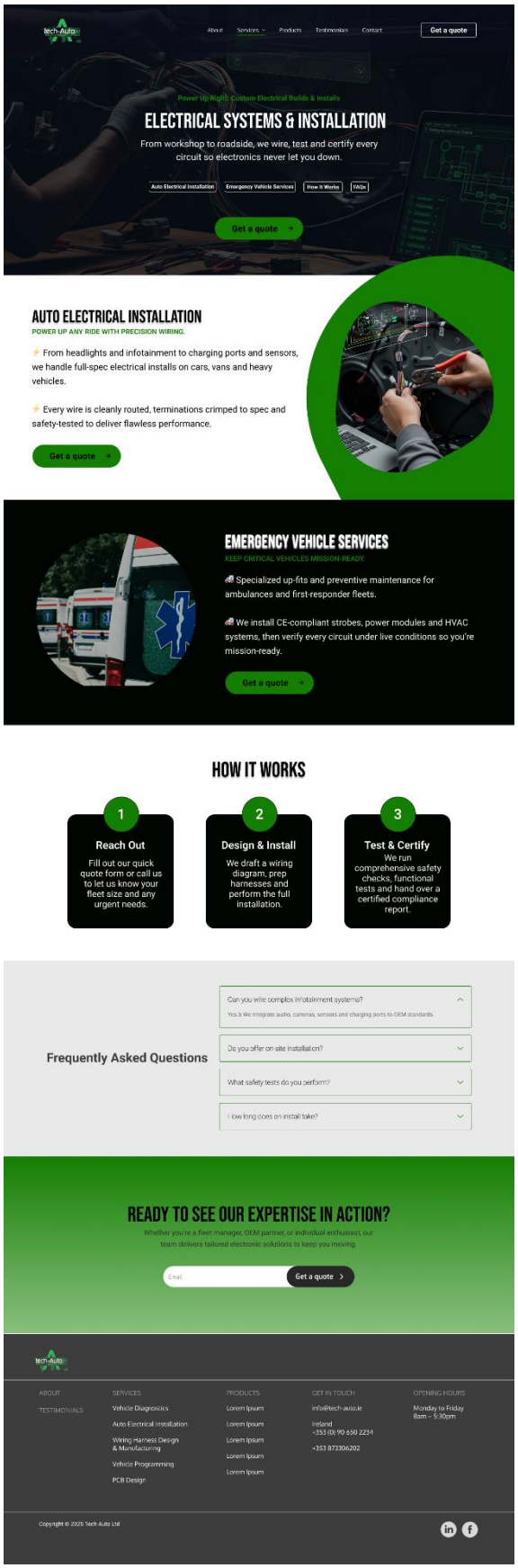


Figure C-5 Tech-Auto Electrical Systems & Installation Page Mockup
Source: Author's own creation

Figure C-6 Tech-Auto Design & Manufacturing Page Mockup
Source: Author's own creation

Figure C-7 Tech-Auto Closed-Lopp Fleet Management Solutions Page Mockup
Source: Author's own creation

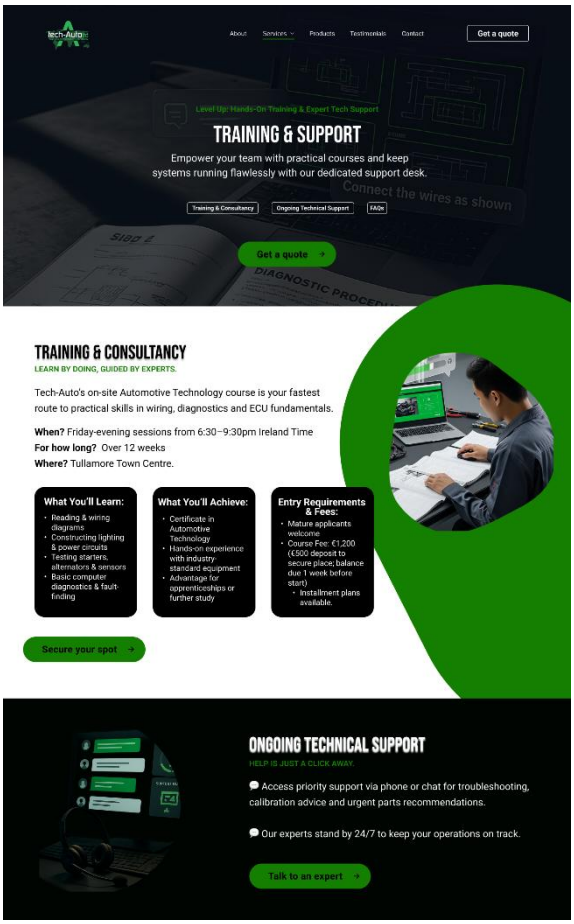


Figure C-8 Tech-Auto Training & Support Page Mockup
Source: Author's own creation

