Technical Report - **Product specification**

My Sweet Home

Course:	IES - Introdução à Engenharia de Software
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Project abstract:	My Sweet Home is a system where a user can associate multiple output devices installed in his home to certain actions and rules that act upon the information from input devices.

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1 Introduction

This project takes place as the final assignment for the Introduction to Software Engineering (IES) course. As we embark on the journey of software development, it's essential to understand the broader context and objectives of this particular project.

In a world where technology continues to reshape the way we live, 'My Sweet Home' emerges as a way to simplify the setup and connection between the ever growing quantity of intelligent devices that live in our homes. Our vision is to create a seamless and intuitive system that empowers users to effortlessly connect and orchestrate the devices in their homes, transforming ordinary living spaces into intelligent, responsive environments. 'My Sweet Home' is a project that promises to redefine the way we interact with our living spaces by enabling users to associate input devices, such as thermostats, daylight sensors, biometric sensors, with customized output actions.

Imagine a home where your preferences are not just known but actively catered to, where your actions harmonize with the desires of others in your household. 'My Sweet Home' will bring this vision to life by tailoring actions to each specific user and ensuring that they do not conflict with the preferences of fellow residents. For instance, if one user wants to enjoy music at a specific time, 'My Sweet Home' will ensure that the music does not disrupt another's peace and quiet.

This is not just about automation; it's about personalization. From simple tasks like adjusting the temperature or routing your phone's music to the house's speakers upon your arrival, to more complex scenarios limited only by your imagination.

With a user-friendly front-end interface, you can effortlessly define and refine these action-reaction pairs, making your home smarter, more comfortable, and uniquely yours.

Welcome to 'My Sweet Home,' where technology enhances your life and transforms your home into a sanctuary of customized comfort and convenience.

