



BRACT's Vishwakarma Institute of Information Technology, Pune-48

PROJECT REPORT ON

“E-Commerce Website for IoT Components”

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Abstract

The term Internet of Things (IoT) components refer to a wide range of fundamental elements that are necessary for integrated devices to function as a whole. The components make up the foundation of the Internet of Things (IoT). These include both software and hardware that are seamlessly integrated. Sensors collect data on temperature, light and motion in the real environment, similar to what ears and eyes do. Actuators then take action depending on this data, for example, changing a light in response to user commands or turning on a heater based on a sensor reading. Many techniques, such as Wi-Fi and cellular networks are utilized to link the digital and physical domains. Sensor data is collected, microcontrollers interpret it to extract useful information and it is then frequently transferred to the cloud for additional analysis. IoT devices' microcontrollers and microprocessors handle data processing, task execution and communication management. They are the brains of the system. Communication modules, which support several protocols such as Wi-Fi and Bluetooth provide smooth connectivity between devices and networks. In addition, platforms, development kits and cloud services provide infrastructure and tools to make the design, development and implementation of IoT solutions more efficient. These elements work together to provide the framework for a wide range of IoT applications in a variety of industries, including industrial automation, healthcare, smart cities and homes. Last but not least, we can communicate with and manage these networked devices due to user interfaces like dashboards and mobile apps.

Keywords: Internet of Things (IoT), Sensors, Actuators

Introduction

The way we connect with the world around us is rapidly evolving due to the Internet of Things (IoT). Visualize an elegant environment where everyday things communicate with one other and respond to their surroundings with ease. A complex interaction of numerous components drives this interconnected reality, which is demonstrated by a thermostat that adjusts automatically to weather conditions or a smart coffee pot that brews in unison with your morning alarm. These elements, which serve as the foundation for the Internet of Things, can be broadly divided into five groups. First and foremost, sensors gather data in real time from the outside environment, serving as the system's eyes and ears. This data adds a vital layer of environmental awareness and can include everything from light and humidity to motion and temperature. Actuators, which constitute the hands and feet of the system, secondly convert this data into actual movements. For example, smart sprinkler systems use rain sensors (the eyes) to sense when watering is needed and turn on sprinkler heads (the hands) in response. Connectivity protocols play the role of connecting these physical items to the digital environment. Wi-Fi, Bluetooth, and cellular networks are examples of invisible networks that make it easier to wirelessly transfer raw sensor data to a cloud or central hub for additional processing. Low-power wide-area networks (LPWAN) provide an energy-efficient alternative for remote applications. Components of data processing are activated once data arrives at its destination. The unprocessed sensor data is analysed by microcontrollers or gateways, which are basically little computers. They prepare the data for additional analysis, frequently on the cloud, and extract insightful information. Consider a fitness tracker that has a step counter. The data processing unit calculates the distance walked or the number of calories burnt to turn this raw data into useful information. Lastly, user interfaces serve as a link between linked equipment and people. These interfaces come in a variety of formats, such as physical interfaces with buttons and displays or smart mobile apps and web dashboards for monitoring and controlling on the go. Through these, users can customize the behaviour of the entire IoT ecosystem in addition to monitoring data, changing settings, and initiating actions. Voice control for dimming smart home lights is a prime example of the effectiveness of a well-thought-out user interface.

Software elements are equally as important to the creation and implementation of Internet of Things solutions as hardware components. Device behaviour is controlled by embedded software and firmware, which also implement features and oversee data processing and storage. Additionally, platforms, development kits, and cloud-based services offer the infrastructure and tools required to simplify the conception, creation, and implementation of Internet of Things applications, hence promoting scalability and creativity. The interplay between these distinct components will encourage the development of linked technologies and open up fresh opportunities for innovation and expansion as IoT keeps growing and reach various aspects of daily life. In this context, this website provides a collection of carefully chosen IoT components, from important microcontrollers (the brains of your project) to a wide variety of sensors that record and transmit environmental data in real time. Through the integration of frontend technologies like HTML, CSS and Javascript this website provides you with an ultimate platform to look for electronic IoT components. The interface has been designed in such a way that it is visually-appealing and user-friendly. This interface will allow customers and IoT enthusiasts to effortlessly browse through various categories of IoT components which include sensors, actuators, microcontrollers, etc., get detailed information about these components and ultimately purchase them. Meanwhile, backend technologies such as PHP and MySQL underpin the system's functionality.

