



Inspiring Excellence

**CSE470: Software Engineering**  
**Project Report**  
**Project Title: NeuraRig**

Group No : 05 , CSE470 Section : 11, Spring 2025	
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## Table of Contents

Section No	Content	Page No
1	Introduction	3
2	Functional Requirements	4
3	User Manual	5
4	Frontend Development	10
5	Backend Development	15
6	Technology (Framework, Languages)	18
7	Github Repo Link	19
8	Individual Contribution	19

## **Introduction**

In today's digital age, the demand for computers and related accessories is continually increasing as technology becomes more integrated into both personal and professional life. Consumers are looking for convenient, reliable, and personalized shopping experiences when purchasing tech products online.

This project aims to develop an AI-integrated e-commerce website specifically designed for selling computers and accessories. The website will offer users an intuitive interface to browse a wide range of products, from laptops and desktops to individual components and peripherals.

What sets this platform apart is its incorporation of artificial intelligence, featuring an AI-powered PC Builder and a virtual chat assistant that enhance user interaction and decision-making. This platform simplifies the shopping process for computer products and assists users in building custom PCs, ensuring compatibility among components and providing tailored recommendations.

With secure user and admin management systems, a streamlined checkout process, and advanced search and filter functionalities, this project aims to deliver a seamless, intelligent, and efficient e-commerce experience.

## **Functional Requirements**

### **Requirement 1: Product Display & Navigation**

1. Home page displaying featured products.
2. Category-based navigation bar for easy product browsing.
3. Category-specific product display pages (e.g., Laptops, Desktops).
4. Search bar for finding specific products.

### **Requirement 2: Product Details & Filtering**

1. Individual product display page (e.g., Lenovo Ideapad 15).
2. Filtering options (e.g., price range, brand, specifications).
3. Sorting options (e.g., highest-rated, lowest price).
4. User reviews and ratings on product pages.

### **Requirement 3: AI-Integrated PC Builder**

1. Manual PC Builder (users can select components manually).
2. AI-assisted PC Builder (recommends compatible components).
3. AI Chat Agent (suggests products and builds PCs for users).
4. Compatibility checker for selected components.

### **Requirement 4: Shopping & Checkout**

1. Shopping cart functionality (add/remove products).
2. Checkout process with order summary.
3. Order tracking page for users.
4. Wishlist feature for saving products.

### **Requirement 5: Admin & User Management**

1. User account page (profile, order history).
2. Admin product adding/editing page.
3. Role-based access (users vs. admins).
4. Secure authentication and session management.

## User Manual

### 1. Getting Started

#### 1.1 Creating an Account

1. Click on "Login" in the top navigation bar
1. Select "Register" to create a new account
1. Fill in your name, email, and password
1. Click "Register" to create your account

#### 1.2 Logging In

1. Click on "Login" in the top navigation bar
1. Enter your email and password
1. Click "Login" to access your account

### 2. Browsing Products

#### 2.1 Viewing All Products

1. Click on "Products" in the navigation menu
1. Browse through the available PC components
1. Use filters on the left side to narrow down by:
  - Price range
  - Brand
  - Technical specifications
1. Sort products by:
  - Price (low to high)
  - Price (high to low)
  - Rating

#### 2.2 Browsing by Category

1. Click on "Categories" in the navigation menu

1. Select a category of interest (CPU, GPU, RAM, etc.)
1. Browse products within that specific category
1. Use the same filtering and sorting options as in the Products page

## 2.3 Viewing Product Details

1. Click on any product card to view detailed information
1. On the product page, you can:
  - View multiple product images
  - Read the detailed description
  - Check technical specifications
  - See price and availability
  - Select quantity
  - Read product reviews
  - Access product support

## 3. Rating and Reviewing Products

### 3.1 Viewing Product Reviews

1. Navigate to the product page
1. Click on the "Reviews" tab to see all customer reviews
1. Reviews display the reviewer's name, rating, review text, and date

### 3.2 Adding a Review

1. Navigate to the product page you want to review
1. Click on the "Reviews" tab
1. If you're logged in and have purchased the product, you'll see an option to "Write a Review"
1. Rate the product from 1-5 stars
1. Write your review text in the provided field
1. Click "Submit Review" to publish your review

