POLITECNICO
MILANO 1863

AUI project 2023-2024

GREEN IFTTT

EcoMate

THE TEAM

• Alessandro Sironi
alessandro1.sironi@mail.polimi.it – 10680296– Computer Science and Engineering

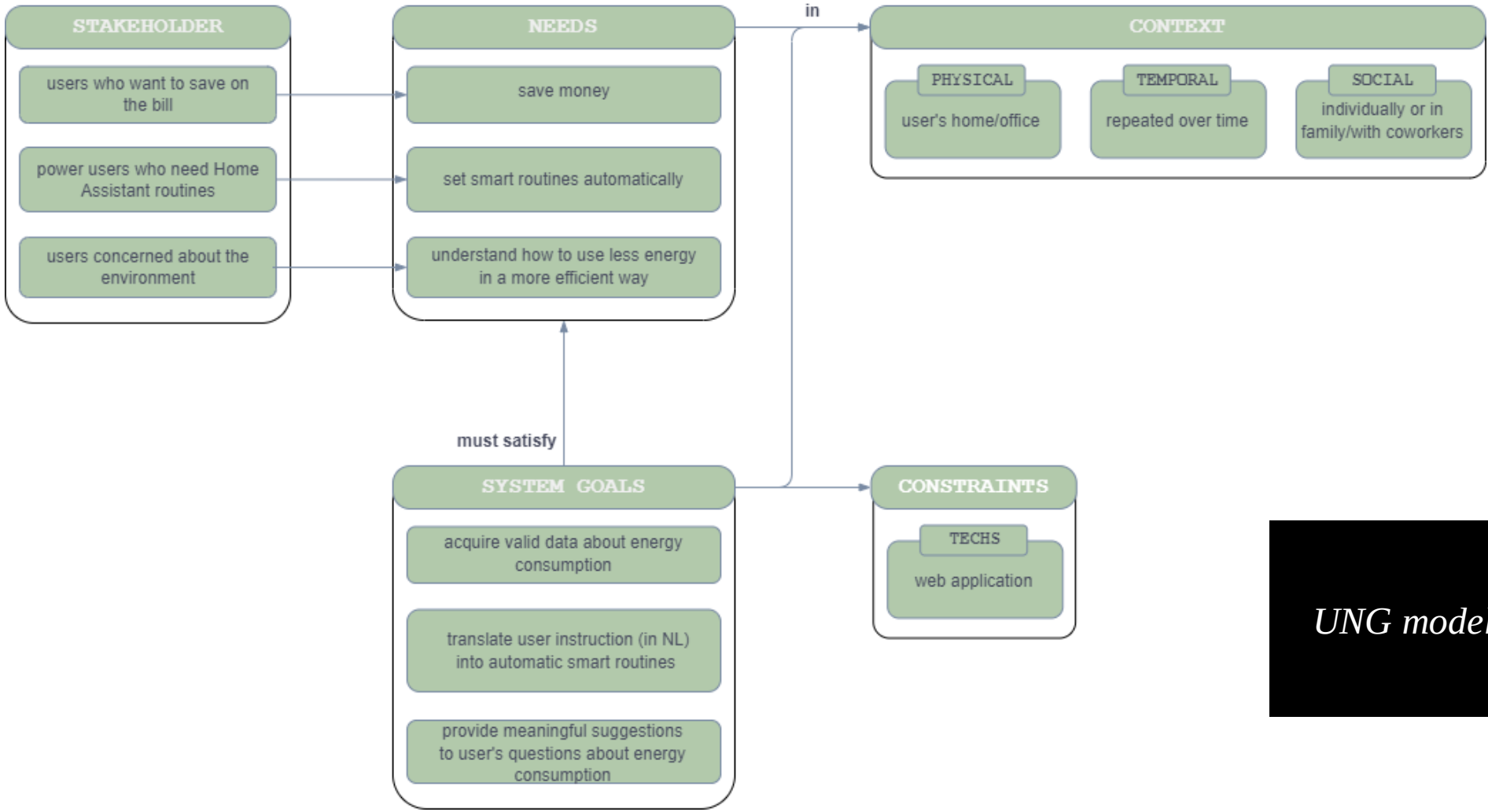
• Samuele Scherini
samuele.scherini@mail.polimi.it – 10674683 – Computer Science and Engineering

