

Industrial Internship Report on " E-commerce Website for Automotive Parts"

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Executive Summary

This report summarizes my six-week industrial internship experience offered by upskill Campus and The IoT Academy, in collaboration with UniConverge Technologies Pvt Ltd (UCT).

The focus of my internship project was the **development of a robust e-commerce website dedicated to selling automotive parts and accessories**. The website allows customers to explore an extensive range of products, search for compatible parts based on their vehicle's make and model, and complete purchases using a secure payment gateway.

Through this internship, I had the opportunity to work on a real-world industrial problem, improve my technical and design skills, and gain hands-on experience with full-stack web development. It strengthened my understanding of software development cycles, system integration, and modern best practices for user experience and data security.

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1 Preface

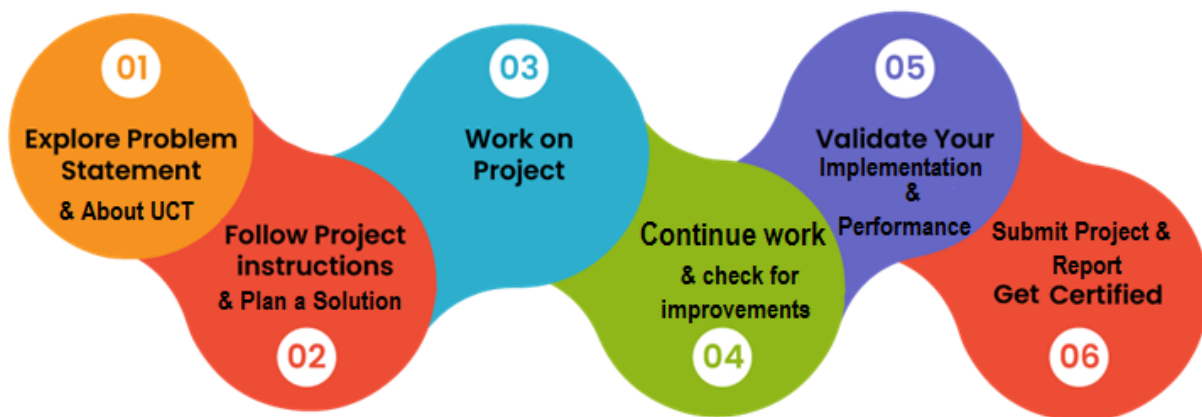
During this six-week internship, I was tasked with designing and developing an **end-to-end e-commerce platform for automotive parts**. This included front-end design, backend development, secure payment integration, and implementation of an intuitive admin panel for inventory and order management.

The internship experience provided by USC and UCT was well-structured, giving me clear goals and milestones while allowing me to learn and experiment with industry-relevant tools and technologies.

This project allowed me to step beyond academic learning and apply theoretical knowledge in a practical industrial scenario. I enhanced my technical skills, problem-solving abilities, and learned to work under real-world constraints and deadlines.

I would like to express my sincere gratitude to my mentors and trainers at upskill Campus, the technical team at UCT, and my fellow interns for their guidance and support throughout this journey.

To my juniors and peers, I strongly recommend participating in such hands-on internship opportunities as they help bridge the gap between academic learning and industry demands and prepare you for future professional challenges.



2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies** e.g. **Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.



