HomeGenie

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Human-Computer Interaction

Section 1: Introduction

Before diving into what this project is all about, I have prepared some questions that demand to be answered for a better understanding of the concepts I have utilized in my implementation.

- What is HomeGenie?

HomeGenie is a Graphic User Interface (GUI) for a Smart Home Assistant System. Its main purpose is to simulate the layout of such a device, so that it is accessible to all potential users, intuitive and interactive. It has plenty of useful functionalities, relevant for enhancing the user experience.

- Why does the world need Smart Home Assistants?

In an era where technology seamlessly integrates with our daily lives, the concept of a smart home has evolved from a futuristic vision to a tangible reality. Smart Home Assistants are essential in this transformation as they enhance convenience, efficiency, and security in our homes. They enable effortless control of various devices, from lighting and thermostats to entertainment systems, through voice commands or mobile apps. This automation not only saves time and energy but also supports sustainable living by optimizing resource use.

- Are people actually using Smart Home Assistants?

According to an article on the website Cleango[1], there are approximately 258.54 million smart homes in the world and at least 72% of all millennials said they are willing to pay more for a property that already has smart home systems installed. So, the answer to the question is yes, people are really using and relying on Smart Home Assistants.

[1] https://www.bookcleango.com/blog/smart-home-statistics

Section 2: Research

To understand the current landscape of Smart Home Assistant usage and user preferences, I conducted an online survey targeting a diverse demographic of participants. The survey[2] aimed to gather insights on how people would want to interact with Smart Home Assistants, their satisfaction levels, and areas for potential improvement. The survey included questions about potential interest in buying a Smart Home Assistant, types of tasks performed, perceived benefits, and any challenges faced by users.

Survey Demographics

The survey received responses from 45 participants across different age groups, levels of education, and levels of interaction with technology. A significant portion of the respondents (77.8%) were aged between 25-34, representing a key demographic for smart home technology. The survey also captured data from a person with disabilities, making it possible to further understand the special needs in this piece of software for this group of people.

Key Findings

1. **Potential Interest and Common Tasks:**
    - **Rate of Attraction**: A significant part (46.7%) of respondents have shown interest in buying and utilizing a Smart Home Assistant, primarily for simplifying and helping with daily domestic tasks.
    - **Popular Functions**: The most common tasks included interaction with smart devices (75%), helping with scheduling tasks and chores (43%), and providing entertainment (40%).
2. **Perceived Benefits:**
    - **Voice Control**: 91% of respondents the convenience of voice control operation as a major benefit, making it easier to manage daily routines.
    - **Simplicity**: 69% of participants think that an intuitive interface is necessary in order to have an efficient interaction with the Smart Home Assistant.
    - **Accessibility**: 51% of potential users noted that Smart Home Assistants should significantly improve accessibility for individuals with disabilities.

[2] https://forms.gle/AqWjAoeoyE442woy8

3. **Challenges and Concerns:**
    - **Security**: 37% of respondents expressed concerns about the potential for security breaches, indicating a need for more robust security measures.
    - **Privacy**: 35% of users raised the issue regarding data privacy, suggesting a need for a secure mechanism and software.
    - **Reliability**: 15% of participants reported possible reliability issues, such as misinterpreted voice commands, affecting the overall user experience.

Conclusion

The survey results highlight a growing adoption of smart home assistants, driven by the benefits of convenience, energy efficiency, and improved accessibility. However, to further enhance user satisfaction and address concerns, it is crucial for me to focus on developing an intuitive user interface, enhancing the reliability of this system and improving data security. These insights provide valuable guidance for the ongoing development and optimization of my Smart Home Assistant, aiming to create a more seamless and secure user experience.

Section 3: Design Principles

Design principles are fundamental guidelines that shape the creation and development of user-centric products and services. In the context of Smart Home Assistants, these principles ensure that the technology is intuitive, accessible, and seamlessly integrated into users' daily lives. By adhering to well-established design principles, I can create an interface that is not only functional and reliable but also enhances the overall user experience through thoughtful design and innovation.

The Design of HomeGenie

Upon launching HomeGenie, users are greeted with an engaging introductory screen featuring a sleek animation. This initial interaction is designed to capture user interest and provide a visually appealing overview. The animation seamlessly transitions into the main dashboard, where users can easily navigate through various sections of the platform.