• Ismaele Villa
ismaele.villa@mail.polimi.it – 10663417 – Computer Science and Engineering

• Adam Andersen
adammartin.andersen@mail.polimi.it – 10966718– Computer Science and Engineering

GROUP 22A

PROBLEM



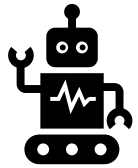
UNG model

PRODUCT GOAL

We are addressing the problem of “green” home automation by providing a conversational agent able to create Home Assistant routines and manage the automation of the house. In order to do so we use GPT as main conversational engine and exploit Home Assistant APIs for the system backend.

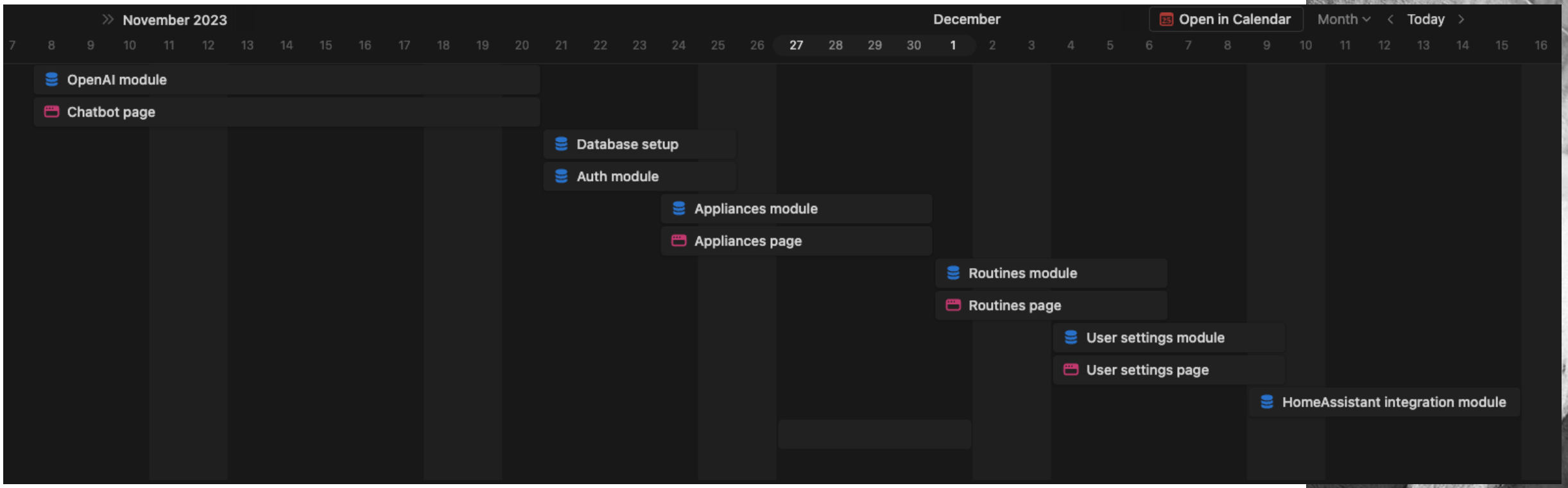
Process and display data about energy source(s).

Translate NL to Home Assistant routines.



Simplify the management of the house by providing a centralized application.