Objectives

1. **Creating a Platform for the Purchase of IoT Components:** The main goal of the e-commerce website is to provide a place where clients can simply explore, search for and buy a variety of IoT components, including microcontrollers, sensors, actuators, and connectivity modules.
2. **Educating Consumers about IoT Technology:** Educating consumers about IoT technology, its uses and how various parts integrate to create IoT solutions may be another goal. The website offers insightful blog pieces that can help achieve this.
3. **User-Friendly Interface:** The interface of the website is thoughtfully developed using HTML, CSS and JavaScript. These are aimed to improve the browsing, searching and purchasing experiences for customers. The navigation system is made to be user-friendly, with a menu layout that is easy to understand.
4. **Effective Backend:** The backend consists of SQL. SQL enables efficient storage, retrieval and manipulation of data.
5. **Secure Payment System:** The website will be connected with secure payment processing technology to enable smooth transactions for event registrations. To protect sensitive financial data, this will include integrating with reliable payment gateways and putting forward industry-standard encryption mechanisms. (Future Scope)

Proposed Methodology

1. **Requirement Analysis:** The main aim is to understand consumer demands and preferences, identify the target audience, market trends and competitors. We also target to fulfil user demands and make the website efficient to use.
2. **Technology Stack Selection:** The selection of efficient and effective technology is the most necessary step. For frontend development we have used HTML, CSS and JavaScript. Whereas for backend, MySQL and PHP is used.
3. **Design Phase:** A visually appealing website with user-friendly interface is the most important aspect. The next step comprises of create wireframes and mock-ups to conceptualize the e-commerce website's layout, navigation and user interface design. This will help to improve the website's appearance and accurately showcase the brand, incorporate graphic assets, colour palettes and branding aspects.
4. **Testing and Quality:** Rigorous testing procedures are integral to ensure the reliability, functionality and performance of the e commerce website. Various testing methodologies, including unit testing, integration testing and user acceptance testing are employed to identify and rectify any defects or discrepancies in the system.
5. **Deployment:** Upon successful completion of testing and quality assurance procedures, the e commerce website is aimed to be deployed into the production environment. This phase involves the installation, configuration and setup of the system infrastructure, ensuring seamless integration with existing organizational frameworks and IT infrastructure.

Agile is a way to manage projects that values being flexible. It prioritizes working together as a team. It also requires being able to respond to changes quickly. Agile focuses on developing products in small steps. This allows teams to deliver working parts early on. They can then continue improving these parts over time. Agile encourages teamwork and collaboration with customers. Teams can adapt to changes easily using this approach. This helps team to develop a efficient software.

Agile is based on four pillars which outline the Agile manifesto:

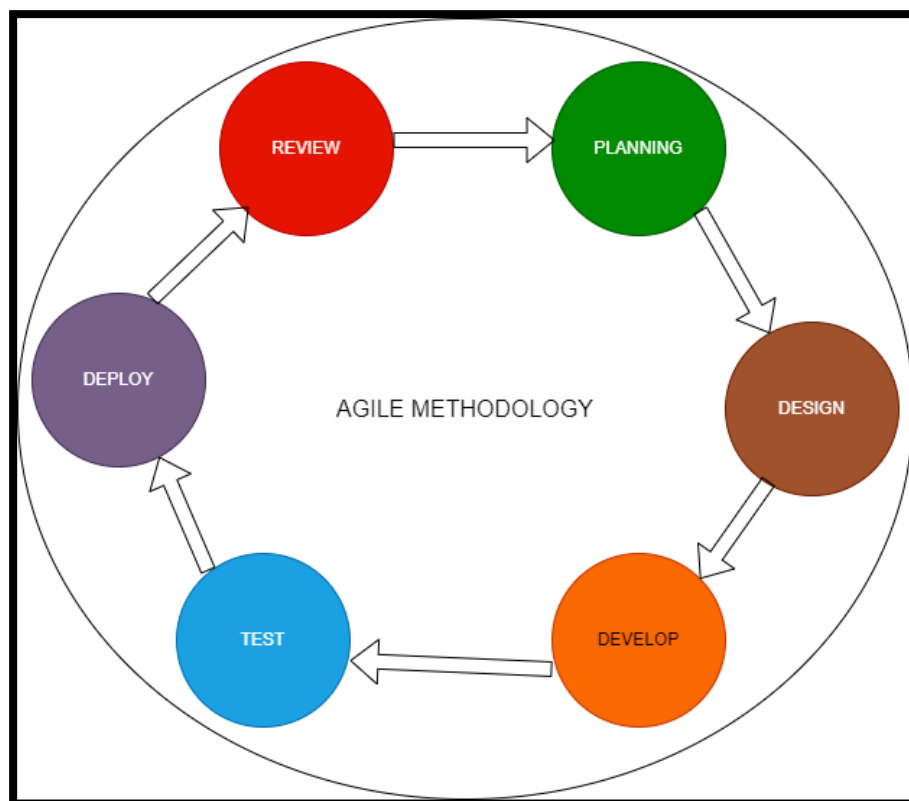
- 1) **Individual's thoughts over the bookish concept:** Agile team values the person's thoughts and encourage individual to share their idea so that the developer's team will think over it, try to implement it and they will not prioritize the bookish technique.
- 2) **Working on project rather than developing document:** Methodology works on the principle that one should focus on developing a project and introducing new idea. So, project development is given more importance over documentation.