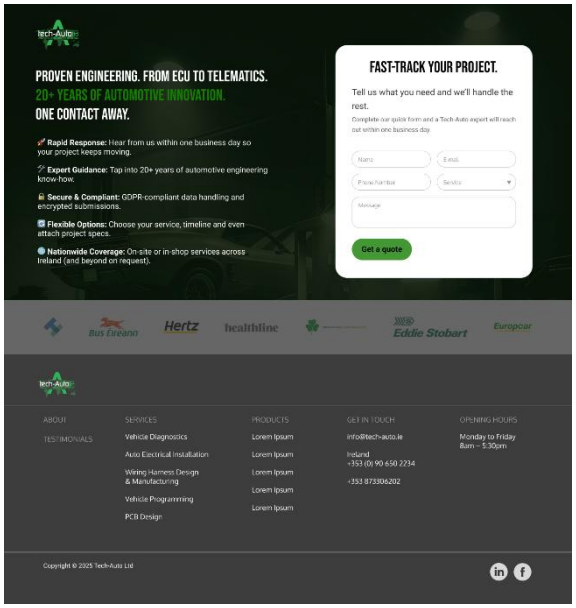


Figure C-9 Tech-Auto Contact Page Mockup
Source: Author's own creation

Appendix D: Tech-Auto's Post-redesign Lighthouse Results

https://tech-auto.ie/

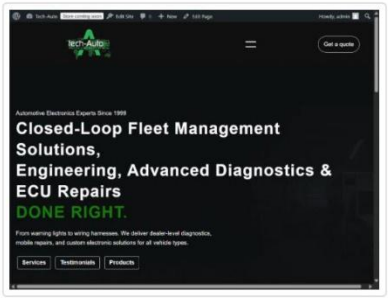
89	89	93	92
Performance	Accessibility	Best Practices	SEO

89

Performance

Values are estimated and may vary. The performance score is calculated directly from these metrics. See calculator.

▲ 0–49 50–89 90–100



METRICS Expand view

First Contentful Paint
0.9 s

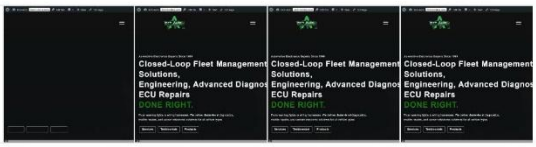
Largest Contentful Paint
1.3 s

Total Blocking Time
160 ms

Cumulative Layout Shift
0

Speed Index
1.6 s

View Treemap



Later this year, insights will replace performance audits. Learn more and provide feedback here.

Try insights

Show audits relevant to: All FCP LCP TBT CLS

DIAGNOSTICS

- ▲ Serve images in next-gen formats — Est savings of 470 KiB
- ▲ Reduce initial server response time — Root document took 1,010 ms
- ▲ Efficiently encode images — Est savings of 298 KiB
- ▲ Largest Contentful Paint element — 1,310 ms
- ▲ Page prevented back/forward cache restoration — 3 failure reasons
- Image elements do not have explicit `width` and `height`
- Minify CSS — Est savings of 2 KiB
- Minify JavaScript — Est savings of 115 KiB
- Serve static assets with an efficient cache policy — 18 resources found
- Eliminate render-blocking resources — Est savings of 0 ms
- Properly size images — Est savings of 157 KiB
- Remove duplicate modules in JavaScript bundles — Est savings of 21 KiB

- Avoid serving legacy JavaScript to modern browsers — Est savings of 43 KiB
- Reduce unused JavaScript — Est savings of 1,676 KiB
- Avoid long main-thread tasks — 4 long tasks found
- User Timing marks and measures — 2 user timings
- Avoid large layout shifts — 1 layout shift found
- Avoid chaining critical requests — 62 chains found
- Minimize third-party usage — Third-party code blocked the main thread for 0 ms

More information about the performance of your application. These numbers don't directly affect the Performance score.