WORK PROCESS

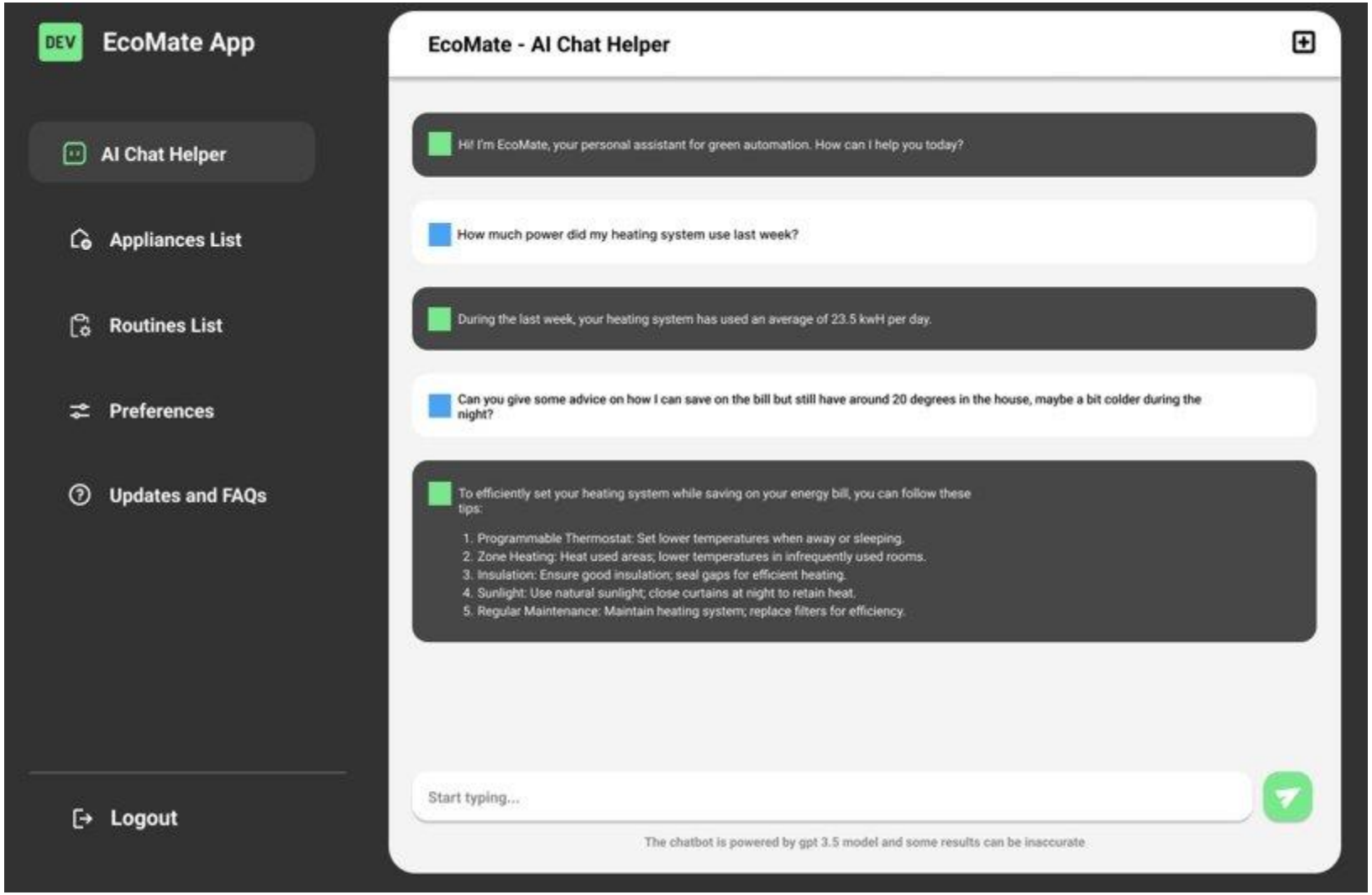


GANTT chart

STATE OF THE ART

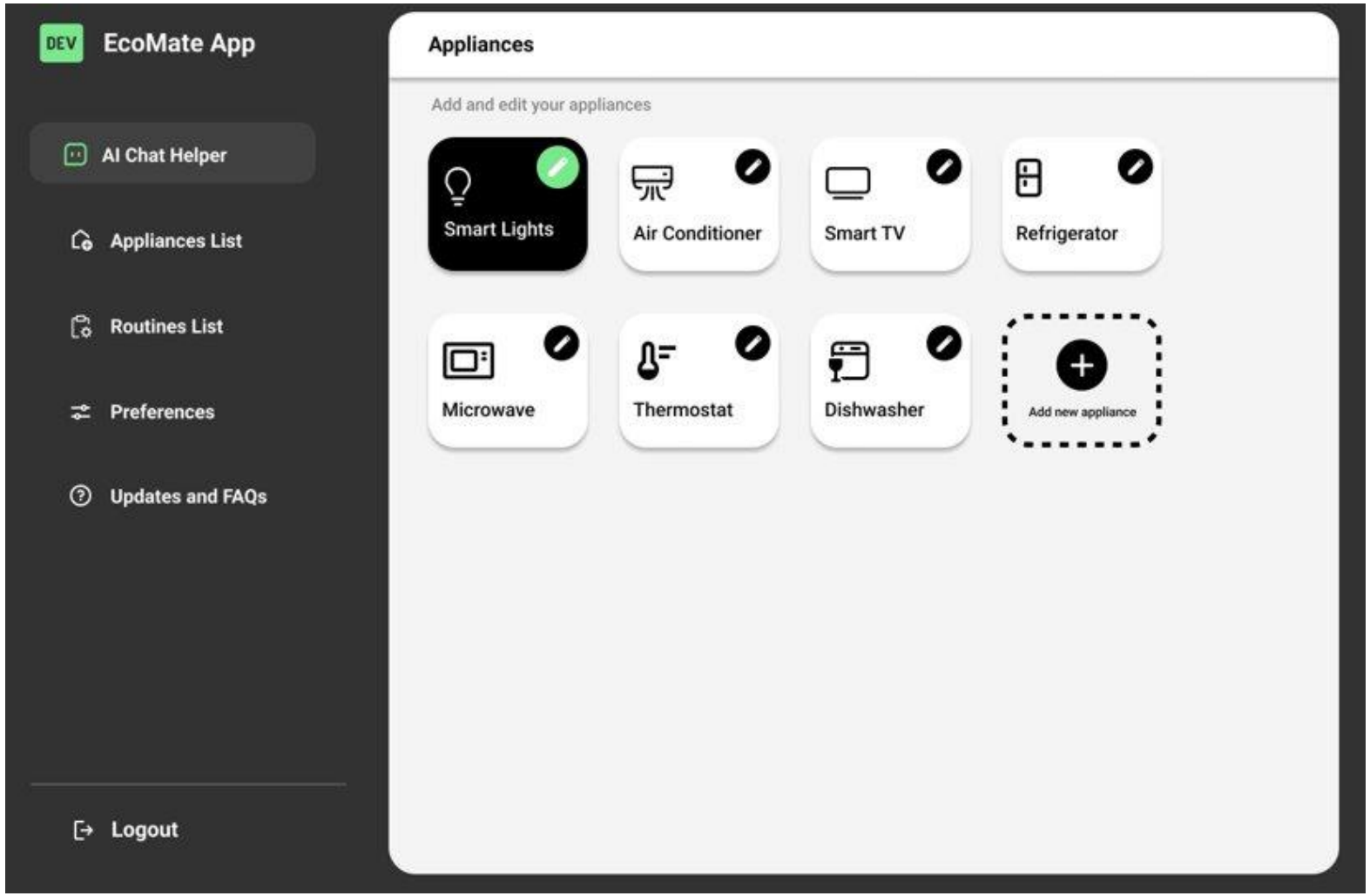
- Google Home, SmartThings, Apple HomeKit are all very popular smart home platform, however they allow only to create routines for brand specific appliances;
- Edison is already working on fully automated kitchen controllable from a smart mirror;
- Conversational agents like chat-gpt provide an advanced user interaction and has been growing exponentially lately;
- IFTTT is a web-based service that allows users to trigger pre-defined routines in order to automate tasks over the "if this than that" logic;
- Home Assistant is an open-source home automation platform that allows users to integrate and control various smart home ecosystems like Philips Hue, Google Assistant, Amazon Alexa, and many others.

