

# FutureHome

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## Executive summary

The FutureHome project addresses a critical challenge in the rapidly growing Smart Home market: the complexity and overwhelming variety of available devices and technologies, which often deter consumers from fully leveraging the benefits of smart home systems. With over 100,000 compatible devices for platforms like Amazon Alexa, consumers are frequently faced with confusion and frustration due to the lack of technical knowledge, interest, or time to navigate this complex landscape. The FutureHome platform seeks to bridge this gap by offering a comprehensive support service that assists households throughout their smart home journey — from selecting appropriate devices to managing and expanding their smart home ecosystems.

Our mission at FutureHome is clear: to make smart home technology simple and accessible for everyone. The project has evolved through various stages, initially focusing on enhancing convenience, security, and energy efficiency within households. Comprehensive research has identified gaps in the market, as well as opportunities for FutureHome to introduce a unique, user-friendly platform that delivers personalized recommendations and optimizes energy consumption. This initiative aims to empower consumers with the tools they need to make informed decisions, ensuring they can fully benefit from smart home technologies. FutureHome seeks not only to facilitate the adoption of these technologies but also to promote a more conscious and sustainable use of resources, ultimately contributing to an improved quality of life in modern homes.

Backed by a diverse team of five members with expertise in database construction, algorithm development, user experience design, and project management, FutureHome has undertaken extensive research activities. Backed by a diverse team of five members with expertise in database construction, algorithm development

This included primary research such as site visits, interviews with IoT experts, and participation in significant industry conferences like the SmartHome Expo in India and the IoT World Solution Congress in Barcelona. These activities provided invaluable insights into current IoT technologies and the latest market trends. Secondary research involved a thorough literature review and web-based research to access a wide range of data on existing smart home solutions. The team also developed detailed personas representing various user groups and stakeholders, which informed the platform's design and functionality. This methodical approach ensured that the platform meets the needs of a diverse range of stakeholders, including homeowners, manufacturers, and energy service providers.

FutureHome's solution is designed to meet the needs of its key stakeholders, including consumers, manufacturers, and energy providers. From the customers' perspective, the platform significantly enhances the home automation experience by providing a comprehensive central hub that supports an extensive array of devices and brands, ensuring seamless interoperability and integration throughout the entire system. This user-friendly solution streamlines the automation process, making it easier than ever to manage and control various smart home technologies from a single, unified interface. For manufacturers, FutureHome provides a platform to reach a targeted audience, offering features like product sponsorships and detailed analytics on customer preferences. Energy providers benefit from advanced energy efficiency comparison features, enabling them to offer personalized energy management solutions. The FutureHome platform could distinguish itself in the market by combining product comparison, tailored recommendations, and seamless device integration into a single, cohesive experience. This differentiates it from existing solutions like e-store websites, smart home platforms, and dedicated smart home integrators, which often lack the depth of personalization, specificity and integration that FutureHome provides.

At the core of FutureHome is a sophisticated algorithm that delivers personalized recommendations based on user profiles and preferences. The platform employs a MySQL relational database to maintain a high-quality, self-synchronizing product dataset. This database is populated with a hybrid automatic-human based Process and updated through AI-driven processes, ensuring the data remains current and accurate. The suggestion algorithm does not focus on individual products but rather on creating coherent packages that work seamlessly together, enhancing the overall user experience. This approach ensures that users receive high-quality recommendations that fit their specific needs, simplifying the decision-making process and promoting seamlessly adoption of smart home technologies.

The FutureHome project has been planned from an economic perspective, with a comprehensive budget and business plan that spans different phases and scenarios. Initial investment costs vary depending on the quality and scope of the project, with projected operational costs increasing as the platform scales. The revenue model for FutureHome is designed to evolve with the platform, starting with sponsored products and a freemium model and expanding to include data licensing and advanced analytics tools. This multi-phase approach ensures that the platform can generate substantial revenue while maintaining a balance between sponsored content and organic recommendations.