### 3.3 Editing or Deleting Your Review

1. Navigate to the product you've reviewed
1. Find your review in the "Reviews" tab
1. Click "Edit" to modify your review or "Delete" to remove it
1. For editing, make your changes and click "Update Review"

#### 4. PC Builder Tool

##### 4.1 Building a Custom PC

1. Click on "PC Builder" in the navigation menu
1. Select components for your build:
  - CPU
  - GPU
  - Motherboard
  - RAM
  - Storage
  - Power Supply
  - Case
1. For each component type, click "Select" to choose from available options
1. View compatibility information and suggestions
1. Adjust quantity for each component as needed

##### 4.2 Using the AI Assistant

1. While in the PC Builder page, you'll see an AI assistant icon
1. Click on it to open the chatbot
1. Ask questions about compatibility, recommendations, or gaming performance
1. The AI can suggest components based on your needs and budget
1. You can add recommended components directly to your build

##### 4.3 Adding Build to Cart

1. After selecting all desired components
1. Review your build summary and total price
1. Click "Add Build to Cart" to add all components to your shopping cart

## 5. Shopping Cart and Checkout

### 5.1 Managing Your Cart

1. Click the cart icon in the top navigation bar
1. Review added items, quantities, and prices
1. Adjust quantities using "+" and "-" buttons
1. Remove items by clicking the "Remove" button
1. View the cart subtotal and total

### 5.2 Checkout Process

1. From your cart, click "Proceed to Checkout"
1. Enter or confirm your delivery information:
  - Full name
  - Email
  - Phone number
  - Address
  - City, State, ZIP code
  - Delivery instructions (optional)
1. Click "Continue to Payment"
1. Enter your payment details:
  - Card number
  - Expiry date
  - CVV
1. Review your order summary
1. Click "Place Order" to complete your purchase

### 5.3 Order Confirmation

1. After successful checkout, you'll see an order confirmation page
1. This page will display:
  - Order number
  - Order summary
  - Estimated delivery date



- Payment information

## 6. User Account Management

### 6.1 Viewing Order History

1. Log into your account
1. Click on "My Orders" in the navigation menu
1. View a list of all your past orders
1. Click on any order to view its details:
  - Order status
  - Items purchased
  - Order total
  - Shipping information

### 6.2 Managing Your Profile

1. Click on your name in the top navigation bar
1. Select "Profile" from the dropdown menu
1. View and update your personal information:
  - Name
  - Email
  - Password
  - Default shipping address

## 7. Getting Help

### 7.1 Product Support

1. Navigate to the product page
1. Click on the "Support" tab
1. Access product documentation, FAQs, and troubleshooting guides
1. Contact customer support through the provided options

### 7.2 Customer Service

1. Click on "About Us" in the navigation menu
1. Find contact information for customer service
1. Reach out via email, phone, or live chat during business hours

This user manual provides comprehensive guidance for navigating and using all features of the NeuraRig website, from browsing products to building custom PCs, leaving reviews, making purchases, and managing your account.