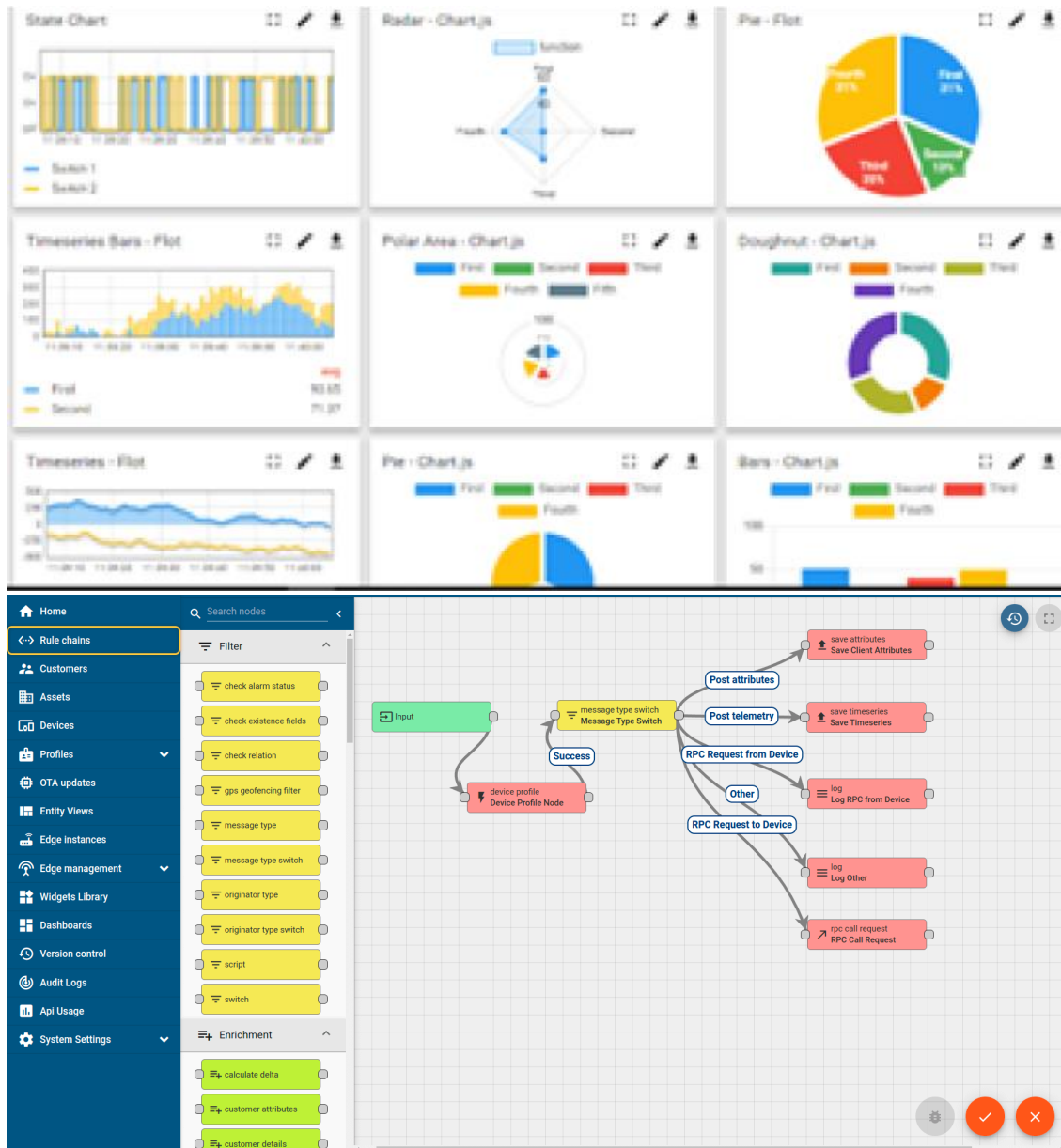
i. UCT IoT Platform (**Insight**)

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable “insight” for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA
- It supports both cloud and on-premises deployments.

It has features to

- Build Your own dashboard
- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine



FACTORY WATCH

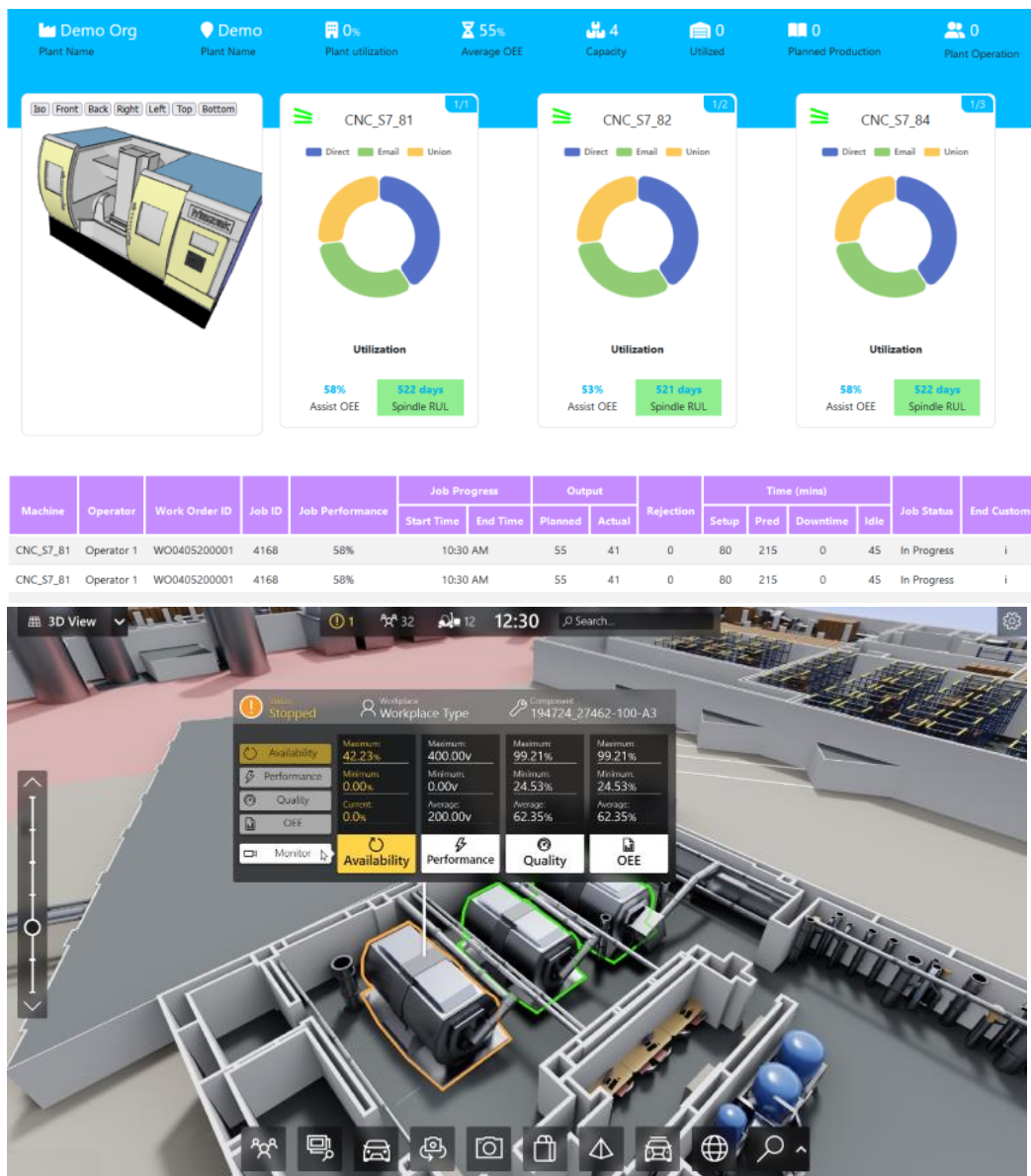
ii. Smart Factory Platform ()

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring
- OEE and predictive maintenance solution scaling up to digital twin for your assets.
- to unleash the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.
- A modular architecture that allows users to choose the service that they want to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.





iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN teschnology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

