A Title to the Report

A Catchy Optional Subtitle that Grabs the Attention

AiFo: AiFoundations

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Ostschweizer Fachhochschule

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by

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Preface

A preface...

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OST, October 2024

Summary

A summary...

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1 Introduction

Introduction

In this document we will describe the process of implementing the Miniproject required for the AI-Foundaitions module. It is expected to generate at least 3 ideas that make use of the GPT-assistant and build an application around that idea.

The first step will describe the generation and thinking process for the ideas and the selection of one idea based on evaluaiton. We will then continue on refining the idea and create specifications that the applcation must implement.
additional text

additional text

We wanted to implement an idea that could actually have a practical usecase and one that we would personally use. We did some brainstorming together and came up with things that we struggle with regularly and where a Large Language Model could be of help. Within a short amount of time we came up with three ideas:

- Food recipe generator that returns recipes based on what kind of food you have at home (would be the user input)
- Since Christmas is arriving soon: gift idea generator based on what properties the gift receiver has
- Belt balancer generator for the game Factorio [1]

Immediately, we thought about the practicality and implementation side of things. All three of the ideas were well usable, however one stood out on the complexity and possibilty of implementation. A belt balancer in factorio serves the use of distributing X number of input belts or conveyors (that transport materials) to Y number of outputs. In the game, you can import structures such as a belt balancer in the form of a blueprint string. This string looks like glibberish to the human eye because the game first decodes the string using base64 and afterwards uses zlib inflate to finally get the json representation of the individual strucutres that will be placed in the game to complete the balancer. To many this will sound like an application where a Large Language Model will no work very well to generate these complex and very error intolerant string, and you are correct! We generated such a string 10 times and not once did the string import work in the game itself. This idea was not going to work well so it is eliminated.

We decided on the following criterias for evaluating which idea to choose:

- practical use (weight 30)
- ease of implementation (weight 5)
- beneficial (weight 20)
- originality (weight 10)

idea	practical use	ease of implementation	beneficial	originality	total score
Recipe generator	5 * **30**	8 * **5**	7 * **20**	5 * **10**	**400**
Gift Idea Generator	7 * **30**	8 * **5**	9 * **20**	8 * **10**	**510**

Since the Gift Idea Generator received more points, this is what we chose for the project.

Before starting to implement the idea, we first decided on specifications that the application schould meet. We discussed ideas and boundries and agreed on the following: The application should take three parameters as inputs from the user: Gender, Age and personal interests It should be available on mobile to be easaly useable when you are on your way out. When the user presses the button to generate the ideas upon entering the parameters, he should receive 5 gifting ideas in text form.

[1] Not affiliated with the product however you should try it anyway

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About the Template

This template aims to simplify and improve the (Xe)LaTeX report/thesis template by OST with the following three main design principles:

- **Simplicity First:** A class file that has been reduced by nearly 70% to simplify customization;
- **Effortless:** A careful selection of common packages to get started immediately;
- **Complete:** Ready-to-go when it comes to the document and file structure.

This template works with pdfLaTeX, XeLaTeX and LuaLaTeX. In order to adhere to the OST house style, either XeLaTeX or LuaLaTeX is required, as it supports TrueType and OpenType fonts. BibLaTeX is used for the bibliography with as backend biber. Please visit `https://norukh.github.io/report/` for the full documentation.

Documentation (Abridged)

As a report/thesis is generally a substantial document, the chapters and appendices have been separated into different files and folders for convenience. The folders are based on the three parts in the document: the frontmatter, mainmatter and appendix. All files are inserted in the main file, `report.tex`, using the `\input{filename}` command. The document class, which can be found in `ost-report.cls`, is based on the book class.

The template will automatically generate a cover when the `\makecover` command is used. The title, subtitle and author will also be present on the title page. To give greater flexibility over the title page, the layout is specified in `title-report.tex`. A title page for theses is also available: `title-thesis.tex`. Change the corresponding `\input{...}` command in the main file to switch.

The bibliography has been set up in `report.tex` to allow for easy customization. It is included in the table of contents and renamed to 'References' using the `heading=bibintoc` and `title=References` options of the `\printbibliography` command respectively. If you would like to use a different .bib file, change the command `\addbibresourcereport.bib` accordingly.

→ *Visit `https://norukh.github.io/report/` for the full documentation.*

License

Figure 2.1: OST Campus Rapperswil

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Implementation

To create an Application which can integrate into the daily lifes of someone, we will use the Flutter Technology Stack to create Software which can be accessed from many different platforms. For Developement, we focused on the usage of the Application on an Android Mobile Phone, however if we would like to expand our Application onto different plattforms, it would not require a lot of additional work.

Because we already defined the different Inputs which the user has access to, as described in Chaopter **??**, we could immediately start with Implementation.