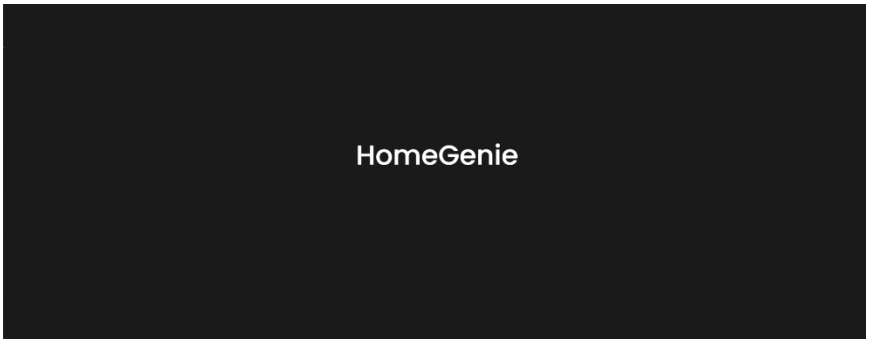


Figure 3.1: Intro screen

The user interface is intuitively organized into several key sections that can be easily navigated, each represented by a distinct icon on the left-hand side menu:

1. **Dashboard**: The central hub of the platform, the Dashboard provides an overview of all the user's friends and their status. It also provides information about the live time and weather at the current location of the user.

2. **Rooms**: This section displays each room of the house, enabling users to control and monitor specific devices of the rooms in their home. Whether it's adjusting the lighting in the living room or checking the temperature in the bedroom, the Rooms section offers a tailored approach to home management.

3. **Security**: Focused on home safety, the Security section allows users to manage security cameras, alarm systems, windows and smart plugs. It provides[3] the ability to review security footage, ensuring that users can maintain a secure environment.

4. **Leisure**: The Leisure section enhances the home entertainment experience by integrating a music system, connected to a Spotify account, and access to a news section based on a certain topic. Users can control speaker management across the rooms, creating a relaxing ambiance with ease.

5. **Activities**: This area helps users keep track of certain chores and activities, with the help of a task scheduler and a notes section. This way, the Activities section ensures a personalized and efficient time management.

6. **Notifications**: The Notifications section keeps users informed with real-time updates and alerts. Notifications are tied up to the application's buttons, providing insight of the usage of the smart devices in the users' home.

7. **Settings**: The Settings section allows users to customize their HomeGenie experience. From configuring notification preferences to managing account details, this section provides all the necessary tools for personalization and optimization of the Smart Home Assistant.

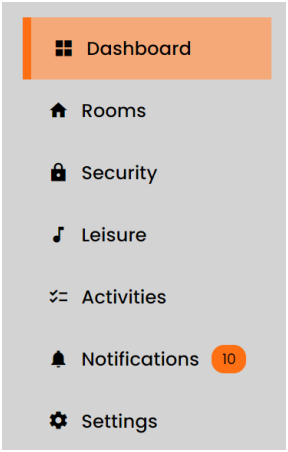


Figure 3.2: Left-hand side menu

Overall, the design of HomeGenie is centered on user-friendly navigation and comprehensive functionality, ensuring that users can effortlessly manage and enjoy their smart home environment.

[3] Review of video footage should be provided in future updates of HomeGenie.

Section 4: Prototyping and Iteration

In the development of HomeGenie, prototyping played a crucial role. High-quality interactive prototypes were meticulously crafted to showcase the platform's usability and accessibility features. These prototypes served as tangible representations of the user interface, allowing potential users to interact with and provide feedback on the design.

Initial Functionalities

HomeGenie boasts a wide array of functionalities designed to enhance the user experience and provide an accessible, intuitive interface. From the moment users engage with the platform, they encounter a seamless integration of features that cater to various aspects of smart home management.

Each room tab in the Rooms Section is connected to the smart devices in that certain room, making it easy for the user to interact with their home from inside the house or remote. Some of the functionalities for the rooms are:

- Light toggling;
- Temperature modifier / Thermostat;
- TV / Computer / Speaker / Lamps switch;
- Fan and Curtains controller;
- Washing Machine usage.

The Security Section is equipped with a suite of functionalities dedicated to ensuring the safety of the home, making it easy to have:

- Smart Plugs control;
- Windows control;
- Alarm System control.

The Leisure section is designed to enhance the home entertainment experience, offering seamless functionalities such as:

- Media playback (Spotify);
- Speakers control;
- News and Media.

The Activities Section is subject to HomeGenie's task scheduler, a tool that allows the user to plan activities, meetings, deadlines, projects etc. in an organized and efficient way. New tasks can always be added and tasks that are done can be eliminated, so that only the remaining ones will be displayed.

Finally, the Settings Section offers the possibility of changing the user's profile picture and username.

Following the initial prototyping phase, I dedicated plenty of time for iteration. This process involved analyzing user feedback to identify areas for improvement and implementing changes to enhance the overall user experience. In order to achieve this, I have reached out to some of the persons that completed my initial survey for user research and asked for opinions regarding the improvement of HomeGenie. The answers I got were nothing but impressive and made me want to implement them.