PASSED AUDITS (19) Show

Accessibility

These checks highlight opportunities to improve the accessibility of your web app. Automatic detection can only detect a subset of issues and does not guarantee the accessibility of your web app, so manual testing is also encouraged.

CONTRAST

- Background and foreground colors do not have a sufficient contrast ratio.

These are opportunities to improve the legibility of your content.

NAMES AND LABELS

- Links do not have a discernible name

These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive technology, like a screen reader.

BEST PRACTICES

- Touch targets do not have sufficient size or spacing.

These items highlight common accessibility best practices.

ARIA

▲ Uses ARIA roles on incompatible elements

These are opportunities to improve the usage of ARIA in your application which may enhance the experience for users of assistive technology, like a screen reader.

ADDITIONAL ITEMS TO MANUALLY CHECK (10) Show

These items address areas which an automated testing tool cannot cover. Learn more in our guide on conducting an accessibility review.

PASSED AUDITS (23) Show

NOT APPLICABLE (30) Show

Best Practices

GENERAL

▲ Browser errors were logged to the console

▲ Issues were logged in the `Issues` panel in Chrome Devtools

○ Detected JavaScript libraries

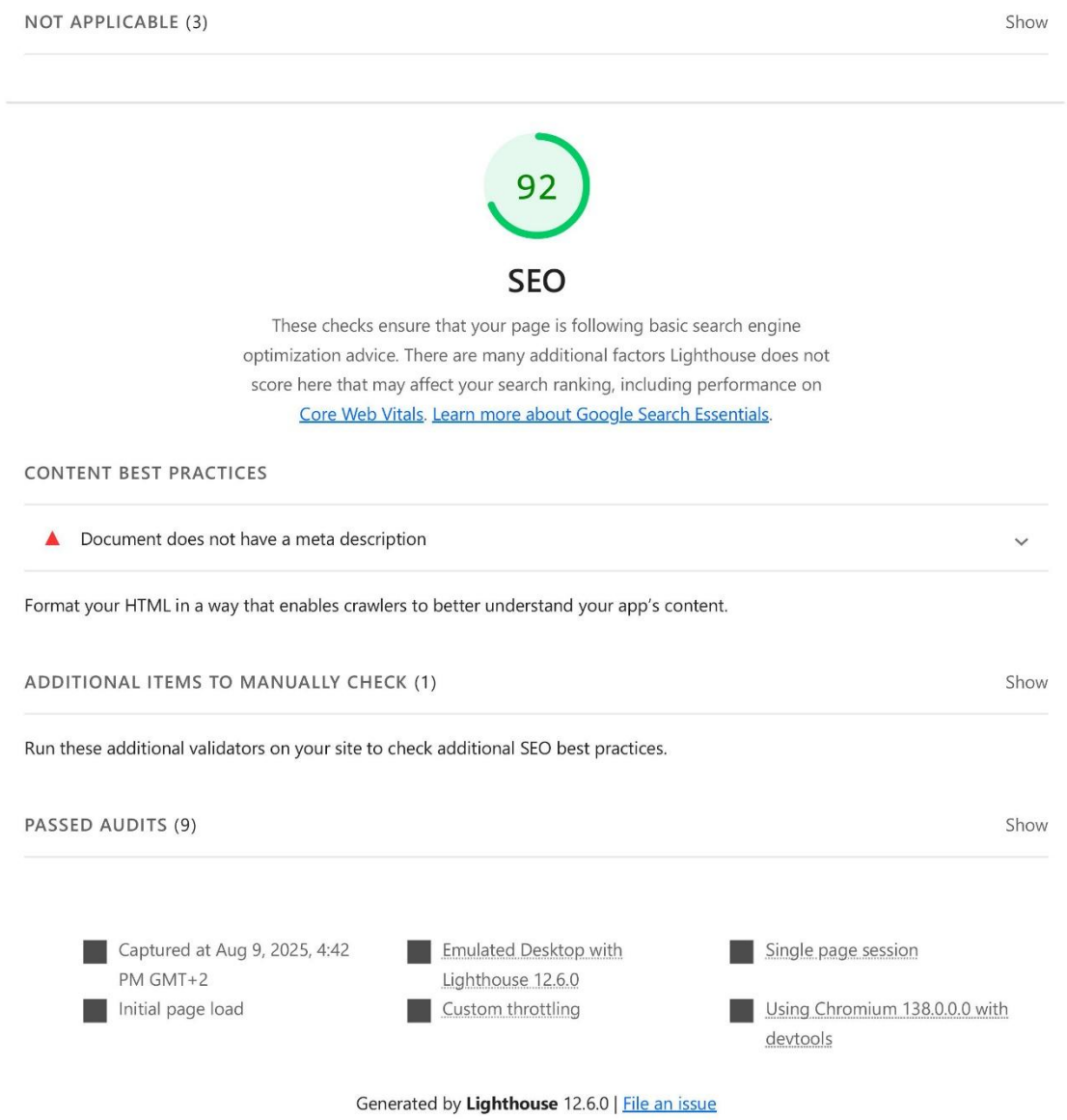
TRUST AND SAFETY

○ Ensure CSP is effective against XSS attacks

○ Ensure proper origin isolation with COOP

○ Mitigate clickjacking with XFO or CSP

PASSED AUDITS (12) Show


NOT APPLICABLE (3)
Show
92
SEO
These checks ensure that your page is following basic search engine optimization advice. There are many additional factors Lighthouse does not score here that may affect your search ranking, including performance on Core Web Vitals. Learn more about Google Search Essentials.
CONTENT BEST PRACTICES
Document does not have a meta description
Format your HTML in a way that enables crawlers to better understand your app's content.
ADDITIONAL ITEMS TO MANUALLY CHECK (1)
Show
Run these additional validators on your site to check additional SEO best practices.
PASSED AUDITS (9)
Show
Captured at Aug 9, 2025, 4:42 PM GMT+2
Initial page load
Emulated Desktop with Lighthouse 12.6.0
Custom throttling
Single page session
Using Chromium 138.0.0.0 with devtools
Generated by Lighthouse 12.6.0 | File an issue

Appendix E: Custom Code Examples

Hero Navigation Links

This snippet, used specifically on the homepage, creates a lightweight, styled navigation bar linking to different sections of the same page (Services and Testimonials). For consistency and better user experience (UX), a customized version of this navigation was also implemented across other pages. Instead of relying on a WordPress block or plugin, the navigation is built with custom HTML and CSS, allowing precise control over styling, hover effects, and performance without adding unnecessary scripts or stylesheets.