3) Customer interaction over a negation of the contract:

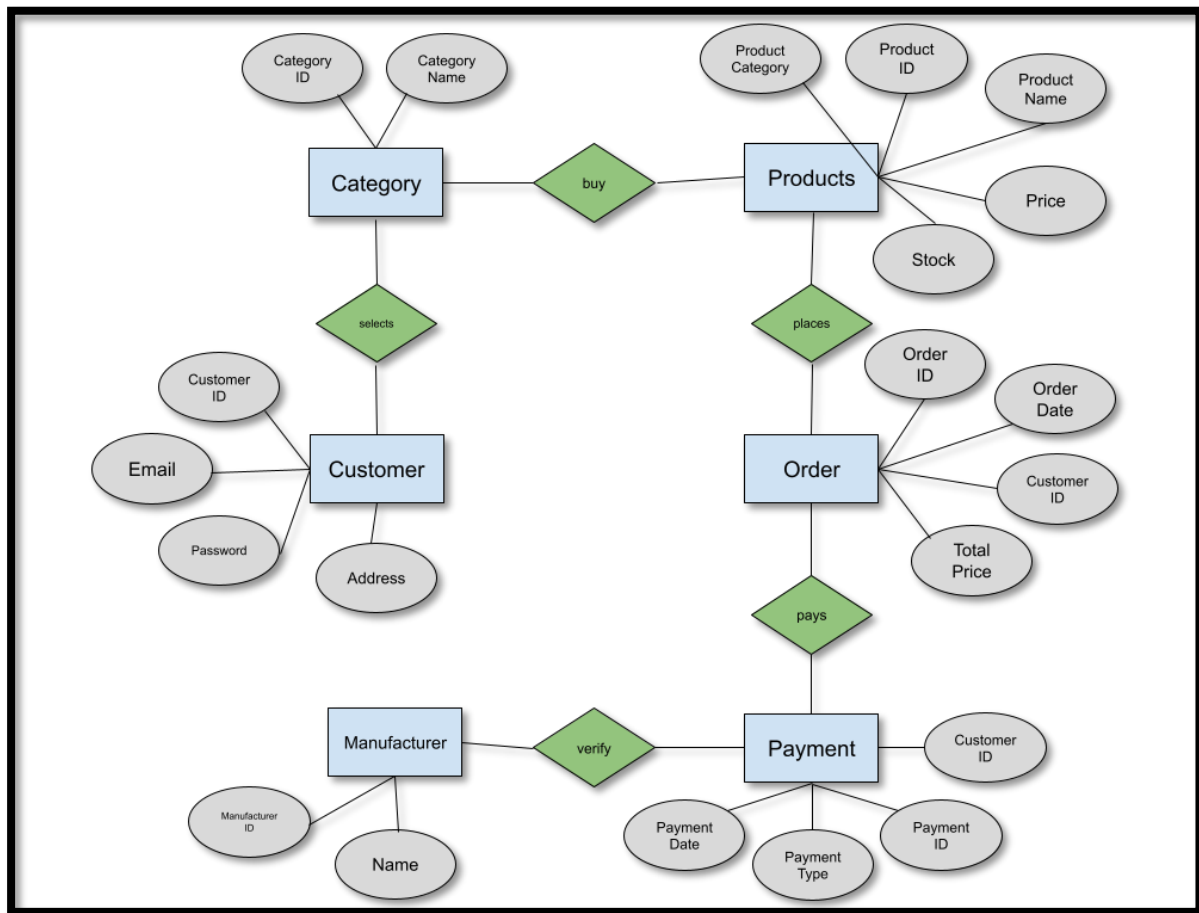
The most important part of the model is customer and whole software development is based on this review of customer.