Added Functionalities

- Security camera control[4], allowing the user to have real-time footage of a security camera installed inside or outside the house;
- A calendar linked to the task scheduler, helping the user to better visualize the deadlines of the different tasks;
- A notes section that further helps with reminders and other information the user can access at any time through HomeGenie;
- A notifications system, integrated in the Notifications Section, that gives the user insight on when the devices in their home have been used;
- Settings for notifications;
- Possibility to link HomeGenie to social media platforms.

To further enhance accessibility and make HomeGenie more convenient for users with disabilities, we have introduced two critical features.

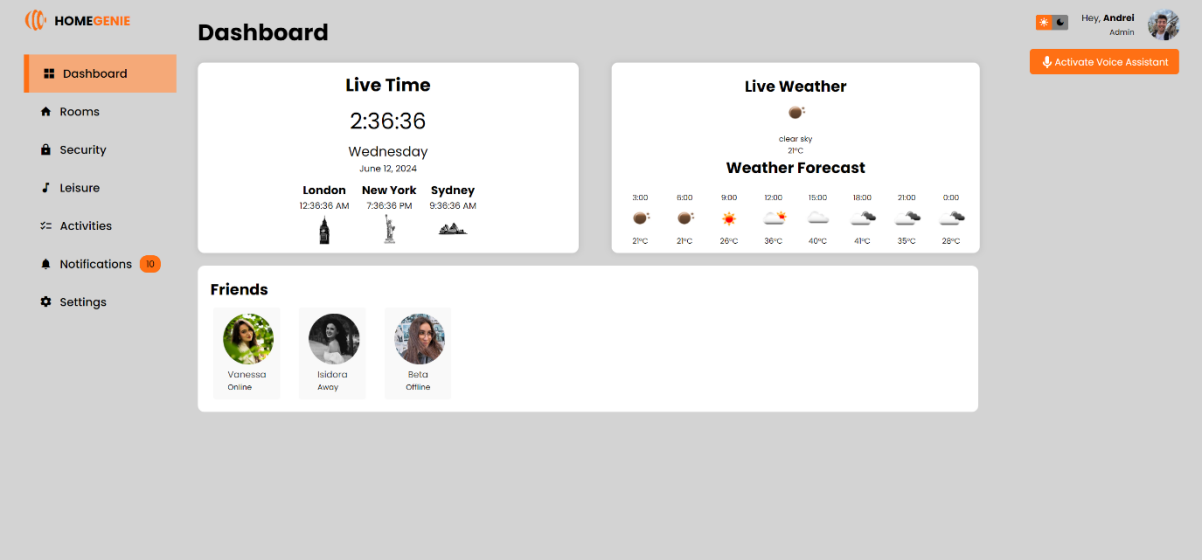
1. **Light Mode/Dark Mod**e option allows users to toggle between lighter and darker color schemes, reducing eye strain and preventing visual fatigue, which is especially beneficial for those with visual impairments;
2. **Voice Commands** feature enables users to perform various tasks through spoken instructions, significantly aiding individuals with visual disabilities and enhancing their overall interaction with the platform.

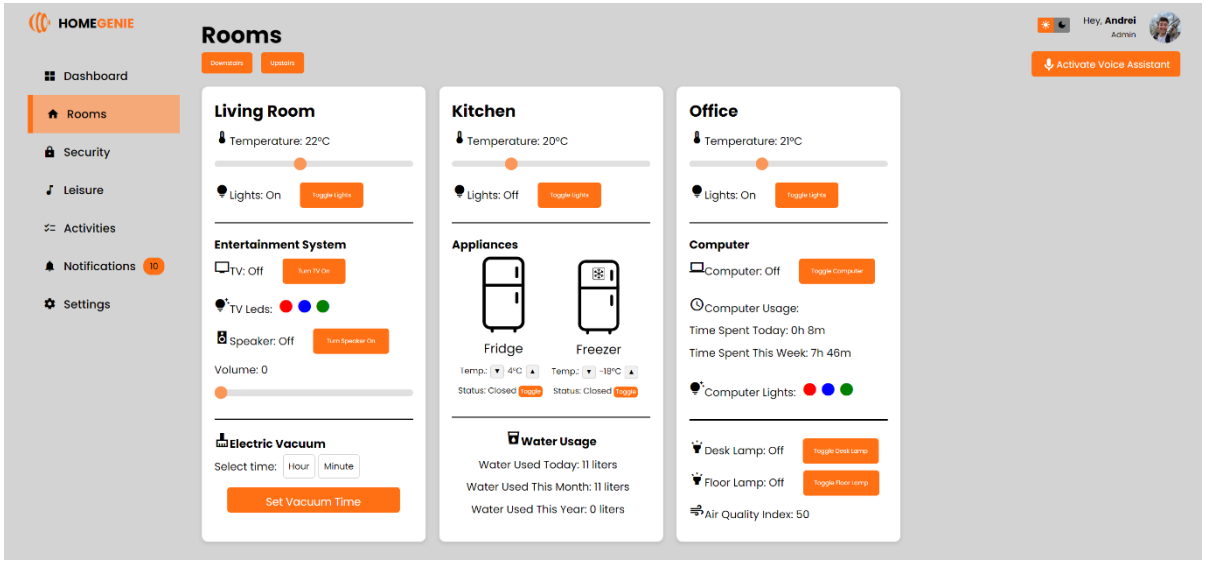
These features collectively ensure that HomeGenie is accessible and user-friendly for everyone.