## Frontend Development

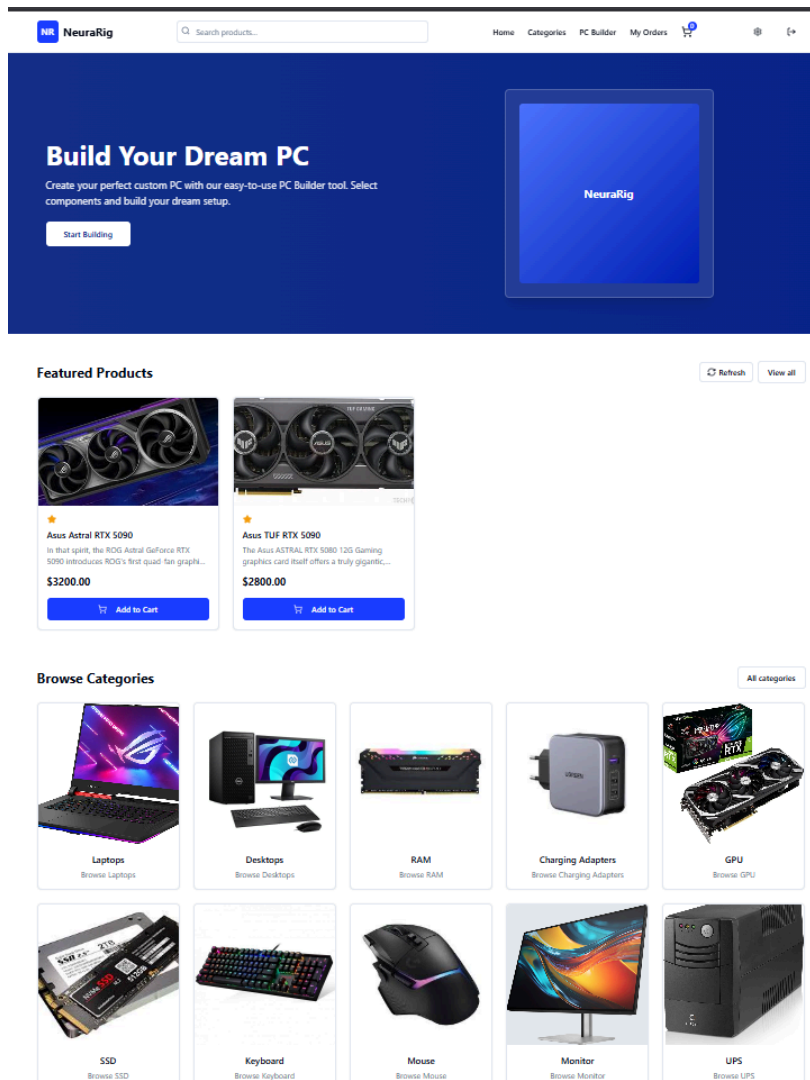
The front-end of the e-commerce website is the user interface that offers an engaging, intuitive, and responsive experience across all devices. It is built using modern web technologies, including **HTML5**, **CSS3**, and **JavaScript**, along with frameworks like **React.js** to create dynamic and component-based user interfaces.

Key components of the front-end include:

- **Homepage Design:** Highlights featured products with a clean, accessible layout.
- **Navigation System:** A responsive, category-based navigation bar enables users to browse product categories efficiently.
- **Product Display Pages:** Visually structured layouts presenting product images, specifications, pricing, and user reviews.
- **Search & Filter Mechanisms:** JavaScript-powered filtering and sorting options for improved usability and real-time results.
- **PC Builder Interface:** A highly interactive module with dropdowns and add-and-drop features.
- **Shopping Cart and Checkout UI:** Seamless cart management and checkout workflows with visual cues for actions like quantity updates and order summary previews.

To ensure a consistent look and feel, the front-end design adheres to UI/UX best practices and is styled using CSS frameworks like **Tailwind CSS**. Responsive design principles are employed to ensure the website functions well on desktops, tablets, and mobile devices.

Furthermore, the front-end communicates with the back-end APIs for tasks such as fetching product data, submitting user reviews, managing shopping cart content, and handling user authentication.



NR

NeuraRig

Search products...

Home

Categories

PC Builder

My Orders

0

0

0

Laptops

Home Categories Laptops

Filters

Search in Laptops

Search in Laptops...

Price Range

0 to 100000

Brand

AMD

Asus

Apple

Asus

Dell

Gigabyte

Lenovo

MSI

Sort By

Default

Price: Low to High

Price: High to Low

Rating


Specifications

Display Size (inch)

Generation

Graphics

Graphics Memory



★


Asus Vivobook S15 S513EA Core i3 11th Gen 4GB RAM 15.6" OLED FHD Laptop

Asus Vivobook S15 S513EA Core i3 11th Gen 4GB RAM 15.6" OLED FHD Laptop may day notice after lampo Asus Vivobook S15 S513EA Core i3 11th Gen 4GB RAM 15.6" OLED FHD Laptop

Asus Vivobook S15 S513EA Core i3 11th Gen 4GB RAM 15.6" LED FHD Laptop The Aus...

\$61001.00

Add to Cart




★

ASUS Vivobook Go 15 L1504FA Ryzen 5 7520U 8GB RAM 15.6" FHD Laptop

ASUS Vivobook Go 15 L1504FA Ryzen 5 7520U 8GB RAM 15.6" FHD Laptop The ASU...