4) Adaption to change over following a plan:

The advantage of this model is that we can adapt to any change which means it's not based on any predefined process or strategies. We can shape it as per customer's requirements which gives the flexibility to work on project and give us efficient edge to work on the project.

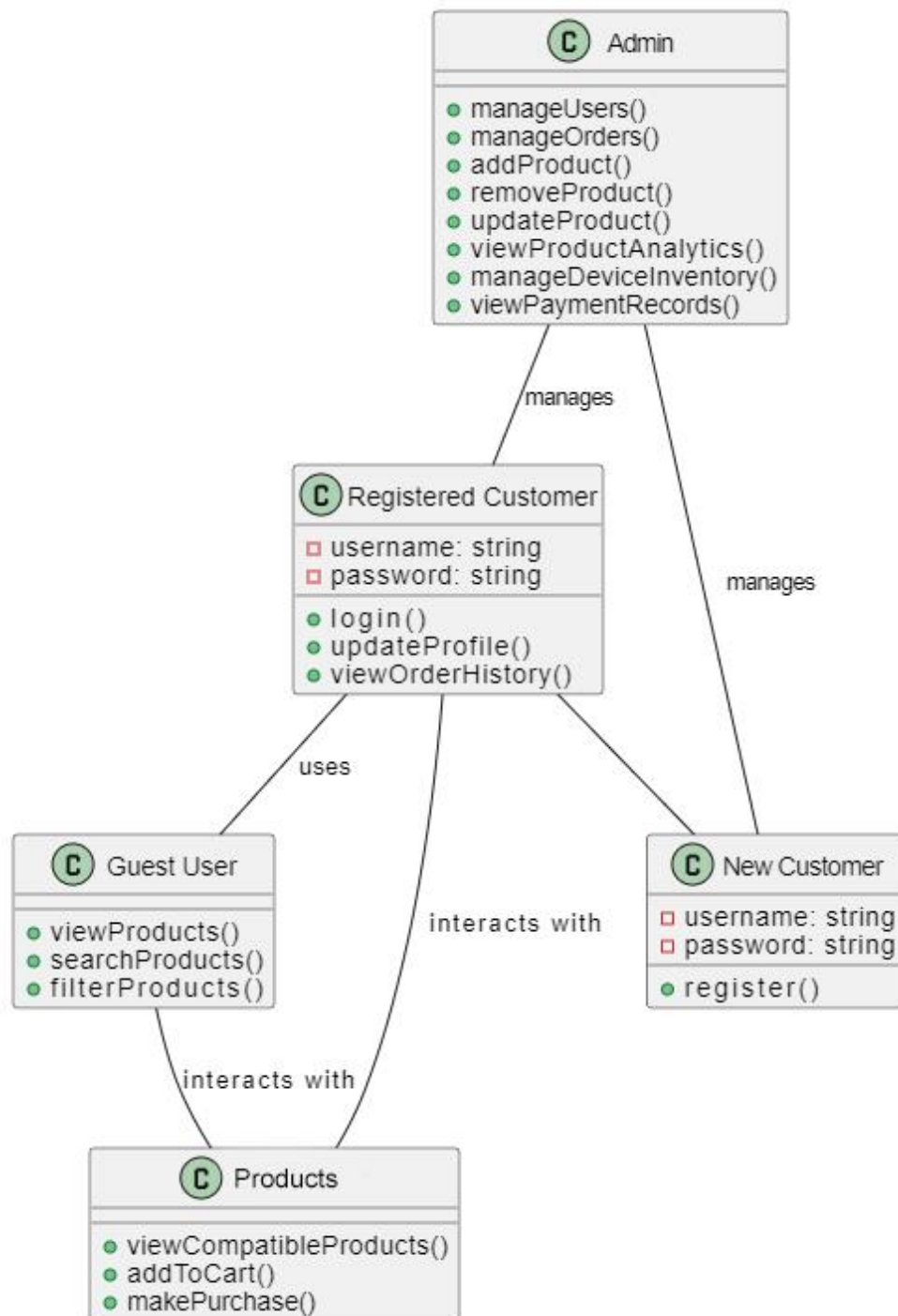


ER Diagram

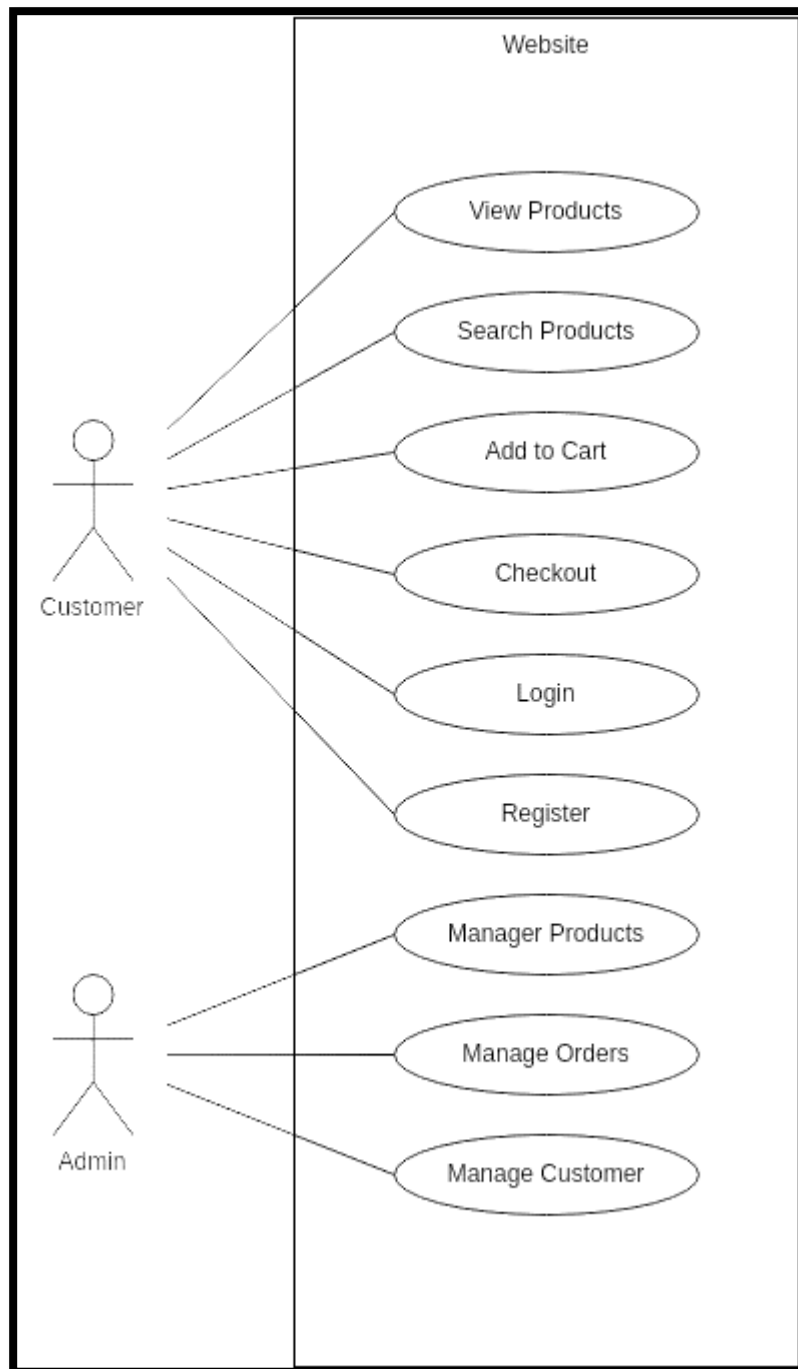


UML Diagrams

1. Class Diagram:

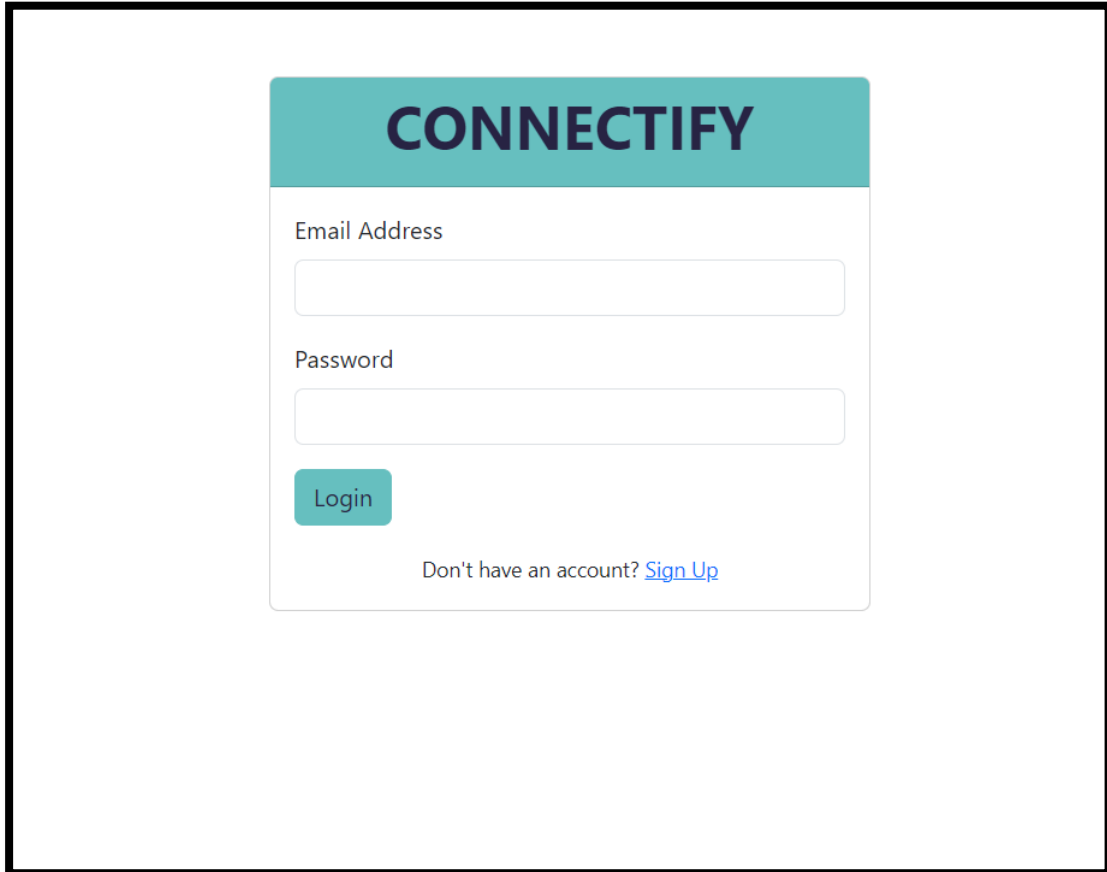


2. Use Case Diagram:

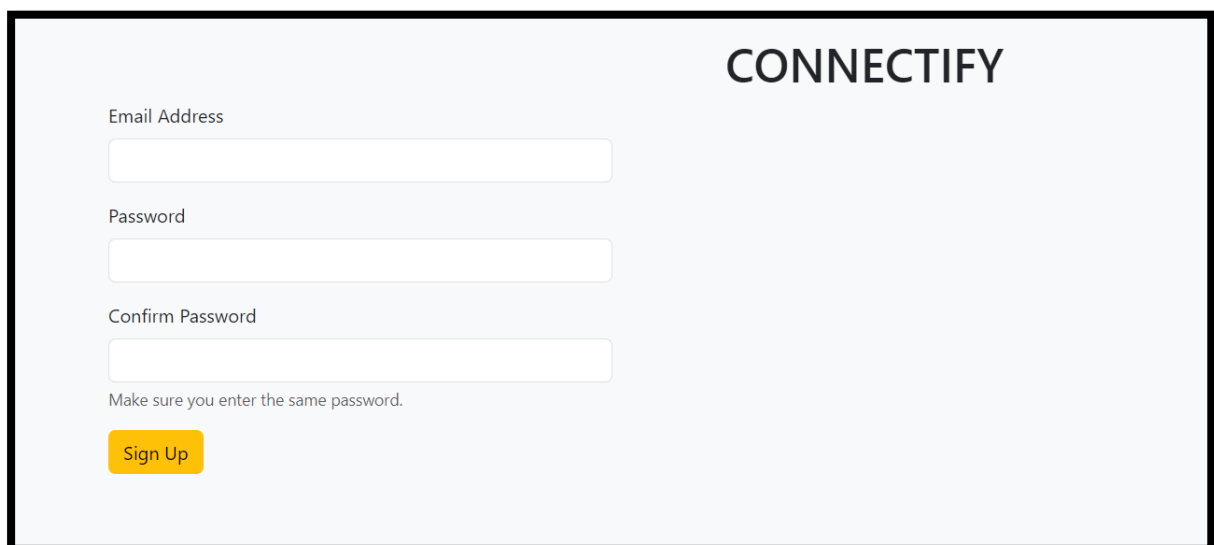


Website GUI

1. Login/Sign Up Page:



A mockup of a login/sign up page for a website called "CONNECTIFY". The page has a teal header with the word "CONNECTIFY" in white. Below the header is a white form with a teal border. The form contains two input fields: "Email Address" and "Password". Below the "Password" field is a teal "Login" button. At the bottom of the form, there is a link that says "Don't have an account? [Sign Up](#)".



A mockup of a sign up page for a website called "CONNECTIFY". The page has a light gray background. The word "CONNECTIFY" is in the top right corner. On the left side, there are three input fields: "Email Address", "Password", and "Confirm Password". Below the "Confirm Password" field is a note that says "Make sure you enter the same password." Below the note is a yellow "Sign Up" button.

2. Landing/Home Page:

Connect to CONNECTIFY

Welcome GuestLogin/Sign UpWishlist (0)


LogoHomeProductsBlogsCart⁰Total Price: Rs. 0/-

Search

Search


CONNECTIFY

Connect and Connect




Infrared IR Sensor
Quartz Technologies
Price: Rs. 34/-

Add to CartView More



Sound Detection Sensor Module for Arduino/RPi/Other Microcontrollers
Brand: REES52
Price: Rs. 38/-

Add to CartView More



Witty Fox ESP32 Storm Board with Support for Battery Charging and Wireless Programming
Brand: Witty Fox
Price: Rs. 615/-

Add to CartView More

Categories

Sensors

Actuators

Microcontrollers

Development Kits

ESP Modules

3. Cart Page:


Connect to CONNECTIFY

Welcome GuestLogin/Sign UpWishlist (0)

LogoHomeProductsBlogsCart¹

CONNECTIFY

Connect and Connect

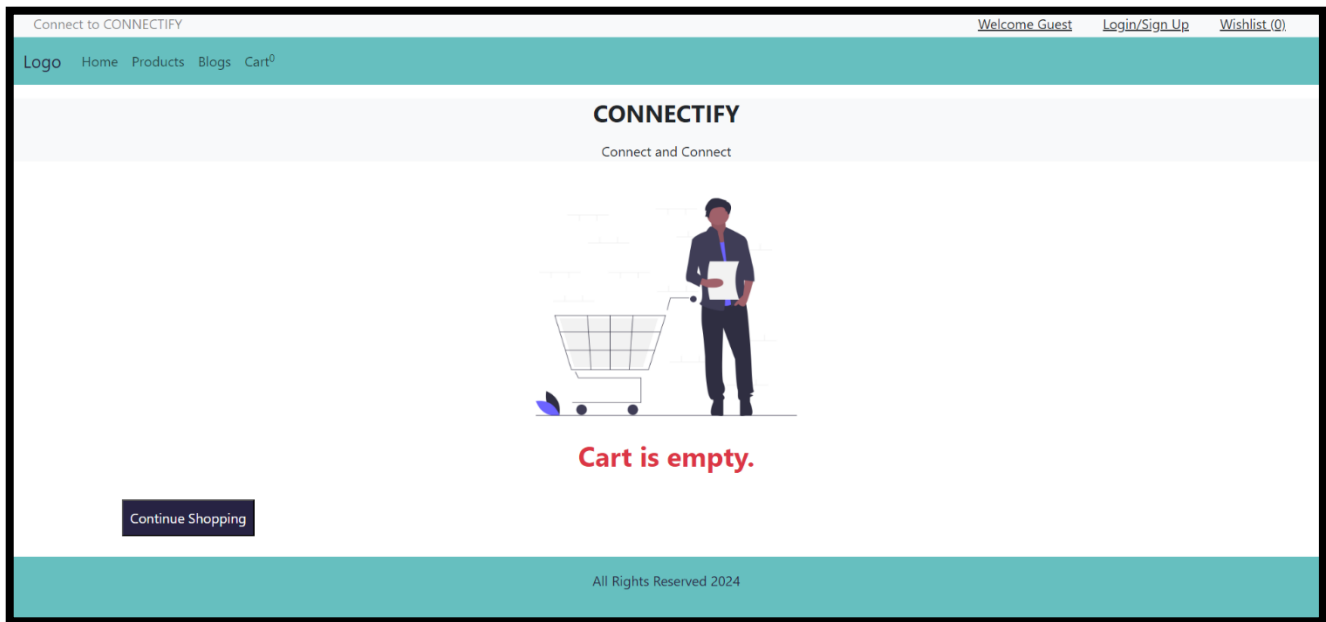
Product Title	Product Image	Quantity	Total Price	Remove	Operations
Sound Detection Sensor Module for Arduino/RPi/Other Microcontrollers		<input type="text"/>	Rs. 38/-	<input type="checkbox"/>	<div>Update CartRemove</div>

