



TECHTRONICS : ONLINE ELECTRICAL EMPORIUM

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Abstract: 'TechTronics' is an innovative e-commerce application designed specifically for electrical products and services. It offers a seamless experience for browsing and purchasing electrical goods, as well as integrated electrician hiring capabilities. Users can easily book top-rated electricians for delivery, installation, maintenance, and troubleshooting services. The app also features a customer feedback system to enable continuous improvement. In case of installation malfunctions or other electrical issues, users can hire electricians directly through the platform. TechTronics serves as an efficient interface between customers and electrical product vendors, ranging from small to large markets, by bringing their products online. Additionally, TechTronics provides significant employment opportunities for electricians, offering a centralized platform for them to showcase their services and connect with customers. This paper outlines the key features, benefits, and project implementation requirements of TechTronics, highlighting its role in transforming the electrical product market and facilitating employment in the industry.

IndexTerms - E-commerce application, Electrical products and services, Integrated electrician hiring, Delivery, Installation, Electricals sales, E-commerce, Web-application, Online-Shopping, Front-end, Back-end, online-payment, Troubleshooting services, Electricians hiring.

INTRODUCTION

In the rapidly evolving landscape of e-commerce, the demand for specialized platforms catering to specific industries is on the rise. The electrical products and services sector, in particular, faces unique challenges in terms of product accessibility, service reliability, and customer satisfaction. TechTronics emerges as an innovative solution designed to address these challenges by integrating seamless browsing, purchasing, and hiring of electricians within a single user-friendly application. Traditionally, purchasing electrical goods and hiring electricians has been a fragmented and often cumbersome process. Customers encounter difficulties in finding reputable electricians for installation, maintenance, and troubleshooting, while vendors struggle to expand their market reach beyond local boundaries. TechTronics steps in to bridge this gap by offering a comprehensive e-commerce platform tailored specifically to the electrical industry. The primary objective of TechTronics is to provide a seamless experience for users seeking electrical products and related services. Through the app, customers can effortlessly browse through a diverse range of electrical items categorized by type, brand, and specifications. This intuitive interface enables informed decision-making and streamlined purchases, enhancing overall customer satisfaction. One of the standout features of TechTronics is its integrated electrician hiring functionality. Users can easily book top-rated electricians for a range of services, including product installation, maintenance, and troubleshooting. This streamlined process eliminates the hassle of separately sourcing and vetting electricians, ensuring prompt and reliable service delivery. TechTronics also prioritizes efficient delivery and installation services. Customers can expect timely delivery of purchased products to their doorstep, with the added convenience of professional installation by qualified electricians. This end-to-end service approach ensures a smooth and hassle-free experience for users from purchase to setup.

LITERATURE REVIEW

In the context of e-commerce, studies emphasize the importance of user experience, interface design, and convenience in driving customer engagement and satisfaction (Li & Karahanna, 2015; Tan & Teo, 2000). Seamless browsing, intuitive navigation, and personalized recommendations are identified as critical factors influencing purchase decisions and overall user retention.

The role of online platforms in connecting customers with service providers, particularly in specialized sectors like electrical services, has garnered attention (Chun et al., 2017; Hu & Tang, 2019). These platforms leverage digital technologies to facilitate seamless interactions between consumers and service professionals, improving accessibility and transparency in service delivery.

Studies on customer feedback and satisfaction highlight the importance of continuous improvement in service quality (Deng et al., 2010; Homburg et al., 2009). Customer feedback mechanisms, when integrated into e-commerce applications, enable businesses to gather insights, address issues promptly, and enhance overall customer experience.

II. METHODOLOGY

2.1. Front End / Presentation Tier:

Implementing a responsive UI/UX using Flutter to create a user-friendly interface for customers interacting with the website's frontend. With intuitive navigation, visually appealing designs, and responsive layouts to optimize user experience across devices and screen sizes.