DESIGN SOLUTION



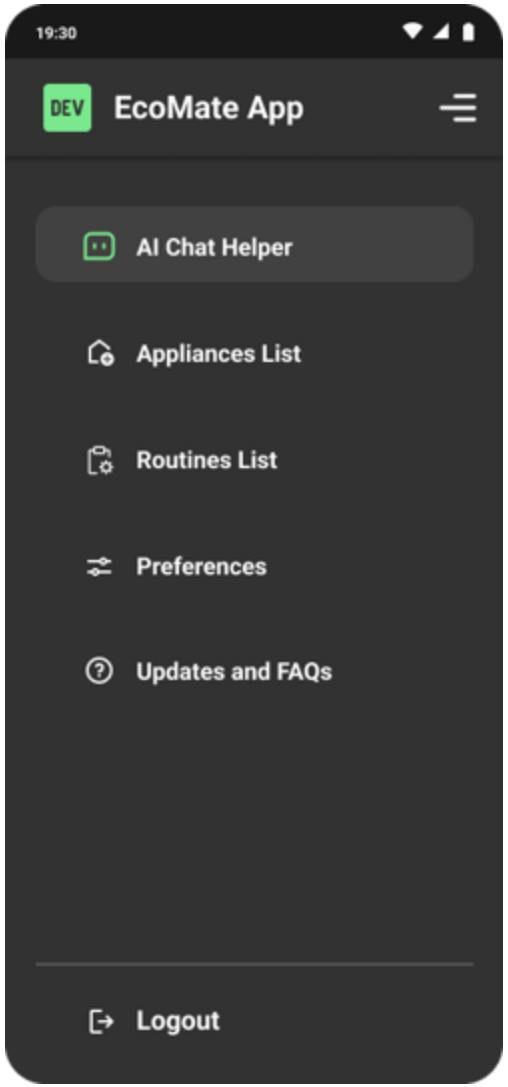
The home page is a user friendly chatbot with a similar design to chat gpt.