The FutureHome project has successfully identified and effectively addressed the wide range of key challenges that consumers commonly face within the smart home market. By doing so, it has created a more comprehensive, user-friendly solution that enhances the overall experience for users. With its interface and sophisticated recommendation algorithm, the platform is poised to simplify the smart home integration process for a broad audience. Moving forward, it is essential for FutureHome to continuously monitor advancements in smart home technology, establish partnerships with manufacturers, and refine its platform based on user feedback. The project's future development plans include expanding the platform's features, enhancing AI algorithms, and improving the user interface to maintain its competitive edge in the market. Strategic marketing efforts will also be crucial in establishing FutureHome as a leading solution in the smart home industry. The FutureHome team is committed to continuing their work in this dynamic field, aiming to achieve long-term success and establish a dominant position in the market.

## Key Words

Smart Home, Comparator, Products Database, Suggestion Algorithm

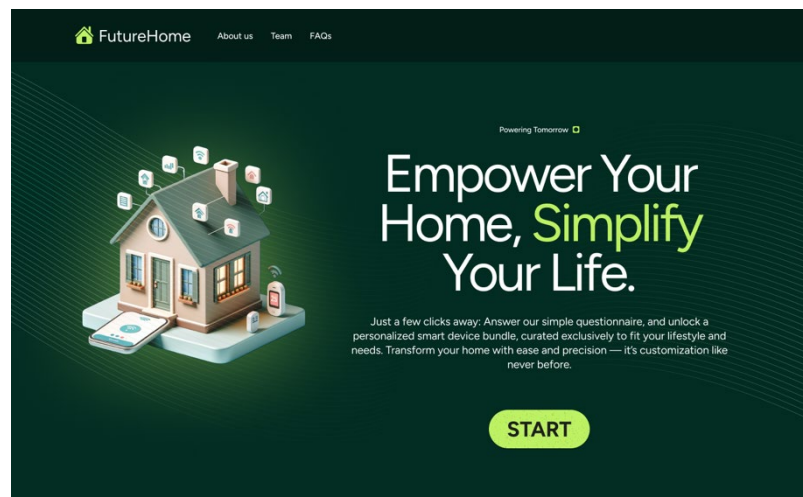


Figure 1: Comparator Platform Homepage

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Figure 2: Comparator Platform Homepage

## Project description

The FutureHome project aims to revolutionize the smart home market by developing an innovative business model and digital platform that allows users with low expertise level in automation in implementing their smart solution. FutureHome will offer a fair and objective comparison among different smart home devices and suggestion tailored to costumers' needs. The prominent goal is optimizing energy consumption, promoting significant economic savings, and ultimately improving the overall quality of life for its users.

At the core of the FutureHome platform is a highly sophisticated suggestion engine, which is powered by a robust mySQL relational database and a cutting-edge recommendation algorithm. This system sets FutureHome apart by offering not just a catalogue of individual devices, but creating complete, coherent smart home packages that are customized to meet the unique needs and preferences of each user. By understanding user behaviour and preferences, the algorithm ensures that devices from different manufacturers work seamlessly together, providing a level of interoperability that is often lacking in existing solutions. This eliminates the frustration many users experience when trying to integrate multiple devices from different ecosystems, simplifying the decision-making process and promoting a smoother adoption of smart home technologies.

One of the platform's standout features is its user-friendly interface, designed to make the complex world of smart home technology accessible to everyone, regardless of their technical expertise. The platform simplifies the decision-making process by guiding users through each stage of their smart home journey — from selecting the appropriate devices and systems to installing and managing them effectively. FutureHome's personalized recommendation system is designed to optimize energy consumption, a feature that appeals to both environmentally-conscious users and those looking to reduce household expenses.

In addition to benefiting consumers, the FutureHome platform offers significant advantages to manufacturers and energy service providers. For manufacturers, the platform serves as a valuable marketing tool, offering targeted product sponsorships and detailed analytics on customer preferences and behaviours. This allows manufacturers to better understand market demand and tailor their products to meet the needs of FutureHome's diverse user base. Energy providers, on the other hand, benefit from the platform's advanced energy efficiency comparison features, which enable them to offer personalized energy management solutions to their customers. By leveraging the platform's data and analytics, energy providers can help consumers make smarter decisions about their energy usage, leading to greater customer satisfaction and increased energy savings.