2.2. App Logic (Web Server) / Business Logic Tier:

Developing and implementing business logic to manage interactions between suppliers, customers, and electricians. Built functionalities for registering suppliers, processing orders, managing electrician profiles, and recording customer feedback and ratings. Ensuring robust data processing and validation to maintain data integrity and support efficient business operations.

2.3. Database / Data Tier:

Utilized Firebase as the backend database to securely store and manage business accounts, user data, and electrician profiles. Implementing database schemas to efficiently organizing and retrieving information related to suppliers, products, users, and service providers. Implemented data security and authentication system to protect sensitive information and ensure compliance with privacy regulations.

III. EXISTING SYSTEM

In the field of electrical e-commerce, there are existing systems and platforms. Here are a few examples:

3.1. Amazon Electricals: Amazon, one of the largest e-commerce platforms globally, offers a dedicated section for electrical products. It provides a wide range of electrical items, from appliances to power tools, with customer reviews, ratings, and competitive pricing.

3.2. Alibaba: Alibaba, a prominent online marketplace based in China, includes a dedicated category for electrical products. It serves as a platform connecting manufacturers, suppliers, and buyers in the electrical industry, offering a wide range of products at competitive prices.

3.3. Home Depot: Home Depot is a well-known retailer specializing in home improvement and construction products, including electricals. It provides an extensive selection of electrical equipment, lighting fixtures, wiring supplies, and related accessories both in physical stores and through its online platform.

3.4. Grainger: Grainger is a leading distributor of industrial and electrical products. It offers a comprehensive catalog of electrical components, tools, safety equipment, and maintenance supplies, targeting businesses and professionals in the electrical industry. These are just a few examples of existing systems and platforms in the electricals e-commerce application domain.

IV. PROPOSED SYSTEM

Bringing the delivery of electrical appliance products to the home by an electrician can be a value-added service provided through an e-commerce app. Here's a detailed description of how this feature implemented

4.1. Service Selection: When customers purchase electrical appliance products through the e-commerce app, they have the option to select an additional service for delivery and installation by an electrician. This service can be presented as an add-on during the checkout process.

4.2. Scheduling and Availability: After selecting the delivery and installation service, customers can choose a preferred date and time slot for the electrician's visit. The app should provide a calendar or availability schedule to ensure that customers can select a suitable appointment time.

4.3. Cost Estimation: The app should calculate the cost of the delivery and installation service based on factors such as the type of appliance, the complexity of installation, and the customer's location. The estimated cost should be displayed to the customer before confirming the appointment.

4.4. Confirmation and Communication: Once the appointment is confirmed, the customer should receive a confirmation notification through the app, along with details such as the appointment date, time, and the assigned electrician's contact information. The electrician should also receive the necessary details for the scheduled visit.

4.5. Pre-visit Communication: Before the scheduled visit, the assigned electrician can contact the customer to confirm the appointment and gather any additional information about the installation requirements or specific customer preferences. This can be done through in-app messaging or direct phone communication.

4.6. On-site Visit: On the scheduled date and time, the electrician arrives at the customer's home with the purchased electrical appliance. They should come equipped with the necessary tools and equipment for the installation. The electrician verifies the

product, assesses the installation requirements, and ensures that the necessary electrical connections and safety measures are in place.

4.7. Installation and Setup: The electrician performs the installation of the electrical appliance according to the manufacturer's instructions and industry best practices. They ensure that the appliance is properly connected, aligned, and tested for functionality. If there are any additional settings or configurations specific to the appliance or customer preferences, the electrician can assist in setting them up.

4.8. Demonstration and Instruction: After the installation, the electrician provides a brief demonstration of the appliance's features and functionality to the customer. They may explain the usage instructions, and maintenance tips, and answer any questions the customer may have.

4.9. Payment and Feedback: Once the installation is complete, the customer can make the payment for the delivery and installation service through the app. The app can provide a secure payment gateway for the transaction. After the payment, the customer can provide feedback or rate the service provided by the electrician, allowing them to continuously improve their service quality.