\$62000.00

Add to Cart




★

Gigabyte Gaming G5 MF Intel Core i5 12500H 8GB RAM 512GB SSD 15.6 inch FHD Display Matte Black Gaming Laptop

Features of Gigabyte Gaming G5 MF Laptop in Bangladesh Laptop Brand - Gigabyte...

\$115000.00

Add to Cart




★

Gigabyte Gaming G6 MF 13th Gen Intel Core i7 13700H 16GB RAM, 512GB SSD 16 inch FHD+ WUXGA Display Matte Black Gaming Laptop

Features of Gigabyte Gaming G6 MF Laptop in Bangladesh Laptop Brand - Gigabyte...

\$138000.00

Add to Cart




★

Apple MacBook Pro (Late 2023) Apple M3 Pro 36GB RAM, 1TB SSD 14.2 inch Liquid Retina XDR Display Space Black Laptop

Features and Benefits Apple M3 Pro Chip for Superior Performance: The M3 Pro chip...

\$390000.00

Add to Cart



★

Apple MacBook Air (Early 2025) Apple M4 Chip 16GB RAM, 256GB SSD Sky Blue MacBook #M0ST4ev/A

Features of Apple MacBook Air (Early 2025) Laptop in Bangladesh Apple MacBook Air...

\$135000.00

Add to Cart

NR

NeuraRig

Search products...

Home

Categories

PC Builder

My Orders

0

0

0

PC Builder

Build your own PC by selecting components from our catalog.

CPU / Processor

Select a CPU

+ Add CPU

GPU / Graphics Card

Select a GPU

+ Add GPU

Memory / RAM

Select RAM

+ Add RAM

Storage

Select storage

+ Add Storage

Motherboard

Select a motherboard

+ Add Motherboard

Build Summary

No components selected yet

Total \$0.00

Add Build to Cart

NR

NeuraRig

Search products...

Home

Categories

PC Builder




My Orders

0

0

0

Your Cart

Product	Price	Quantity	Total
<div><div></div><div><div>Asus Astral RTX 5090</div><div>Category: GPU</div><div>Remove</div></div></div> <div>\$3200.00</div> <div><div>-</div><div>2</div><div>+</div></div> <div>\$6400.00</div>	<div><div></div><div><div>Asus TUF RTX 5090</div><div>Category: GPU</div><div>Remove</div></div></div> <div>\$2800.00</div> <div><div>-</div><div>1</div><div>+</div></div> <div>\$2800.00</div>		
<div><div></div><div><div>Asus TUF RTX 5090</div><div>Category: GPU</div><div>Remove</div></div></div> <div>\$2800.00</div> <div><div>-</div><div>1</div><div>+</div></div> <div>\$2800.00</div>			

Continue Shopping

Order Summary

Subtotal

\$9200.00

Shipping

\$15.00

Tax (8%)

\$736.00

Total

\$9951.00

View My Orders

Proceed to Checkout

By proceeding, you agree to our terms and conditions.

Admin Dashboard

Logout

Products Categories Brands Orders Users

Add New Product

Product Name

Enter product name

Price

Enter price

Description

Enter product description

Category

Select a category

Brand

Select a brand

Stock

Enter stock quantity

☐ Featured Product

Product Images

Choose Files No file chosen

Specifications

Add Product

Admin Dashboard

Logout

Products Categories Brands Orders Users

User Management

Search by name, email or ID...

All Roles

Refresh

User	Email	Role	Registered On	Orders	Actions
<div><div></div><div>Mahir Tajwar</div><div>ID: 68111a48a18cb2b5e8d91d0b</div></div>	<div></div> mahir@gmail.com	User	April 30, 2025	0	...
<div><div></div><div>testuser123</div><div>ID: 68124bcbab594c9a57b94653</div></div>	<div></div> test@example.com	User	April 30, 2025	1	...
<div><div></div><div>saba</div><div>ID: 681d167e0be8ba015d1c3e70</div></div>	<div></div> saba@gmail.com	User	May 9, 2025	1	...
<div><div></div><div>mahir</div><div>ID: 681d7b99116d9bb351a12d011</div></div>	<div></div> mahir19800@gmail.com	User	May 9, 2025	1	...
<div><div></div><div>Super Admin</div><div>ID: 681d1b9ff7dcfa70491440159</div></div>	<div></div> admin@neurarig.com	Admin	May 9, 2025	0	...
<div><div></div><div>samin</div><div>ID: 681d1e89d53687197e64179</div></div>	<div></div> abarsamin100@gmail.com	User	May 9, 2025	1	...