## Team description by skill

The FutureHome team consists of five engineers from diverse disciplines, each contributing unique skill to the project. While their academic backgrounds vary—from electronics, mechanical, to management engineering—working on FutureHome required a broadening of their skills, including learning from one another to ensure the platform's success. Below is a breakdown of their roles and the skills they brought to the project:

**Matteo – Database Architecture & Data Management (Electronics Engineering Background):** Matteo's background in electronics engineering originally focused on hardware systems, but for FutureHome, he expanded his skill set to include database design and management. He became proficient in MySQL systems and database modeling, areas typically outside the realm of electronics engineering. Matteo took the lead in designing the platform's database architecture, learning about data population processes and ensuring smooth and secure data integration.

**Edoardo – Algorithm Development & Data Analytics (Mechanical Engineering Background):** Edoardo's mechanical engineering background centered on physical systems, but to meet the needs of FutureHome, he delved into algorithm development and data analytics. This required him to acquire skills in machine learning, data science, and predictive modeling, using tools like Python—all of which were outside his typical mechanical engineering training.

**Michelangelo – Advanced Algorithmic Solutions & Software Engineering (Electronics Engineering Background):** Michelangelo, also an electronics engineer, had to transition from hardware expertise to software engineering for FutureHome. His deep dive into algorithms and optimization process was essential for making the result of FutureHome

reliable.

Tommaso – User Interface Design & Front-End Development (Electronics Engineering Background): With a foundation in electronics engineering, Tommaso took on the challenge of leading the mockup design of FutureHome. He quickly became proficient in design tools like Figma. Tommaso's ability to create intuitive user interfaces, while ensuring technical feasibility, required significant learning and collaboration with his teammates.

Ilaria – Project Management & Economic (Management Engineering Background): As the only management engineer on the team, Ilaria's expertise in project management, business strategy, and financial planning was helpful in keeping FutureHome on track. However, her role also required her to support more technical aspects of the project.

## Goal

The goal of the FutureHome project is to address the complexities and challenges that consumers face in navigating the rapidly expanding smart home market. With the increasing variety of devices and technologies available, consumers often find it difficult to select, integrate, and manage smart home systems. FutureHome aims to simplify this process by offering a comprehensive platform that provides personalized recommendations for smart home devices, tailored to each user's specific needs and preferences. By doing so, the project seeks to enhance convenience, security, and energy efficiency for households while ensuring a seamless and user-friendly experience.

At the core of FutureHome's mission is the development of an advanced web platform powered by a sophisticated recommendation algorithm. This algorithm processes user inputs—such as property details, desired level of automation, energy efficiency goals, and budget—to generate customized product bundles. These bundles ensure compatibility between different devices and maximize user satisfaction by taking into account factors such as price, energy savings, privacy concerns, and ease of use. FutureHome distinguishes itself from existing solutions by offering not just product comparisons but also complete smart home packages that are optimized for interoperability and user convenience.

Another key objective of the FutureHome project is to promote sustainable and energy-efficient living. By providing recommendations for energy-efficient devices, the platform encourages users to adopt technologies that help reduce their environmental footprint. This aligns with the broader trend of integrating sustainability into everyday living through smart technology.

Furthermore, FutureHome aims to cater to multiple stakeholders, including consumers, manufacturers, and energy service providers. For consumers, it provides a user-friendly interface and tailored recommendations; for manufacturers, it offers a targeted platform for promoting products and understanding consumer behavior; and for energy providers, it serves as a tool to advance energy management solutions.

Ultimately, FutureHome seeks to bridge the gap between the complexity of smart home technology and the everyday user by offering a holistic, accessible, and efficient solution for building and managing smart home ecosystems.

## Understanding the problem

The modern smart home market is expanding rapidly, offering consumers an extensive range of devices and technologies designed to enhance convenience, security, and energy efficiency. However, this growth has also introduced several significant challenges for users who are often overwhelmed by the sheer volume of options and lack of clear guidance. The key issues in the smart home market are the complexities of device selection, integration, and management, which prevent consumers from fully utilizing the potential of smart home systems.