2 Product concept

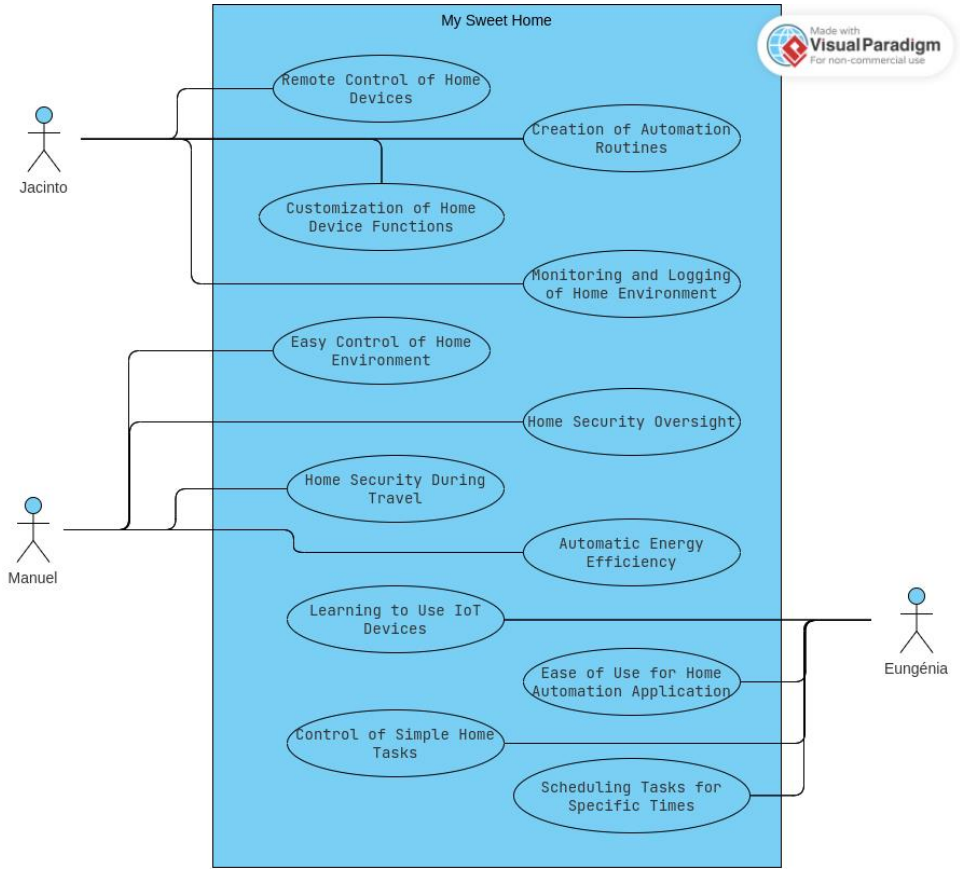
Vision statement

- Our aim with My Sweet Home is to develop a system where a user can associate input devices in his house to certain actions.
- This project involves several receivers (inputs, such as thermostats, daylight-sensors, biometric-sensors, etc...) to be associated with output actions defined by the user and executed by a set of output devices.
- The actions would be tailor made for each specific user and would need to verify if, for example, a user's action would interfere with another user's preference, like if a user likes to turn on music at 11:00h but another user, which we know is inside the same house, doesn't want to be bothered by music until later.
- One example of a simple task would be to close the windows if the temperature got too cold for the specifications of the users inside the house, or to pass the music streaming of a user's phone to the house's speakers after he arrives home.
- In the front-end we would be able to set these action-reaction pairs.

Many other products like these exist, but most are both closed source and proprietary, meaning that even if you already have such smart devices, they many times lack the capacity to communication between them or the brains necessary to associate the wanted action-reaction pairs for proper home automation.

We aim to make our implementation both open source and easy to work with, so new devices can be implemented and even adapted to work with our solution with easy with some internal know how.

Use case Diagram



Personas and Scenarios

A Persona is a character utilized to tell stories that represent future possible use cases for the system. A Persona is an instanciated actor with a given set of characteristics made to to humanize and help define the usability context of the system and motivations.

A Scenario is a narrative describing interactions between actors and a system. It can be use to describe a specific use case's flow of events, to outline the existing system's usage, or to illustrate a required functionality in a new system. It serves to better understand the use case and give a better view of the problem.

Persona #1 - Jacinto

Name: Jacinto

Age: 35

Occupation: IT Manager

Background: Jacinto lives alone in a smart home equipped with various IoT devices. As a busy professional, he values efficiency and convenience. He often travels for work and likes to keep an eye on his property.

Goals: Jacinto wants to remotely control his home devices and automate routines to simplify his life. He also wants to ensure his home is secure while he's away.

Pain Points: Jacinto may struggle with the setup and maintenance of the system due to his busy schedule. He may also have concerns about data privacy and security.

Persona #2 - Manuel

Name: Manuel

Age: 67

Occupation: Retired Teacher

Background: Manuel lives with his spouse in a small house. Due to their ages, they are looking for ways to make their home more accessible and easier to manage.

Goals: Manuel wants to use home automation to help manage tasks around the home, like controlling lights, adjusting the thermostat, or locking doors. He also wants to use automation to help with energy efficiency.

Pain Points: Manuel may struggle with the technical aspects of setting up and operating the system. He might also have concerns about the cost of implementing and maintaining a home automation system.

Persona #3 - Eugénia

Name: Eugénia

Age: 55

Occupation: Nurse

Background: Eugénia lives alone and has recently moved into a home with pre-installed IoT devices. She is not very familiar with technology and has minimal experience with smartphones and computers.

Goals: Eugénia wants to take advantage of the installed home automation system to make her life easier, but she's unsure where to start. She would like to control her lighting, heating, and security systems remotely.

Pain Points: Eugénia is not confident about using technology and worries about accidentally triggering the wrong functions. She also fears that she might not be able to troubleshoot issues when they arise. She needs a system that is intuitive and easy to use, with clear instructions and support available.

Scenarios

Scenario 1: Smart Home Automation Setup

Jacinto, the IT Manager, is on a business trip. He decides it's the perfect time to set up his smart home automation system. He remotely connects to his home network using the webapp and with a few clicks, he configures his IoT devices to create an automated routine. He sets up the lights to turn on and off at specific times, adjusts the thermostat, and activates the security system for his peace of mind.

Scenario 2: User-Friendly Assistance

Manuel and his wife usually spend a lot of time inside their home doing tasks and relaxing. Due to their age, Manuel would like to have as much devices set up for security as possible, for example, Manuel wants to set up their oven to make sure neither he or his wife left it turned on for too long, or have the house blinds close after dark so they don’t need to leave the house at night.

Scenario 3: Intuitive Home Automation

Eugénia learned that her house has a smart oven that knows when it is fully preheaten and can send information to our app. She also knows that the app can turn on and off various devices, like lamps and window blinds arround her home, at the times she desires. She

wants to learn how to set up so she watched a youtube tutorial and decided to try the app. Eugénia follows the instructions and quickly learns to control her lighting and simple heating devices remotely. The system's intuitive design and user-friendly interface make her feel more confident and secure.