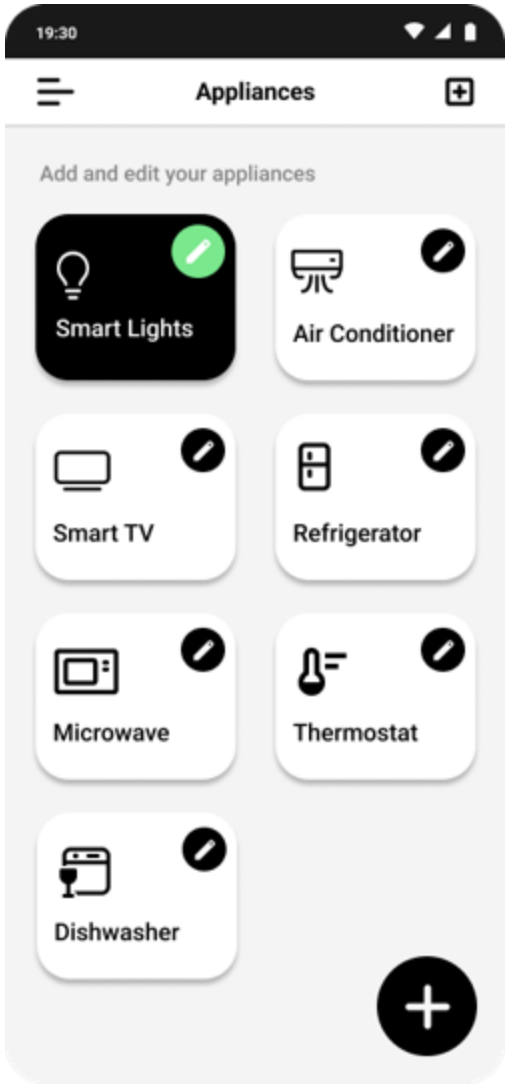
DESIGN SOLUTION

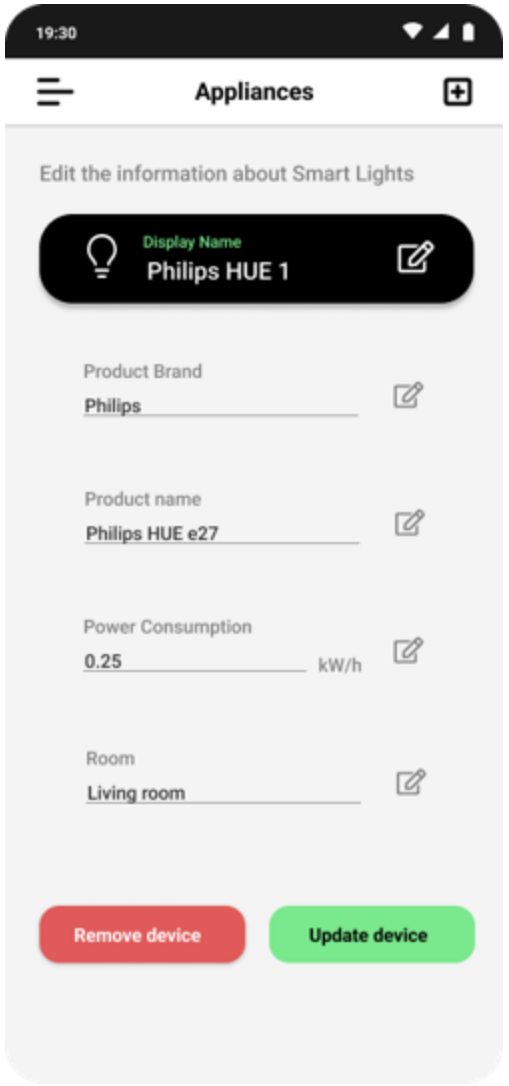


A sidebar allows the user to select from a list of pages. One is dedicated to the appliances management (add, delete, update of the appliances is handled here)

DESIGN SOLUTION







We also provide a mobile version of our EcoMate

LIGHT USER SCENARIO

User profile: Alex is a young professional living in a modern apartment equipped with various smart home appliances, including a smart thermostat, smart lighting system, and energy-efficient appliances. He is environmentally conscious and wants to adopt sustainable habits to reduce his carbon footprint.

User goal: Alex aims to leverage technology to monitor and optimise his energy consumption. He is eager to learn practical green habits that align with his eco-friendly lifestyle.