```
<!-- HERO NAVIGATION -->
<div class="service-nav">
  <a href="#services" class="service-nav__link">Services</a>
  <a href="#testimonials"  class="service-
nav__link">Testimonials</a>
  <!--  <a href="#products"  class="service-
nav__link">Products</a> -->
</div>

<style>
  .service-nav {
    text-align: left;
    margin: 1.5rem 0;
  }
  .service-nav__link {
    display: inline-block;
    margin: 0 .25rem;         /* gap between buttons */
    padding: .25rem .75rem;
    border: 1px solid #fff;
    border-radius: 4px;
    text-decoration: none;          /* remove link-deco */
    font-weight: bold;
    color: #fff;
    transition: background .2s;
  }
  .service-nav__link:hover {
    background: rgba(255,255,255,0.1);
  }
</style>
```

Full-Width Social Proof Bar

This snippet was created to display partner and client logos in a visually appealing, full-width bar while bypassing WordPress' built-in paddings and content width restrictions. The goal was to achieve a cleaner, edge-to-edge layout and smoother visual transitions between sections, enhancing the overall aesthetic of the site.

```
<!-- SOCIAL PROOF BAR -->
<section class="social-proof alignfull">
  <div class="social-proof__inner">
    <img src="https://tech-auto.ie/wp-
content/uploads/2025/08/logo_sp_evm_uk.png" alt="evm UK">
    <img src="https://tech-auto.ie/wp-
content/uploads/2025/08/logo_toronto_paramedic_services.png"
alt="Toronto Paramedic Services">
    <img src="https://tech-auto.ie/wp-
content/uploads/2025/08/logo_primo_coachworks.png" alt="Primo
Coachworks">
    <img src="https://tech-auto.ie/wp-
content/uploads/2025/08/logo_malley.png" alt="Malley">
    <img src="https://tech-auto.ie/wp-
content/uploads/2025/08/logo_paramount_conversions.png"
alt="Paramount Conversions">
  </div>
</section>

<style>
/* full-width */
.social-proof.alignfull {
  position: relative;
  width: 100vw;
  margin-left: calc((100vw - 100%) / -2);
  max-width: none !important;
  padding: 0;
}

.social-proof {
  background: #666;
  overflow: hidden;
}

.social-proof__inner {
  max-width: 1200px;
  margin: 0 auto;
  display: flex;
  align-items: center;
```

```
  justify-content: space-between;
  padding: 1rem 0;
  height: 100px;
  box-sizing: border-box;
}

.social-proof__inner img {
  height: 50px;
  width: auto;
  opacity: 0.6;
  object-fit: contain;
}

</style>
```

Testimonial Slider

This code implements a fully customized testimonial slider to replace the need for additional WordPress plug-ins, ensuring faster load times and greater design control. It was used on the homepage to showcase client feedback in a rotating, visually appealing format while maintaining consistent styling with Tech-Auto's brand identity.