NR

NeuraRig

Q

Search products...

Home

Categories

PC Builder

My Orders

1

Admin Dashboard

Logout

Products

Categories

Brands

Orders

Users

Order Management

Q

Search by order ID, customer name, email, or address...

All Orders

Refresh

🔗

Order ID: 68138039b8ba956c3f921dc6

Placed on: 5/1/2025, 8:07:53 PM

📍

Shipping Address

statst

👤

Customer Information

Name not available

Email not available

Cancelled

\$1299.99

Order Items

Product name not available x 1

\$1299.99

🔗

Order ID: 6813819e98401bf89664f3e6

Placed on: 5/1/2025, 8:13:50 PM

📍

Shipping Address

statst

👤

Customer Information

Name not available

Email not available

Cancelled

\$99.99

Order Items

Product name not available x 1

\$99.99

## Backend Development

The back-end of the e-commerce website is responsible for managing data, implementing business logic, and facilitating communication with the front-end. It is developed using the **Node.js** runtime environment along with the **Express.js** framework, which provides a fast, scalable, and efficient architecture for web applications.

### Key Responsibilities of the Back-End:

- **User Management:**  
Handles user registration, login, secure password storage (e.g., using bcrypt), session management, and role-based access control for users and admins.
- **Product Management:**  
Enables (Create, Read, Update, Delete) operations on products, accessible to admins through a secure API. Product data includes images, specifications, pricing, ratings, and reviews.
- **Shopping Cart & Orders:**  
Manages shopping cart sessions, order creation, and checkout processing. Each order includes product details, quantities, total cost, and order status tracking.
- **AI PC Builder Integration:**  
Backend APIs support the logic for the manual and AI-assisted PC builder. This includes storing build templates and interacting with an AI service for recommendations.
- **Database Integration (MongoDB):**  
MongoDB is used as the primary NoSQL database, providing flexible, document-based data storage. Collections are defined for users, products, orders, and build configurations. MongoDB's schema-less nature allows for easy updates and scalability as new features or data types are introduced.
- **Security Measures:**  
Includes input validation, authentication tokens (e.g., JWT), and protection against common vulnerabilities such as injection attacks and cross-site scripting (XSS).

This robust and modular back-end architecture ensures the website is scalable, secure, and responsive to user interactions. Combined with MongoDB, it allows for fast data retrieval and smooth performance across various functionalities.

PROJECT Project 0 CLUSTER Cluster0

+ Create Database

Search Namespaces

test

- brands
- carts
- categories
- orders
- pcbuilds
- products**
- users

### test.products

STORAGE SIZE: 164KB LOGICAL DATA SIZE: 169.67KB TOTAL DOCUMENTS: 95 INDEXES TOTAL SIZE: 36KB

Find Indexes Schema Anti-Patterns Aggregation Search Indexes

Generate queries from natural language in Compass

INSERT DOCUMENT

Filter Type a query: { field: 'value' } Reset Apply Options

```

_id: ObjectId('6813bb2c9a8a6bfe86e70adf')
name: "Lenovo IdeaPad 1 15AMN7 AMD Athlon Silver 7120U 512GB Storage 15.6"
      FHL"
brand: ObjectId('6813baa19a8a6bfe86e70904')
modelName: "Lenovo IdeaPad 1 15AMN7 AMD Athlon Silver 7120U 512GB Storage
          15.6" FHL"
description: "The Lenovo IdeaPad 1 15AMN7 AMD Athlon Silver 7120U 512GB
            Storage 15.6"