Context: Alex regularly tracks his energy usage through the web app, which provides detailed insights into his smart home's power consumption patterns. He is enthusiastic about exploring new ways to incorporate energy-saving practices into his daily routine, contributing to a more sustainable and environmentally friendly lifestyle.

Tasks (textual narrative):

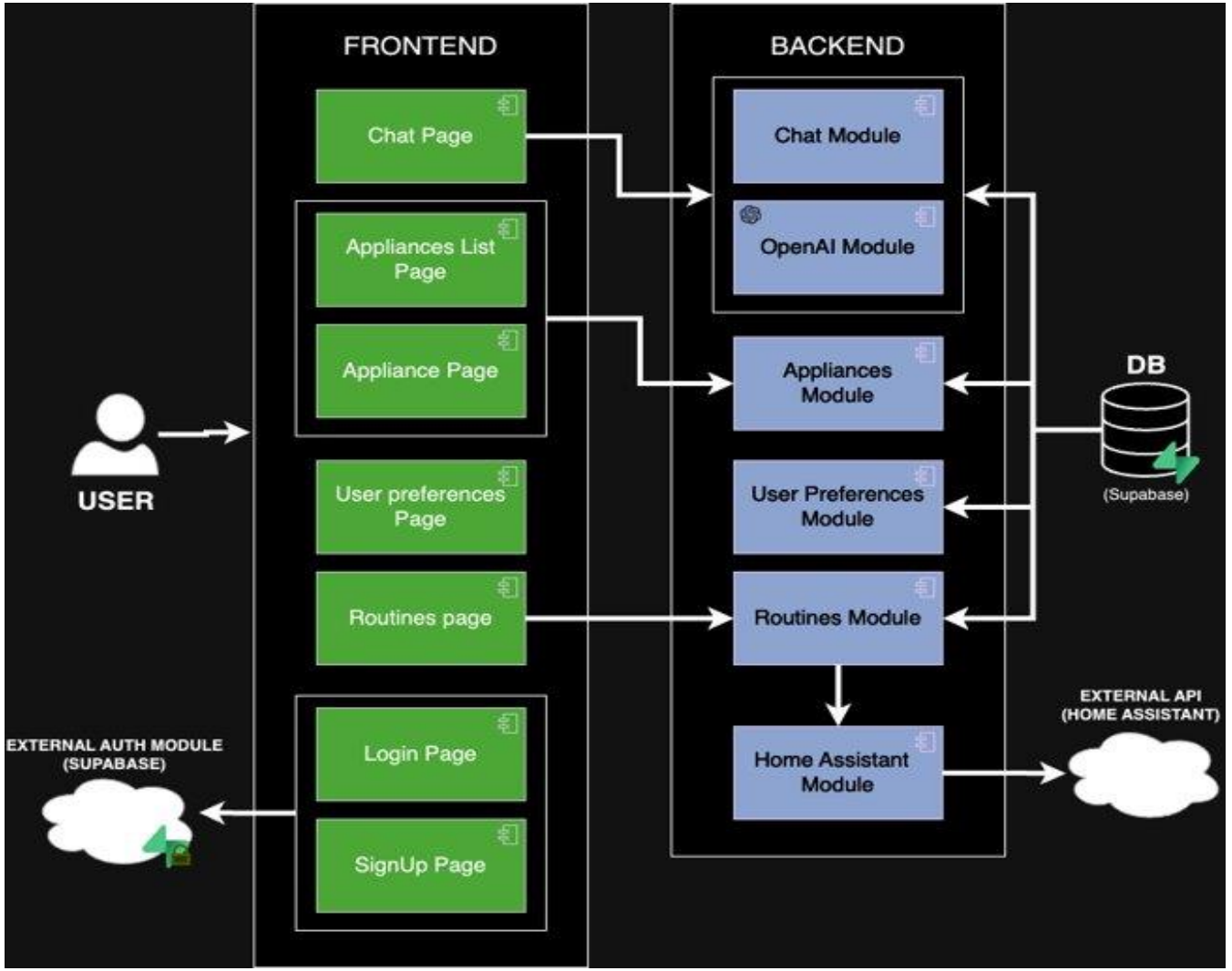
- Alex opens the (web)app, greeted with an analysis of his energy consumption patterns.
- Alex asks the chatbot about what are the main areas one can improve to reduce its carbon footprint at home, leveraging the smart setup.
- The chatbot provides Alex a few general ideas to apply to his lifestyle and habits.