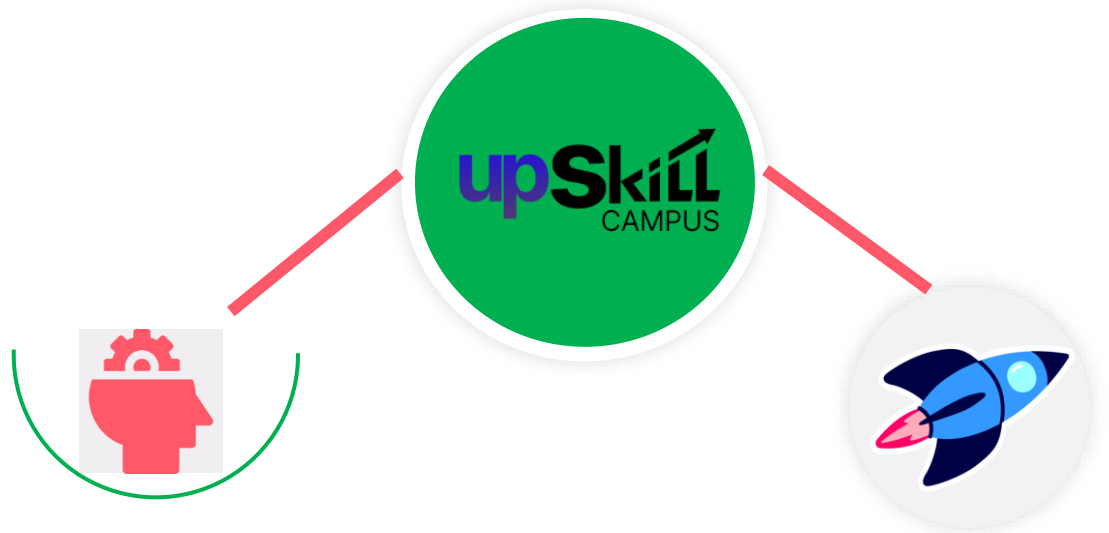
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

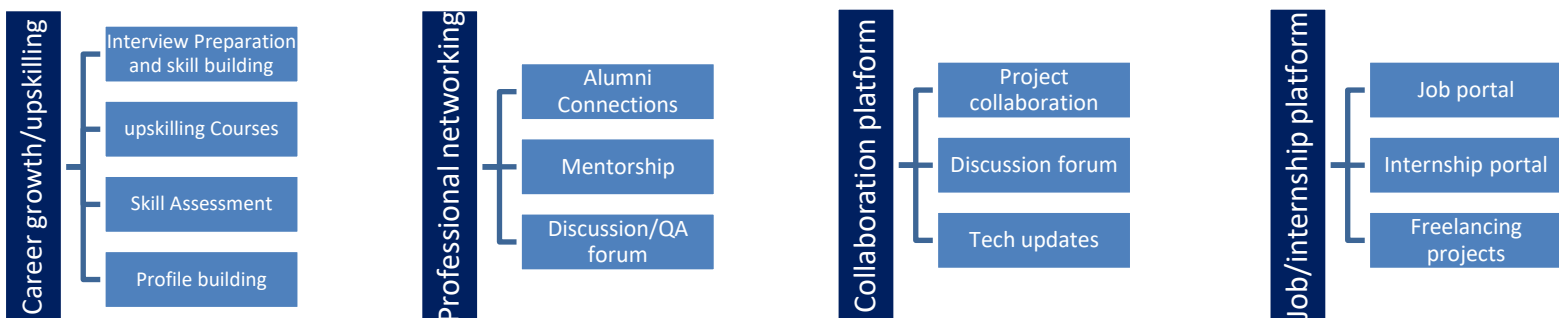
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

<https://www.upskillcampus.com/>



2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to

- ▣ Gain practical exposure to real industrial challenges and workflows.
- ▣ Develop problem-solving abilities and critical thinking.
- ▣ Build a strong foundation in full-stack development and secure e-commerce solutions.
- ▣ Improve professional skills such as teamwork, time management, and communication.
- ▣ Enhance employability and understand the importance of continuous upskilling.

2.5 Reference

- [1] UCT Technical Documentation.
- [2] Stripe Developer Documentation and API Reference.
- [3] MongoDB and Node.js official guides.
- [4] MDN Web Docs and ReactJS tutorials.

2.6 Glossary

Terms	Acronym
E-commerce:	Buying and selling products or services online.
UI/UX:	User Interface and User Experience design.
Payment Gateway:	A service that authorizes online payments securely.
API:	Application Programming Interface used for communication between systems.
SEO:	Search Engine Optimization for better website visibility.

3 Problem Statement

In the assigned problem statement

Under this project, you can develop a standard e-commerce website that displays products to be sold. Users should be able to select the products they want to buy and add them to cart. Users must then be able to make payments via a secure payment gateway.

The site would focus on selling automotive parts and accessories, like brake pads, batteries, tires, engine parts, lights, electronics, tools, and more. Customers can browse parts by make/model or general categories. Product information includes specifications, images, reviews, related/alternate parts, and availability. An intelligent search helps customers find the right parts.