Subtotal: Rs. 38/-

Continue ShoppingCheckout

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4. Empty Cart Page:



Future Scope

E-commerce websites have a bright future ahead of them in the dynamic world of digital commerce. These websites are well-positioned to take advantage of cutting-edge technologies to improve user experiences, expedite transactions, and broaden their market reach as long as technology keeps advancing at a quick rate. The future of e-commerce is anticipated to be significantly shaped by important developments like social commerce, augmented reality, mobile commerce, and artificial intelligence. Due to the increasing use of smartphones and tablets, mobile commerce will only increase, requiring e-commerce websites to be optimized for seamless mobile experiences. E-commerce websites will be able to automate customer care interactions, optimize pricing tactics, and provide personalized suggestions thanks to artificial intelligence and machine learning. Technologies like virtual reality and augmented reality will completely transform the internet by providing dynamic shopping environments and immersive product visualization. The distinction between social interactions and online shopping will become increasingly hazy due to social commerce, which is driven by the incorporation of e-commerce features into social media platforms. Furthermore, ethical and sustainable factors will have a greater impact on customer purchasing decisions, which will force e-commerce companies to give eco-friendly policies and transparent supply chains a priority. In general, innovation, personalization, and adaptability will define the future of e-commerce websites, with a persistent emphasis on improving client experiences and fostering company expansion in the digital age.

Our aim is to constantly modify the website and adapt new technologies to maintain it. The new technologies include the use of React JS framework for frontend, scalable MongoDB and Node.js for backend and a payment gateway API for safer transactions.

Conclusion

In conclusion, e-commerce websites will see an environment of never-before-seen opportunity and innovation in the future. E-commerce platforms will continue to change as a result of technological advancements and evolving customer behaviour as we enter a world that is becoming more and more digital. Due to the widespread usage of smartphones and tablets, e-commerce websites will need to give priority to mobile optimization and user-friendly experiences as mobile commerce grows exponentially. Personalized suggestions, predictive analytics, and automated customer care solutions will all be made possible by the integration of artificial intelligence and machine learning algorithms, which will also completely transform how companies engage with their clientele. With its realistic product presentation and virtual try-on features that bridge the gap between physical and virtual worlds, augmented reality and virtual reality technologies have the potential to completely change the online shopping experience.

Businesses will be able to take advantage of social networks' enormous potential as shopping destinations, increasing engagement and conversion rates, through social commerce, which is powered by the integration of e-commerce features into social media platforms. Furthermore, in order to satisfy the demands of ethical and sustainable consumers, e-commerce platforms will need to adopt eco-friendly procedures, open supply chains, and socially conscious programs. The future of e-commerce websites is essentially defined by the convergence of market trends, consumer expectations, and technology. This presents a variety of options for businesses to succeed in the dynamic and always changing digital marketplace by being innovative and differentiating. We will definitely modify this website to new technologies like React JS framework for frontend, MongoDB and Node.js for backend and we will also try to implement the payment gateway API very soon in the future.