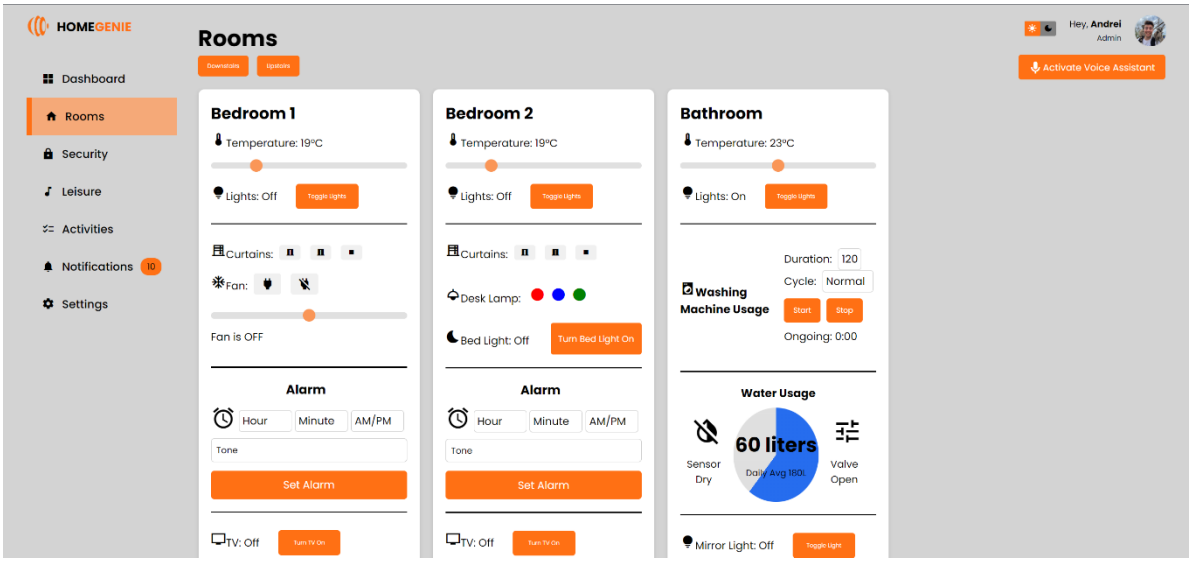
[4] As mentioned before, this is to be implemented in a future version.

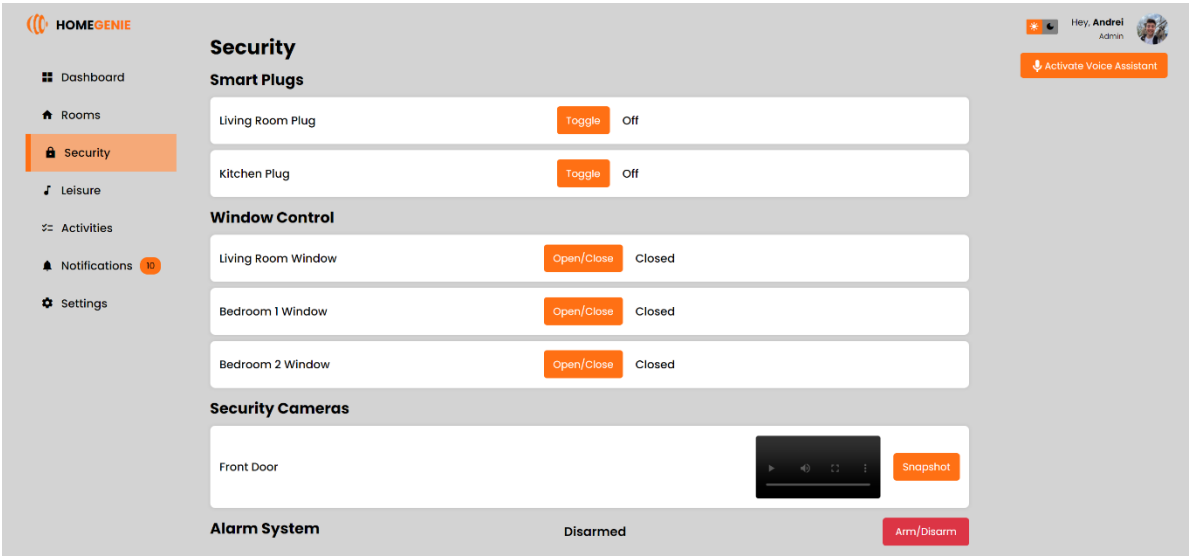
Section 5: Final Design and Implementation