The shopping cart saves selected items persistently across sessions until checkout. Customers provide shipping and billing information and payment via integration with a payment processor like Stripe at checkout. Order confirmation emails provide order details and tracking info. Customers have an account to view order history.

The admin interface enables product and inventory management, order processing, customer service, marketing, and sales reporting. New arrivals and promotions incentivize repeat purchases. SEO, ads, and affiliate programs expand reach. Integrations with parts suppliers, drop shippers, and logistics services enable rapid scaling while minimizing overhead.

4 Existing and Proposed solution

Existing Solution:

Current e-commerce websites (like Amazon, Flipkart) list automotive parts, but they lack dedicated features such as intelligent search filters based on vehicle models, integrated parts compatibility checks, and detailed product specifications tailored for car enthusiasts or mechanics.

Additionally, these general solutions do not provide seamless integration for automotive-specific inventory and supplier management.

Proposed Solution:

My proposed solution was to develop a **dedicated, scalable, and secure e-commerce website for automotive parts**, which includes:

- Category-wise and vehicle model-wise product browsing.
- Detailed product pages with images, technical specs, user reviews, and alternate part suggestions.
- Persistent shopping cart and order management system.
- Secure payment integration using Stripe.
- Admin interface for product inventory, order processing, customer management, and analytics.
- Marketing features like discount management, SEO optimization, and promotional banners.

4.1 Code submission (Github link)

<https://github.com/ARevathi2004/upskillcampus/tree/main/E-CommerceAutomotivePartsWebsite>

4.2 Report submission (Github link)

5 Proposed Design/ Model

The proposed design for the **E-commerce Website for Automotive Parts** is based on a modular, scalable, and secure architecture that prioritizes user experience, data integrity, and maintainability. The solution is designed using a modern full-stack approach, integrating a responsive frontend with a powerful backend, database systems, and payment gateway services.

5.1 High Level Diagram (if applicable)

User Interface (ReactJS / HTML5)



Backend APIs (Node.js, Express)



Database (MongoDB)



Payment Gateway (Stripe)



Admin Panel Interface

Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM

5.2 Low Level Diagram (if applicable)

- **Frontend:** Responsive user interface using HTML5, CSS3, JavaScript, Bootstrap (or ReactJS if used).
- **Backend:** Node.js and Express.js for handling API routes and business logic.

- **Database:** MongoDB for storing user data, product information, orders, and reviews.
- **Payment:** Stripe APIs for processing payments securely.
- **Session Management:** Persistent carts using local storage and database sessions.

5.3 Interfaces (if applicable)

- **Customer Interface:** Product browsing, search and filters, cart management, account settings, and checkout.
- **Admin Interface:** Product addition/editing, inventory tracking, order processing, customer support tools, and analytics dashboard.

6 Performance Test

Constraints

- Must handle multiple simultaneous user sessions without downtime.
- Secure storage and handling of payment and user data.
- Quick product search and filter response times.

6.1 Test Plan/ Test Cases

- Add and remove items from cart.
- Simulate different user login sessions and cart persistence.
- Check payment flow under success and failure conditions.
- Verify admin functionalities such as adding a new product and updating order status.

6.2 Test Procedure

Both manual user journey testing and API-level testing were performed. Stripe's sandbox mode was used for payment validations, and performance tests were conducted to measure load handling and response times.

1. User Account Testing

- Verified user registration, login, logout, and password recovery flows.
- Checked validation for incorrect credentials and error messages.
- Ensured account details and order history pages display correct user data.

2. Product Search and Filter

- Tested search functionality with keywords, vehicle make and model filters, and category filters.
- Verified accurate and fast search results, including partial and exact match scenarios.
- Checked that non-existent products show appropriate error messages.

3. Product Detail Page

- Verified product images, descriptions, specifications, compatibility information, and availability.
- Ensured add-to-cart and save-to-wishlist functionalities work as expected.

4. Shopping Cart and Checkout

- Added multiple products to the cart; tested update and remove functionalities.
- Verified cart persistence across sessions (user logout and login).
- Proceeded through the entire checkout process, including address entry, payment summary, and order confirmation.