V. PRE-REQUISITES FOR SETTING THE ENVIRONMENT

- Web Hosting and Domain Registration
- Selection of E-commerce Platform
- Server Setup
- SSL Certificate
- Payment Gateway Integration
- Product Database Setup
- Content Management System (CMS) Implementation
- Responsive Design
- Security Measures
- Analytics and Tracking
- Testing and Quality Assurance
- Backup and Disaster Recovery Plan

VI. TECHTRONICS FEATURES

6.1. User-Friendly Interface: Techtronics offers a user-friendly interface, allowing customers to easily navigate the application, search for specific electrical products, and place orders with a few simple clicks. The intuitive design ensures a seamless shopping experience.

6.2. Extensive Product Catalog: The application provides an extensive catalog of electrical products, ranging from household appliances to industrial equipment. Users can search for products using keywords or specific appliance names.

6.3. Integrated Electrician Hiring: One of the key differentiating features of Techtronics is its integrated electrician hiring facility. Upon placing an order, users have the option to book a top-rated electrician who will not only deliver the product but also provide installation and maintenance services. This feature ensures a hassle-free experience for customers.

6.4. Maintenance Tips: After installing the product, the electrician will provide maintenance tips to the customer. These tips may include best practices for usage, cleaning, and troubleshooting common issues. Techtronics aims to empower customers to properly maintain their electrical products.

6.5. Customer Ratings and Feedback: Customers have the ability to rate the service provided by the electrician through the Techtronics app. They can also provide continuous feedback on their experience, allowing the app to gather valuable insights and improve its service quality. This feedback loop ensures that the app can serve customers effectively and address any areas of improvement.

VII. BENEFITS AND IMPACT

7.1. Convenience and Time Savings: Techtronics streamlines the process of purchasing electrical products, hiring electricians, and receiving maintenance tips. Customers can access a wide range of services in one platform, saving time and effort.

7.2. Enhanced Customer Satisfaction: By providing maintenance tips and facilitating customer feedback, Techtronics enhances customer satisfaction. Customers can maintain their electrical products effectively and provide input on the quality of service, leading to continuous improvements.

VII. FLOW DIAGRAM

Below is the flow diagram involving the customer, business, and electrician modules outlining the key activities and interactions within each module:

8.1 Customer’s flow diagram

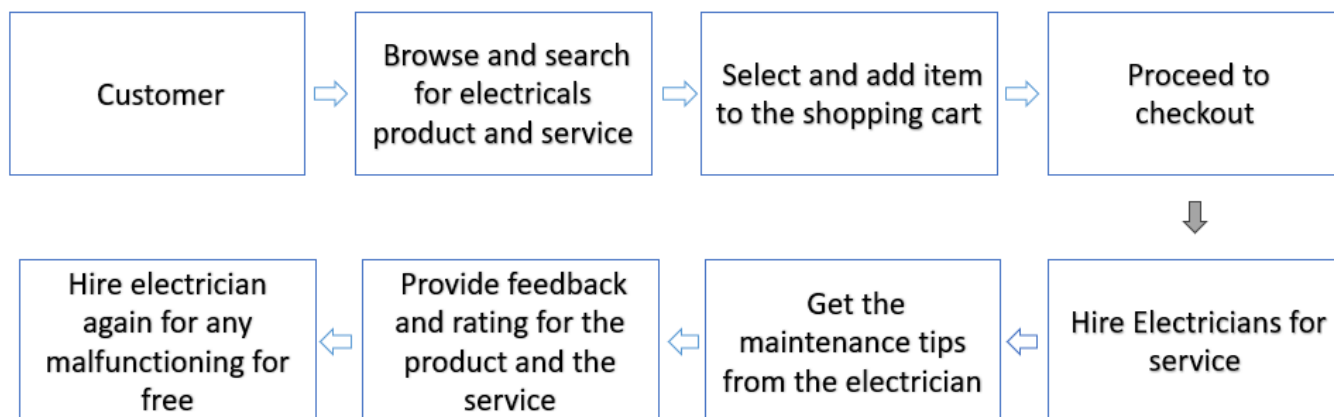


Figure 1

8.2 Business people’s flow diagram

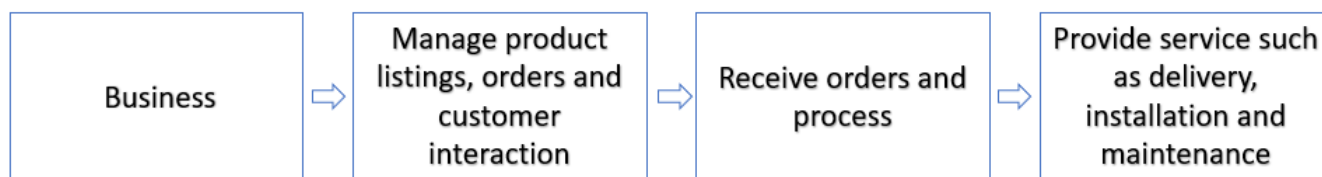


Figure 2

8.3 Electrician’s flow diagram

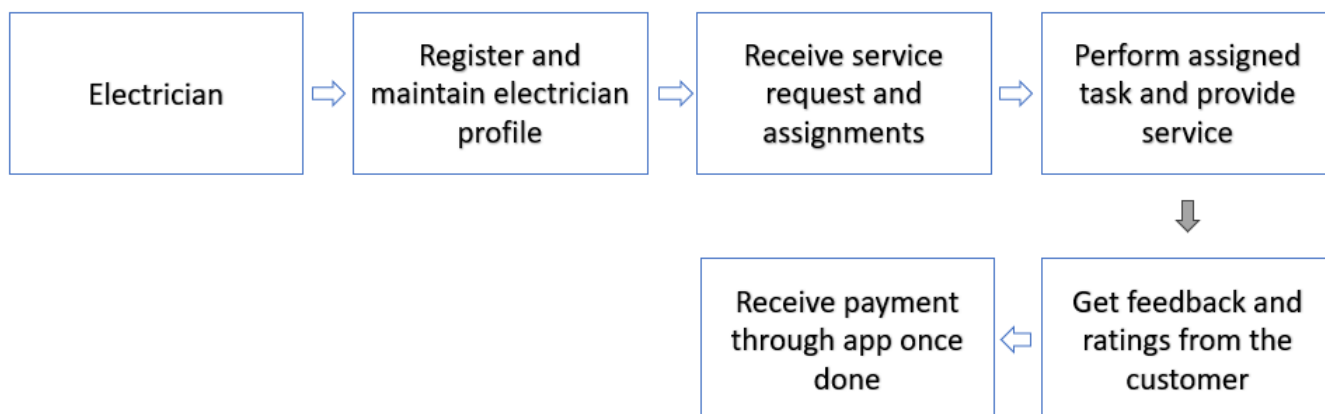


Figure 3

8.4 Use case diagram for Techtronics

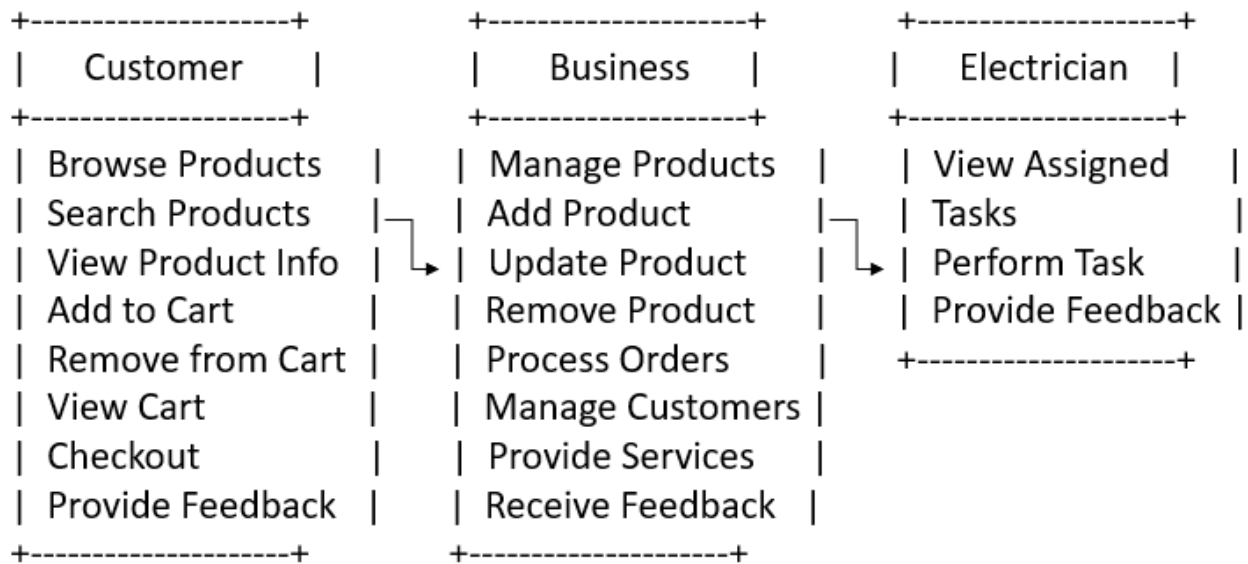


Figure 4

IX. RESULT

9.1. User Engagement and Satisfaction: TechTronics has successfully enhanced user engagement by providing a user-friendly interface and seamless browsing experience for customers. The responsive UI/UX design implemented using Flutter has contributed to higher customer satisfaction and increased interactions with the platform.

9.2. Integrated Business Logic: The implementation of robust business logic has facilitated efficient management of product listings, orders, and customer interactions for businesses. Features such as order processing, customer management, and service provision have streamlined operations and improved productivity.

9.3. Enhanced Service Delivery: Electricians registered on TechTronics have benefited from streamlined service assignments, enabling them to view tasks, perform services, and receive feedback in a systematic manner. This has led to improved service delivery and customer satisfaction.

9.4. Data Management and Security: The use of Firebase as the backend database has ensured efficient data storage, retrieval, and security. Business accounts, user profiles, and electrician details are managed securely, maintaining data integrity and privacy.

9.5. Feedback and Improvement: The feedback mechanism integrated into TechTronics has provided valuable insights for continuous improvement. Customer feedback and ratings have enabled businesses and electricians to enhance service quality and address areas of improvement.

X. CONCLUSION