POWER USER SCENARIO

User profile: Sarah is a young professional living in a small apartment. She owns a smart thermostat, smart lighting, and a smart TV, all of which are connected to the web app for better management.
User goal: Sarah wants to reduce her energy bills by creating automated routines.
Context: Sarah often forgets to turn off her devices, leading to unnecessary energy consumption. She is conscious of her carbon footprint and wants to actively contribute to energy conservation efforts.
Tasks (textual narrative):

1. Sarah opens the (web)app, that has been already configured with the list of owned smart devices.
2. Sarah asks the chatbot some ideas for configuring routines and provides some details about her daily routine.
3. The chatbot suggests a schedule for her smart heating and lighting, to optimise energy usage during peak and off-peak hours. Then, follows up with a suggestion about a routine “sleep” that, when activated, also turns off the tv.
4. Sarah submits to the chatbot that the routine created is ok.
5. The chatbot generates the Home Assistant routine.
6. Sarah sees the Home Assistant routine correctly set up in the app.

TECHNOLOGICAL SOLUTION



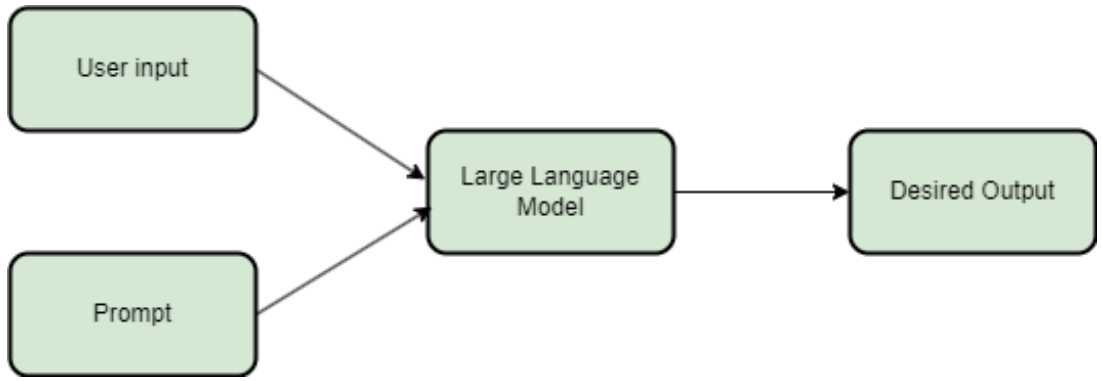
The application is internally divided between frontend and backend and, externally, uses Supabase services either for authentication and database storage and Home Assistant for home automation.