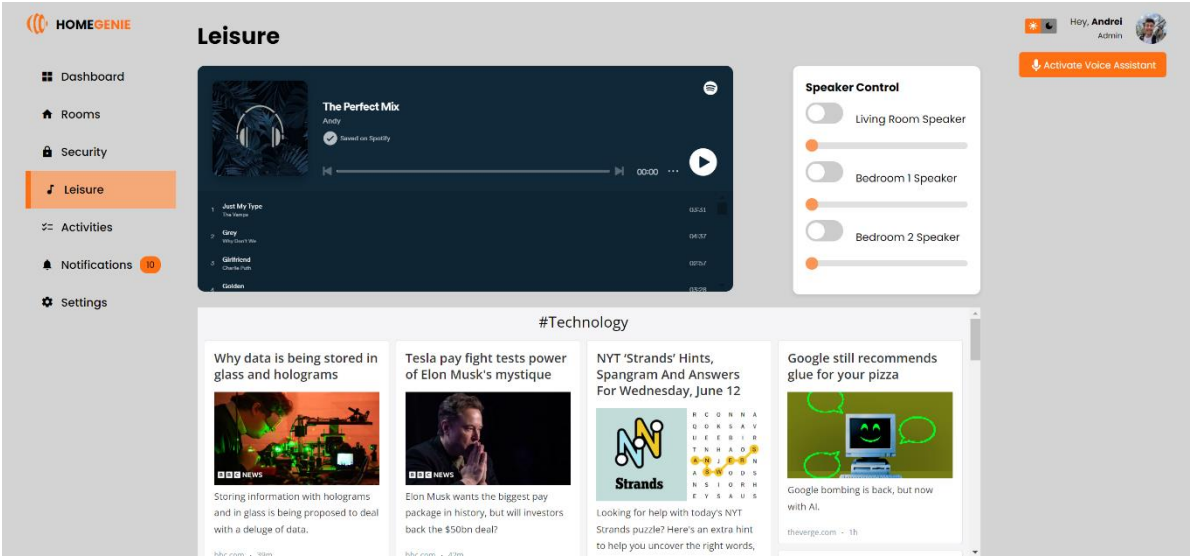
The final design of HomeGenie represents the culmination of extensive user research, iterative prototyping, and rigorous testing. It features a sleek, intuitive interface that seamlessly integrates various smart home functionalities, ensuring ease of use and accessibility for all users. The design emphasizes clear navigation, with distinct sections for different aspects of home management, such as security, leisure, and activities. Accessibility features, including Light Mode/Dark Mode and Voice Commands, have been thoughtfully incorporated to accommodate users with disabilities. The result is a robust, user-centric platform that not only meets the diverse needs of modern households but also provides a cohesive and enjoyable user experience.






HOMEGENIE
Rooms
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Hey, Andrei
Admin
Activate Voice Assistant
Bedroom 1
Temperature: 19°C
Lights: Off
Toggle Lights
Curtains:
Fan:
Fan is OFF
Alarm
Hour
Minute
AM/PM
Tone
Set Alarm
TV: Off
Turn TV On
Bedroom 2
Temperature: 19°C
Lights: Off
Toggle Lights
Curtains:
Desk Lamp:
Bed Light: Off
Turn Bed Light On
Alarm
Hour
Minute
AM/PM
Tone
Set Alarm
TV: Off
Turn TV On
Bathroom
Temperature: 23°C
Lights: On
Toggle Lights
Washing Machine Usage
Duration: 120
Cycle: Normal
Start
Stop
Ongoing: 0:00
Water Usage
Sensor Dry
60 liters
Daily Avg 180l
Valve Open
Mirror Light: Off
Toggle Light


HOMEGENIE
Security
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Hey, Andrei
Admin
Activate Voice Assistant
Smart Plugs
Living Room Plug
Toggle
Off
Kitchen Plug
Toggle
Off
Window Control
Living Room Window
Open/Close
Closed
Bedroom 1 Window
Open/Close
Closed
Bedroom 2 Window
Open/Close
Closed
Security Cameras
Front Door
Snapshot
Alarm System
Disarmed
Arm/Disarm