Product requirements (User stories)

<Keep in mind **main scenarios, related to the core value** of the system, and the methods for agile project management>

<Define the epics to be covered in the project.>

https://www.atlassian.com/agile/project-management/epics (this probably helps)

<present the user stories identified for the selected epics.>

Based on the user stories provided, here are the epics:

Epic 1: Remote Control and Monitoring

User Story #1: As Jacinto, I want to be able to remotely control my home devices, such as lights, thermostat, and security system, so that I can ensure my home is secure and comfortable even when I'm away on business trips.

User Story #5: As Manuel, I want to easily control the lights and thermostat in my home, so that I can manage my home environment and ensure my safety and comfort without relying on manual adjustments.

User Story #7: As Manuel, I want to make sure my home is secure while I travel to my vacation house, so that I can ensure my house is safe while I am away.

Epic 2: Automation and Routine Creation

User Story #2: As Jacinto, I want to create automation routines for my home devices, such as turning off lights and adjusting the thermostat at specific times, so that I can save energy and simplify my daily routines.

User Story #3: As Jacinto I want to create be able to map certain functions like

turning on music and pausing it depending on the current time and who else is in the house.

User Story #8: As Manuel, I want to automatically turn off the lights and central heating when necessary, so that I can increase my energy efficiency and waste less money on power.

User Story #12: As Eugénia, I want to be able to set up certain tasks to specific times of the day, so that I can, for example, wake up to music two hours before the next appointment in my schedule but never after 10 am.

Epic 3: Home Security

User Story #6: As Manuel, I want to have a security system overwatching the house while I do tasks, so that I can ensure that I don't forget any important security tasks like closing the fridge or turning off the stove.

User Story #10: As Eugénia, I want the application to be easy to use so that I can be sure I made the correct decisions in setting up my house's devices and functions.

Epic 4: IoT Device Usage and Education

User Story #9: As Eugénia, I want to easily learn how to use my house's installed IoT devices so that I can take advantage of their benefits.

User Story #11: As Eugénia, I want to control simple devices and functions so that I can crack down on as many small home tasks as I can.

Epic 5: Environmental Control and Monitoring

User Story #4: As Jacinto, I want to be able to monitor and log different receivers like thermometers around the house so that I can check how different parameters like temperature varied around the day.

3 Architecture notebook

Key requirements and constrains

<Identify issues that will drive the choices for the architecture such as: Will the system be driven by complex deployment concerns, adapting to legacy systems, or performance issues? Does it need to be robust for long-term maintenance?

Identify critical issues that must be addressed by the architecture, such as: Are there hardware dependencies that should be isolated from the rest of the system? Does the system need to function efficiently under unusual conditions? Are there integrations with external systems? Is the system to be offered in different user-interfacing platforms (web, mobile devices, big screens,...)?

E.g.: (the references cited in [XX] would be hypothetical links to previous specification documents/deliverables)

There are some key requirements and system constraints that have a significant bearing on the architecture. They are:

- The existing legacy Course Catalog System at Wylie College must be accessed to retrieve all course information for the current semester. The C-Registration System must support the data formats and DBMS of the legacy Course Catalog System [E2].
- The existing legacy Billing System at Wylie College must be interfaced with to support billing of students. This interface is defined in the Course Billing Interface Specification [E1].
- All student, professor, and Registrar functionality must be available from both local campus PCs and remote PCs with internet dial up connections.
- The C-Registration System must ensure complete protection of data from unauthorized access. All remote accesses are subject to user identification and password control.
- The C-Registration System will be implemented as a client-server system. The client portion resides on PCs and the server portion must operate on the Wylie College UNIX Server. [E2]
- All performance and loading requirements, as stipulated in the Vision Document [E2] and the Supplementary Specification [15], must be taken into consideration as the architecture is being developed.>

Architetural view

→ Discuss architecture planned for the software solution.

→ include a diagram

Module interactions

→ explain how the identified modules will interact. Use sequence diagrams to clarify the interactions along time, when needed

→ dicuss more advanced app design issues: integration with Internet-based external services, data synchronization strategy, distributed workflows, push notifications mechanism, distribution of updates to distributed devices, etc.>

4 Information perspetive

<which concepts will be managed in this domain? How are they related?>

<use a logical model (UML classes) to explain the concepts of the domain and their attributes>

5 References and resources

<document the key components (e.g.: libraries, web services) or key references (e.g.: blog post) used that were really helpful and certainly would help other students pursuing a similar work>