One of the primary challenges is the overwhelming number of smart home devices available to consumers. From thermostats and lighting systems to security cameras and voice assistants, there are thousands of options, each with its own set of features, technical specifications, and compatibility requirements. Many consumers, particularly those without a strong technical background, find it difficult to navigate this crowded marketplace. They often lack the time or expertise needed to assess which products will work best for their specific needs. As a result, they may make suboptimal purchases or fail to fully leverage the benefits of the smart home ecosystem.

Another significant problem in the smart home space is the lack of interoperability between devices from different manufacturers. Many smart home devices operate on proprietary communication protocols, such as Apple's HomeKit, Amazon's Alexa, or Google's Nest. This creates isolated ecosystems, where users are unable to integrate devices from different brands into a single, cohesive system. For example, a security camera that is compatible with Alexa may not work with Google Home, limiting the user's ability to control all devices from a unified hub. As a result, consumers often have to invest in multiple hubs or controllers, increasing both the complexity and cost of their smart home setup.

As more consumers become conscious of their environmental impact and energy usage, energy efficiency has become a key consideration in the adoption of smart home technologies. While products such as smart thermostats and energy-efficient lighting systems are available, many consumers struggle to find reliable information on the actual energy savings these devices provide. Furthermore, integrating renewable energy systems like solar panels into smart home setups remains a challenge for the average user, complicating their ability to live more sustainably.

The increase in connected devices within homes has raised concerns about security and privacy. Smart home devices collect vast amounts of data on users' habits, routines, and preferences, which introduces the risk of cybersecurity breaches. Unauthorized access to these systems could lead to privacy violations or even physical security risks, such as hacking into security cameras or alarm systems. Many consumers are also concerned about how their data is being used by manufacturers and third parties, which adds another layer of hesitation in adopting smart home technologies.

For consumers with limited technical knowledge, setting up and configuring smart home devices can be a daunting task. Many devices require complicated installation processes, and without professional assistance, users may encounter difficulties in ensuring their systems function correctly. Additionally, concerns about obsolescence and future compatibility deter potential buyers. Consumers fear that the devices they purchase may soon become incompatible with newer technologies, leading to a waste of money and effort.

In conclusion, the major challenges in the smart home market stem from consumer confusion over the vast array of available devices, issues with interoperability between different brands, concerns about energy efficiency, privacy, and security risks, as well as technical barriers to installation and operation. Addressing these problems is crucial for improving the user experience and driving broader adoption of smart home technologies.

## **Exploring the opportunities**

Despite the challenges present in the smart home market, there are immense opportunities for innovation and growth. The rapid adoption of smart home technologies, driven by increasing consumer demand for convenience, security, and energy efficiency, creates a fertile landscape for new solutions. Companies that can address the existing pain points—such as device overload, interoperability issues, and security concerns—have the potential to capture a significant share of this evolving market. By leveraging emerging technologies and providing a more user-centric experience, businesses can unlock new value for consumers, manufacturers, and service providers.

One of the most promising opportunities lies in simplifying the smart home experience for consumers. Currently, many users are overwhelmed by the sheer number of available devices and the technical knowledge required to integrate them. A platform that offers personalized recommendations based on user needs, budget, and preferences can bridge this gap. Such a solution would provide tailored smart home packages that ensure compatibility across devices, reduce decision fatigue, and enhance user satisfaction. By streamlining the product selection process and focusing on user-friendly interfaces, businesses can significantly improve the adoption rate of smart home technologies.

Interoperability is another key area of opportunity. With the development of universal communication protocols, such as the Matter protocol, there is a growing movement toward standardizing smart home device communication. Companies that can integrate this standardization into their offerings will position themselves as leaders in enabling seamless smart home ecosystems. A platform that allows users to control and monitor devices from multiple brands and systems through a single interface will be highly attractive to consumers, as it simplifies the complex nature of managing



various smart home systems.

Sustainability and energy efficiency represent additional growth avenues. With increasing awareness of environmental concerns, consumers are actively seeking ways to reduce their carbon footprint and lower energy bills. Smart home technologies that optimize energy use, such as smart thermostats, lighting, and appliances, are already in demand. However, there is an opportunity to enhance this further by integrating renewable energy systems, like solar panels, into smart home platforms. A solution that provides real-time monitoring and control of energy usage, combined with personalized recommendations for energy-saving products, would resonate with eco-conscious consumers and help drive adoption of smart home technologies focused on sustainability.