HOMEGENIE
Leisure
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Hey, Andrei
Admin
Activate Voice Assistant
The Perfect Mix
Andy
Saved on Spotify
00:00
Speaker Control
Living Room Speaker
Bedroom 1 Speaker
Bedroom 2 Speaker
#Technology
Why data is being stored in glass and holograms
Storing information with holograms and in glass is being proposed to deal with a deluge of data.
Tesla pay fight tests power of Elon Musk's mystique
Elon Musk wants the biggest pay package in history, but will investors back the $50bn deal?
NYT 'Strands' Hints, Spangram And Answers For Wednesday, June 12
Strands
Looking for help with today's NYT Strands puzzle? Here's an extra hint to help you uncover the right words,
Google still recommends glue for your pizza
Google bombing is back, but now with AI.
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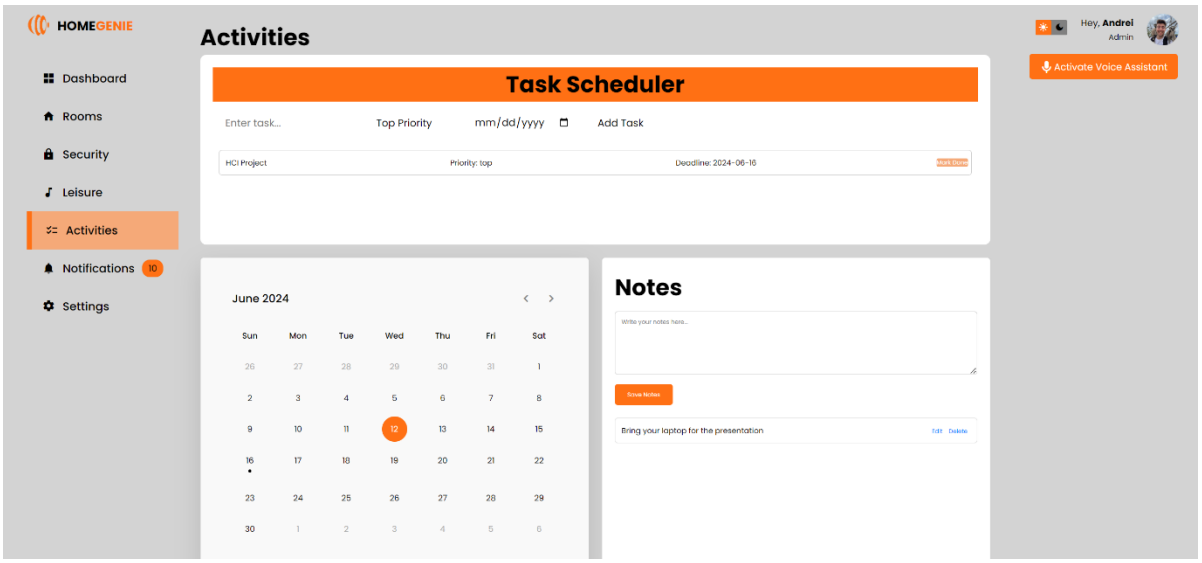
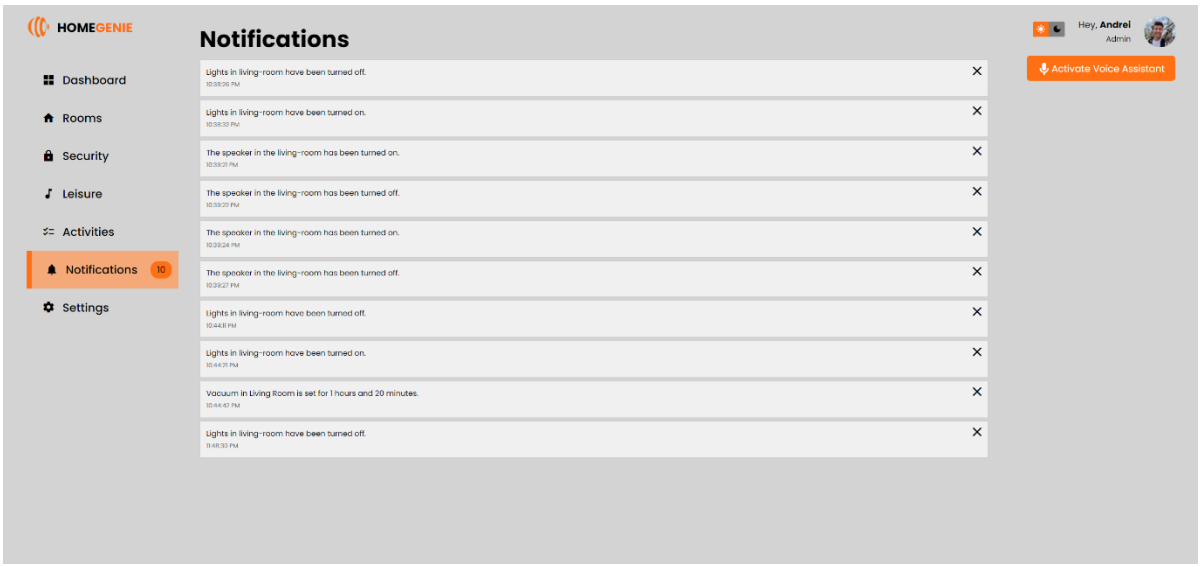
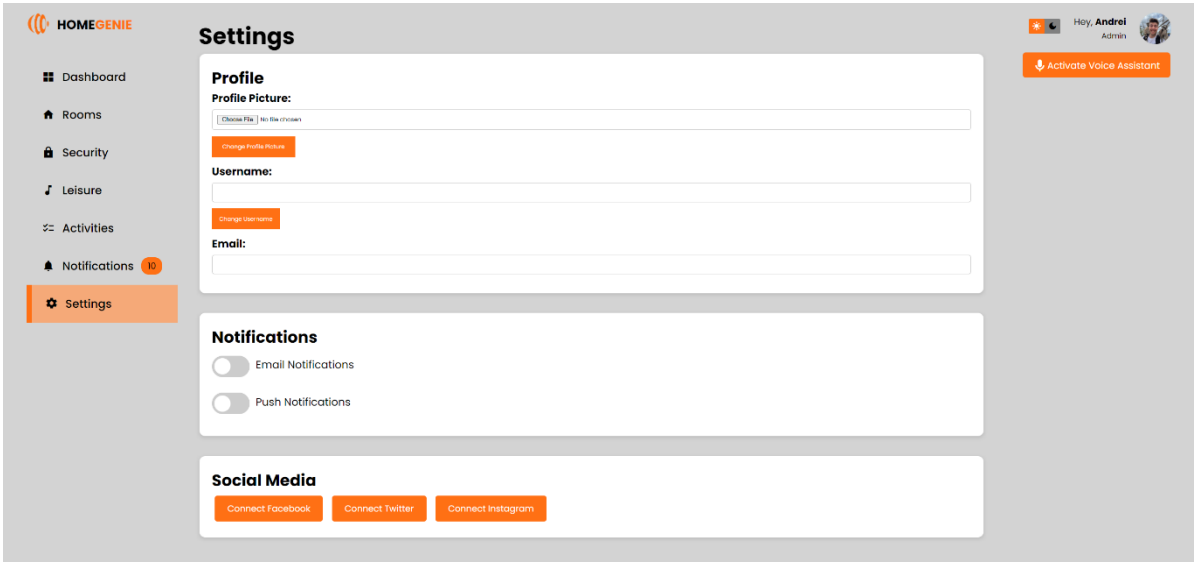