```

PREVIOUS 1-20 of many results NEXT

NEURARIG

- > node\_modules
- > public
- > server
- > src
- gitignore
- bun.lockb
- components.json
- create-admin.html
- JS create-admin.js
- eslint.config.js
- JS generate-secret.js
- index.html
- package-lock.json
- package.json
- JS postcss.config.js
- README.md
- TS tailwind.config.ts
- tsconfig.app.json
- tsconfig.json
- tsconfig.node.json
- JS update-role.js
- vite.config.ts



```

JS server.js  X
server > JS server.js > ...
1  const express = require('express');
2  const cors = require('cors');
3  const mongoose = require('mongoose');
4  const dotenv = require('dotenv');
5  const auth = require('./middleware/auth');
6  const path = require('path');
7
8  // Import routes
9  const productRoutes = require('./routes/productRoutes');
10 const categoryRoutes = require('./routes/categoryRoutes');
11 const authRoutes = require('./routes/authRoutes');
12 const adminRoutes = require('./routes/adminRoutes');
13 const orderRoutes = require('./routes/orderRoutes');
14 const cartRoutes = require('./routes/cartRoutes');
15 const brandRoutes = require('./routes/brandRoutes');
16 const userRoutes = require('./routes/userRoutes');
17
18 // Load environment variables
19 dotenv.config();
20
21 // Debug logging for environment variables
22 console.log('Environment variables loaded:');
23 console.log('MONGODB_URI:', process.env.MONGODB_URI);
24 console.log('PORT:', process.env.PORT);
25 console.log('JWT_SECRET:', process.env.JWT_SECRET ? 'Set' : 'Not set');
26
27 if (!process.env.JWT_SECRET) {
28   console.error('JWT_SECRET is not set in environment variables');
29   process.exit(1);
30 }
31
32 const app = express();
33 const PORT = process.env.PORT || 5000;
34

```

```

Home.tsx  X
src > components > Home.tsx > ...
1  import React, { useEffect, useState } from 'react';
2  import { Product } from '../types';
3  import { getFeaturedProducts } from '../services/data-service';
4  import { Link } from 'react-router-dom';
5
6  const Home: React.FC = () => {
7    const [featuredProducts, setFeaturedProducts] = useState<Product[]>([]);
8    const [loading, setLoading] = useState(true);
9    const [error, setError] = useState<string | null>(null);
10
11    useEffect(() => {
12      const fetchFeaturedProducts = async () => {
13        try {
14          const products = await getFeaturedProducts();
15          if (products && products.length > 0) {
16            setFeaturedProducts(products);
17            setError(null);
18          } else {
19            setError('No featured products found');
20          }
21        } catch (err) {
22          setError('Failed to load featured products');
23          console.error(err);
24        } finally {
25          setLoading(false);
26        }
27      };
28
29      fetchFeaturedProducts();
30    }, []);
31
32    if (loading) {
33      return (
34        <div className="container mx-auto px=8">

```

## Technology (Framework, Languages)

### Front-End:

- **Language:** JavaScript, HTML5, CSS3
- **Framework:** React.js
- **Styling Framework:** Tailwind CSS
- **Routing:** React Router

### Back-End:

- **Language:** JavaScript (Node.js)
- **Framework:** Express.js

### Database:

- **Database System:** MongoDB
- **ODM (Object Data Modeling Library):** Mongoose (for MongoDB interaction)

### Other Tools & Technologies:

- **Package Manager:** npm (Node Package Manager)
- **Authentication & Security:** JSON Web Tokens (JWT), bcrypt
- **Version Control:** Git
- **AI Integration:** Groq API

## Github Repository

Link: [mahirTaj/NeuraRig](https://github.com/mahirTaj/NeuraRig)

### Individual Contribution

ID	Name	Contribution
21201160	Mohd Tashwaruddin Safin	<ul style="list-style-type: none"> <li>• Homepage</li> <li>• Global Search and filter</li> <li>• Category pages</li> <li>• Category search and wise filter</li> <li>• Data Entry</li> </ul>
22299422	Mahir Tajwar Rahman	Admin Dashboard- <ul style="list-style-type: none"> <li>• Product Add, delete, Update</li> <li>• Category Add, delete, Update</li> <li>• Brand Add, delete, Update</li> <li>• Order and User handling</li> </ul>
22301739	Abrar Samin	<ul style="list-style-type: none"> <li>• AI chatbot and builder</li> <li>• PC builder</li> <li>• Product page</li> <li>• Admin side user and product confirmation/navigation</li> </ul>
22299318	Asiful Islam Mahir	<ul style="list-style-type: none"> <li>• Cart and Checkout</li> <li>• Order history</li> <li>• Data Entry</li> <li>• About us</li> <li>• Login, register, secure authentication</li> </ul>