Techtronics presents a comprehensive solution for e-commerce in the electricals sector, offering customers a seamless shopping experience along with the convenience of integrated electrician hiring, maintenance tips, and customer feedback. The user-friendly interface, extensive product catalog, and reliable service providers make Techtronics an attractive platform for customers seeking electrical products and related services. By incorporating maintenance tips, customers can properly care for their products, ensuring longevity and optimal performance. The ability to rate and provide continuous feedback allows Techtronics to effectively improve service quality and address customer needs effectively.

XI. FUTURE WORKS

Looking ahead, there are several avenues for future growth and improvement for the electricals e-commerce application. These include:

11.1. Augmented Reality (AR) Integration: Introducing AR technology can allow customers to virtually visualize electrical products in their own space before making a purchase. This immersive experience can boost customer confidence, reduce product returns, and enhance the overall shopping experience.

11.2. Integration with Smart Home Systems: Collaborating with smart home system providers can enable seamless integration of electrical appliances with existing smart home ecosystems. This can open up new opportunities for cross-selling, upselling, and providing a holistic solution to customers' smart home needs.

By focusing on these future scope areas, the electricals e-commerce application can further solidify its position in the market, attract new customers, and retain existing ones. With a customer-centric approach and a commitment to innovation, the application can continue to thrive in the dynamic and competitive e-commerce landscape

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