Moreover, the growing emphasis on data privacy and security opens opportunities for companies that prioritize these aspects. As smart home devices increasingly collect sensitive personal information, users are becoming more concerned about data breaches and unauthorized access. Offering secure, privacy-focused solutions that provide transparency around data usage and ensure robust protection will appeal to security-conscious consumers. This could involve developing systems that rely on simplifying the adoption process.

Finally, there is potential for monetization through strategic partnerships with smart home manufacturers and energy providers. By facilitating targeted advertising, product sponsorships, and offering valuable data insights, platforms can generate revenue while providing manufacturers with direct access to relevant consumer segments. This business model can also be extended to energy service providers who are looking to offer personalized energy management solutions to their customers.

Generating a solution

The core concept of FutureHome is to simplify the decision-making process for households looking to integrate smart home technology. The platform uses a sophisticated algorithm that generates personalized recommendations based on user profiles and preferences. By analyzing the specific needs and preferences of users, FutureHome’s algorithm optimizes smart home product bundles that are not only tailored to individual requirements but also designed to work seamlessly together. This approach eliminates the complexity of selecting and managing multiple devices, ensuring a smooth user experience from start to finish.

At the heart of the platform is a MySQL relational database that stores and manages a constantly updated, high-quality dataset of smart home products. The integration of AI ensures that the product information remains accurate and up to date, allowing the platform to deliver reliable recommendations. The backend system is built with scalability, reliability, and user-friendliness in mind, providing an intuitive experience through a well-designed graphical interface. The recommendation algorithm further enhances this process by using various optimization techniques to create cohesive product bundles that align with user preferences. AI-generated descriptions of these bundles help users understand the benefits and features of the recommended products, making it easier for them to make informed decisions.

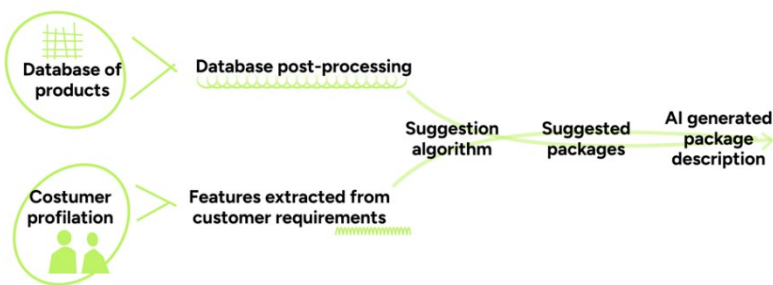


Figure 2: FutureHome’s recommendation system

Unlike existing solutions, which often focus on limited device comparison or basic product control, FutureHome distinguishes itself by offering a comprehensive platform that combines personalized recommendations with seamless product integration. General product comparison websites, such as e-commerce platforms, lack the depth of focus on smart home devices that FutureHome offers. Likewise, dedicated smart home platforms, such as Apple HomeKit or Google Home, primarily focus on device compatibility and control but do not provide the comprehensive comparison and personalized features that FutureHome does. FutureHome's unique value proposition lies in its ability to combine the strengths of both product comparison websites and smart home platforms, delivering a seamless and personalized experience for users.

FutureHome also promotes sustainability by recommending energy-efficient products, encouraging users to make environmentally friendly choices. This focus on energy efficiency is integrated into the recommendation algorithm, helping users reduce their carbon footprint and lower energy costs. The platform's impact extends beyond individual households, with the potential to drive broader adoption of smart home technologies by simplifying the process and reducing decision fatigue for users.

Additionally, FutureHome has the potential to generate new revenue streams by forming partnerships with smart home manufacturers, retailers, and energy providers. Through product sponsorships, advertising revenue, and transaction fees, the platform can create a sustainable business model. FutureHome also envisions expanding its services by offering a direct link between users and professional installers, simplifying the purchasing and installation process. By following a model similar to that of Otovo in the solar panel sector, FutureHome can further enhance its value proposition by offering all-in-one services that foster customer trust and loyalty.

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