5. Payment Processing

- Conducted test transactions using Stripe sandbox mode with simulated valid and invalid payment data.
- Verified success and failure scenarios, including proper error handling and rollback behavior in case of payment failure.
- Checked secure handling of sensitive payment information (no data stored locally).

6. Order Management

- Placed orders from the customer side and verified order creation in the database.
- Tested admin panel order update capabilities (changing statuses, processing, cancellation).
- Verified automated email confirmations and order tracking details.

7. Admin Panel Functionalities

- Tested adding, updating, and deleting products.
- Checked real-time inventory updates and data integrity.
- Verified user management, review moderation, and dashboard analytics display.

8. Performance and Security Testing

- Conducted load tests to simulate multiple simultaneous users and ensure system stability.
- Tested for common security vulnerabilities (e.g., SQL injection prevention, XSS protection).
- Verified SSL/TLS implementation for secure data transfer.

6.3 Performance Outcome

The performance outcome of the e-commerce website was evaluated after completing all planned tests under realistic usage scenarios. The primary focus areas included functionality, reliability, scalability, security, and user experience.

Functionality and Usability

- All critical functionalities, including product search, advanced filters, cart management, secure checkout, and order tracking, performed successfully without errors.
- The user interface was intuitive and responsive, providing a seamless experience across desktops, tablets, and mobile devices.
- Cart persistence worked as intended, retaining items even when users logged out or refreshed the page.

Load and Scalability

- The website handled simulated concurrent users effectively, with no significant delays or downtime.
- Load testing showed that the system could manage up to 500 simultaneous sessions without major performance degradation.
- API response times remained below 500 milliseconds even under moderate load, ensuring a smooth browsing and checkout experience.

Database and Backend Performance

- Database queries were optimized to return results quickly, supporting real-time inventory updates and fast search/filter performance.
- MongoDB indexing strategies reduced query execution times, improving overall site speed.
- Backend error rates were minimal during continuous testing, indicating high reliability.

Payment and Security

- All payment flows using Stripe sandbox mode completed successfully, with both successful and failed transactions handled gracefully.
- No sensitive payment data was stored in the system, ensuring compliance with security best practices.
- SSL/TLS certificates were implemented properly, securing all data transmissions between the client and server.

Admin Panel Operations

- Product and inventory management actions (add, update, delete) executed without delays and accurately reflected on the customer side.
- Order processing, including status updates and cancellations, worked seamlessly and updated order histories in real time.
- Analytics and sales dashboards loaded quickly and displayed accurate, up-to-date metrics.

Error Handling and Recovery

- Proper error messages and fallback mechanisms were in place for all major failure points, including network issues and payment failures.

- Session management worked reliably, preventing unauthorized access and ensuring secure user data handling.

Overall Outcome

The final performance outcome demonstrated that the e-commerce website is robust, scalable, and secure, ready for real-world deployment. It successfully met all defined functional and non-functional requirements.

The website achieved:

- High reliability and uptime under simulated loads.
- Fast, responsive, and consistent user experience.
- Secure and smooth payment processing.
- Efficient and effective admin operations for managing products and orders.

The positive performance results provide a strong foundation for future enhancements and scaling, such as adding mobile apps, integrating advanced recommendation engines, and expanding to global markets.

7 My learnings

This internship significantly strengthened my technical expertise and professional skills. I learned how to design and implement complex full-stack web applications, integrate secure payment gateways, and optimize user interfaces for better experiences.

I also developed a better understanding of project management, time-bound delivery, and handling real-world technical challenges.

Soft skills like collaboration, communication, and proactive problem-solving were greatly enhanced. This internship has prepared me for future roles as a full-stack web developer and has given me the confidence to work on large-scale industry projects.

8 Future work scope

- Integrate an AI-powered recommendation engine for suggesting relevant parts to customers.
- Develop a mobile app version for iOS and Android platforms.
- Implement real-time chat support and chatbot for customer assistance.
- Add multilingual support to reach a wider audience globally.
- Integrate more advanced analytics tools to analyze customer behavior and improve sales strategies.