The slider automatically transitions between testimonials every five seconds but also includes manual navigation through clickable dot indicators. It is responsive, ensuring consistent user experience.

```
<!-- TESTIMONIAL SLIDER -->
<div class="testimonial-slider">
  <!-- Slide #1 -->
  <div class="slide active">
    <div class="slide-content">
      <img
        src="https://tech-auto.ie/wp-
content/uploads/2025/07/Mask-group.png"
        alt="David L."
      />
      <blockquote>
        "As part of the fleet team here at St. James's
Hospital, keeping our emergency vehicles in top condition is
absolutely critical. Tech-Auto has been a trusted partner for
us — their rapid response, deep knowledge of emergency
systems, and professional service have kept our vehicles
road-ready and compliant at all times. They understand the
```

```
urgency and never cut corners. Genuinely outstanding
support.”
        <footer>— David L., Fleet Coordinator, St. James’s
Hospital, Dublin</footer>
      </blockquote>
    </div>
  </div>
</div>

<style>
  .testimonial-slider {
    width: 100vw;
    background: #0A170Aff;
    display: grid;
    position: relative;
    overflow: hidden;
    padding: 2rem 0 3rem;
  }
  .testimonial-slider .slide {
    grid-area: 1 / 1;
    opacity: 0;
    transition: opacity 0.8s ease-in-out;
    display: flex;
    align-items: center;
    justify-content: center;
    padding: 0 1rem;
    box-sizing: border-box;
  }
  .testimonial-slider .slide.active {
    opacity: 1;
  }

  .slide-content {
    display: flex;
    align-items: center;
    max-width: 800px;
    width: 100%;
    margin: 0 auto;
    color: #fff;
  }
  .slide-content img {
    width: 100px;
    height: 100px;
    border-radius: 50%;
    object-fit: cover;
    margin-right: 1.5rem;
    flex-shrink: 0;
  }
```

```
  blockquote {
    margin: 0;
    font-style: italic;
    line-height: 1.4;
  }
  blockquote footer {
    margin-top: 0.5rem;
    text-align: right;
    font-weight: bold;
    color: #ddd;
  }

  /* DOT NAVIGATION */
  .testimonial-nav {
    position: absolute;
    bottom: 1rem;
    left: 50%;
    transform: translateX(-50%);
    display: flex;
    gap: 0.5rem;
  }
  .testimonial-nav .dot {
    width: 10px;
    height: 10px;
    border: 1px solid #fff;
    border-radius: 50%;
    background: transparent;
    cursor: pointer;
    transition: background 0.3s;
  }
  .testimonial-nav .dot.active {
    background: #fff;
  }
</style>

<script>
  (function(){
    const slider = document.querySelector('.testimonial-
slider');
    const slides =
Array.from(slider.querySelectorAll('.slide'));
    let current = 0;

    // dot nav
    const nav = document.createElement('div');
    nav.className = 'testimonial-nav';
    slides.forEach((_, i) => {
      const dot = document.createElement('button');
```

```
      dot.className = 'dot' + (i === 0 ? ' active' : '');
      dot.setAttribute('aria-label', 'Go to slide ' + (i +
1));
      dot.addEventListener('click', () => {
        slides[current].classList.remove('active');
        nav.children[current].classList.remove('active');
        current = i;
        slides[current].classList.add('active');
        nav.children[current].classList.add('active');
      });
      nav.appendChild(dot);
    });
    slider.appendChild(nav);

    function showNext() {
      slides[current].classList.remove('active');
      nav.children[current].classList.remove('active');
      current = (current + 1) % slides.length;
      slides[current].classList.add('active');
      nav.children[current].classList.add('active');
    }

    document.addEventListener('DOMContentLoaded', () => {
      slides[0].classList.add('active');
      setInterval(showNext, 5000);
    });
  })();
</script>
```

Bibliography

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