HOMEGENIE
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Activities
Hey, Andrei
Admin
Activate Voice Assistant
Task Scheduler
Enter task...
Top Priority
mm/dd/yyyy
Add Task
HCI Project
Priority: top
Deadline: 2024-06-16
June 2024
Sun Mon Tue Wed Thu Fri Sat
Notes
Write your notes here...
Save Notes
Bring your laptop for the presentation
Edit Delete


HOMEGENIE
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Notifications
Hey, Andrei
Admin
Activate Voice Assistant
Lights in living-room have been turned off.
Lights in living-room have been turned on.
The speaker in the living-room has been turned on.
The speaker in the living-room has been turned off.
The speaker in the living-room has been turned on.
The speaker in the living-room has been turned off.
Lights in living-room have been turned off.
Lights in living-room have been turned on.
Vacuum in Living Room is set for 1 hours and 20 minutes.
Lights in living-room have been turned off.


HOMEGENIE
Dashboard
Rooms
Security
Leisure
Activities
Notifications 10
Settings
Settings
Hey, Andrei
Admin
Activate Voice Assistant
Profile
Profile Picture:
Choose File
No file chosen
Change Profile Picture
Username:
Change Username
Email:
Notifications
Email Notifications
Push Notifications
Social Media
Connect Facebook
Connect Twitter
Connect Instagram

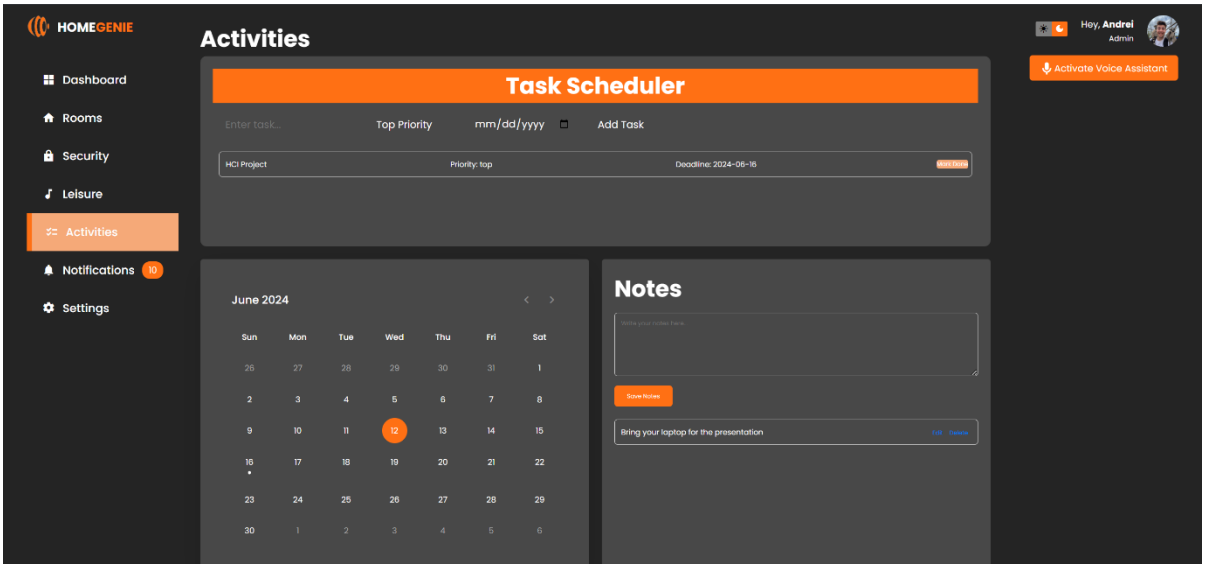


Figure 5.1: Example of one of the sections displayed in dark mode.

Implementation

The implementation of HomeGenie was achieved through the integration of HTML, CSS, and JavaScript, creating a seamless and dynamic user experience. HTML served as the backbone, structuring the content and layout of the application. CSS was utilized to style the interface, ensuring a visually appealing and responsive design that adapts to various devices and screen sizes. JavaScript played a crucial role in adding interactivity, enabling real-time updates, and managing user interactions with the platform. Through the cohesive use of these technologies, I developed a robust and intuitive smart home assistant that is both functional and aesthetically pleasing.

The final result of the website can be found here.

Section 6: Future Additions

As I continue to innovate and enhance the HomeGenie platform, several future additions are planned to further elevate user experience and functionality. Upcoming features include:

- a log in screen, implementation of different users and the possibility to interact between users;
- possibility of adding different widgets to each room tab and of managing inclusion of widgets for each room in real time;
- visualization of the house with the help of a 3D model, possibility of choosing the rooms by clicking on them on that 3D model;
- addition of multiple security cameras and live footage of them being displayed in the app;
- improvement of the notification system, addition of more notifications connected to the app's widgets, such as:
    - friends' status, or messages received from them;
    - information about weather, suggestions regarding what to wear or not to wear at a certain time of the day;
    - temperature suggestions (if a room has a lower temperature that the one preferred, the notification could suggest modifying it);
    - water and electricity usage, suggestions regarding using less of them;
    - reminders for deadlines of tasks;
    - notifications from the social media connected to the app;
- actual implementation of push and email notifications, preferences of which of the notifications should be sent;
- actual implementation for the social media connection;
- more voice commands[5] and implementation of a responding voice for the commands given to the app;
- better graphics and visualization for the widgets already included in the app;
- addition of elements to the right side of the app, under the profile section;
- possibility of choosing between multiple languages for the app.

[5] At this moment, voice commands are only implemented for the living room tab in the Rooms Section, as a preview of how those would work.

Section 7: Conclusions

The development and implementation of HomeGenie have successfully resulted in a intuitive, accessible and user-friendly smart home assistant platform. Through careful consideration of design principles, iterative prototyping, and rigorous user feedback, I have created a system that meets the diverse needs of modern households. The incorporation of accessibility features like Light Mode/Dark Mode and Voice Commands ensures inclusivity, while the robust functionality across all sections provides comprehensive home management solutions. Looking ahead, my planned future additions will continue to enhance the platform's capabilities, cementing HomeGenie's possibility of becoming a strong product in the smart home technology.