PROMPT ENGINEERING

GENERAL PROMPT:
"You are EcoMate. Address me as USERNAME. As a highly-intelligent AI, you provide guidance on green energy practices, energy consumption optimization, and cultivating environmentally friendly habits..."

POWER USER PROMPT:
"Only if I ask you to explixitly create or generate a routine I want you to create a Home Assistant routine. Generate a complete Home Assistant JSON code..."

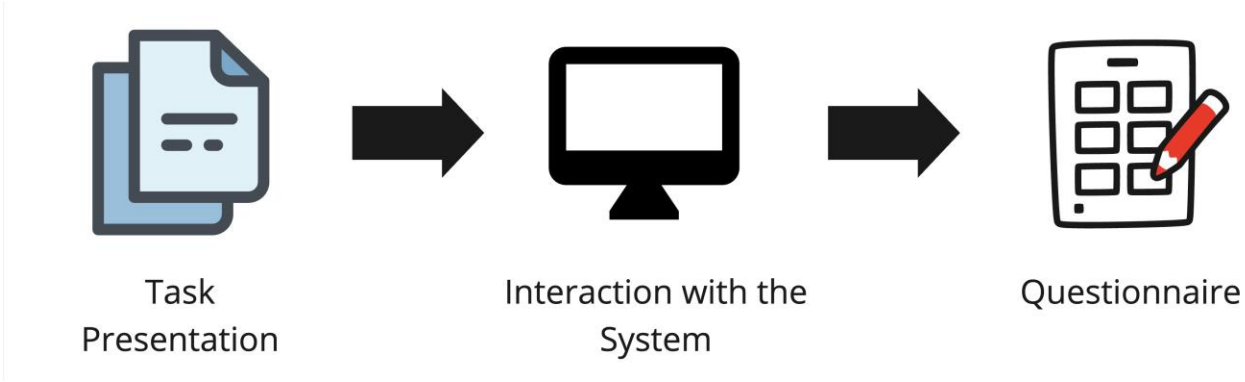
EXPLANATION PROMPT:
"After the answer, explain in a short way (maximum 20 words) the process you follow to generate the response..."



Prompt engineering

EVALUATION

- 17 partecipants involved;
- 3 metrics were used for the evaluation: User Experience Questionnaire (UEQ), Parasocial Interaction (PSI) and System Usability Scale (SUS);
- The application happened to be efficient, easy and supportive;
- Users reported a higher *Interaction Satisfaction* and *Perceived Dialogue* thanks to the use of an LLM instead of a traditional rule-based chatbot;
- The UX measures support a high interest in pro-environment purposes;

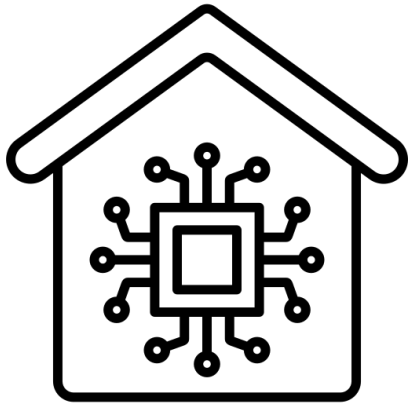


VALUE PROPOSITION

- EcoMate aims at providing a modern tool able to help peolple in becoming more environmentally friendly;
- Through a centralized application, users can manage all their smart appliances with a couple of clicks;
- Users can set smart routines that fits their everyday behaviour and obtain every kind of information regarding green energy practices;
- The ultimate goal is to be able to give a lighter carbon footprint and, at the same time, save money on the energy bill;

FUTURE WORK

- Speech-To-Text conversational agent;
- Integration of real world data for consumption of smart appliances;
- New functions for consumption forecasting (AI driven);
- UI for direct control over single appliances (switch-on/switch-off);
- Edison API



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THANK YOU
FOR YOUR ATTENTION

Group 22A