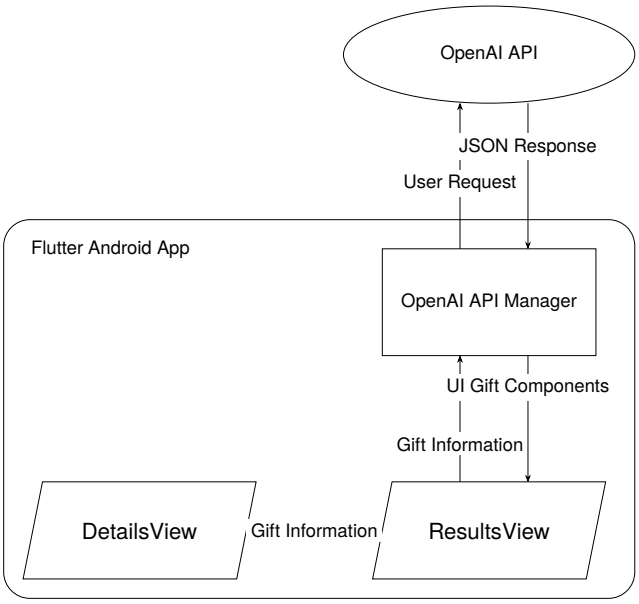


Figure 3.1: Planned architecture of the App

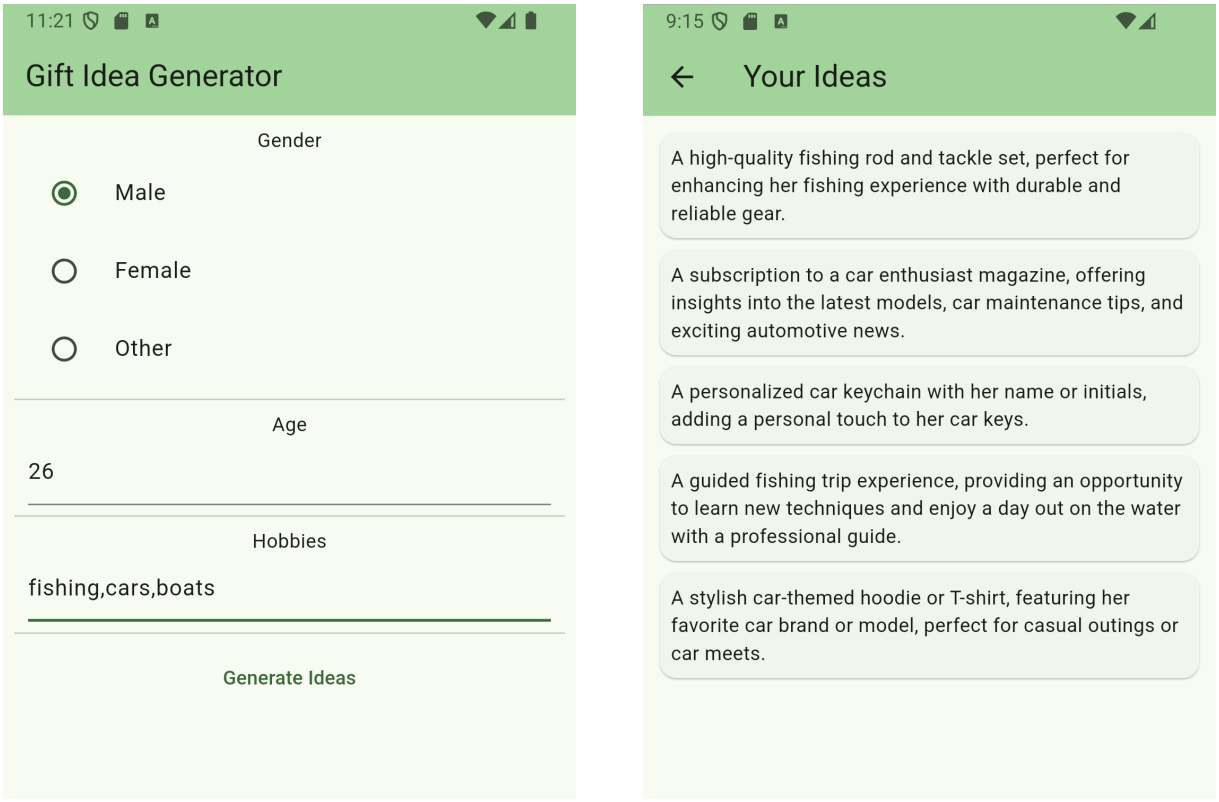
Figure 3.1 describes the planned architecture of the Flutter App. It has two main screens, which the User is guided throug:

1. In the `DetailsView`, the User can specify different attributes about the Person they would like to gift something to (furthermore called the Recipient)
2. As soon as the User submits the Information, all Gift Information is Passed to the `ResultsView`.
3. The `ResultsView` passes the recieved Information to the API Manager, which converts it into a prompt, which is then sent to the OpenAI API.
4. The OpenAI Assistant processes the Request and returns a Response in Form of a JSON Object. (For more details see Section **??**)
5. The API Manager recieves the JSON Object, extracts the relevant Information and sends it to the `ResultsView` in Form of prebuilt widgets, where they are displayed to the User.

OpenAI API Manager

The `OpenAI API Manager` is the backend logic which allows the Application to communicate with the OpenAI Assistant. It provides the functionality to convert User Input into a usable text prompt, as well as convert the recieved JSON into a nice Interface.

```
1     factory GiftResponse.fromJson(Map<String, dynamic> data) {
2         GiftResponse gr = GiftResponse();
```



(a) `DetailsView` **(b)** `ResultsView`

Figure 3.2: Initial Version of the Application

```
        for (Map<String, dynamic> idea in data['presents']) { // Extract "present" objects
          gr.ideas.add(Idea(idea["title"], idea['description'])); // Fill information into new Idea
              () Object
        }
        return gr; // Return a GiftResponse() Object containing Ideas()
    }


    List<Widget> cards(Set<Idea> ideas) {
        List<Widget> cards = List.empty(growable: true);
        for (Idea idea in ideas) { // For all Ideas in the List
            cards.add(Card( // Add a new widget (Flutter Card Widget in this Case)
            child: ListTile(
                title: Text(idea.title), // Title
                subtitle: Text(idea.description), // Description
                trailing: IconButton( // Shopping Bag Button
                    onPressed: () {
                        _launchUrl(
                            "https://www.galaxus.ch/de/search?searchSectors=0&q=${idea.title}");
                    },
                    icon: Icon(Icons.shopping_bag_outlined, color: Colors.green,))),
            ));
        }
        return cards;
    }
```

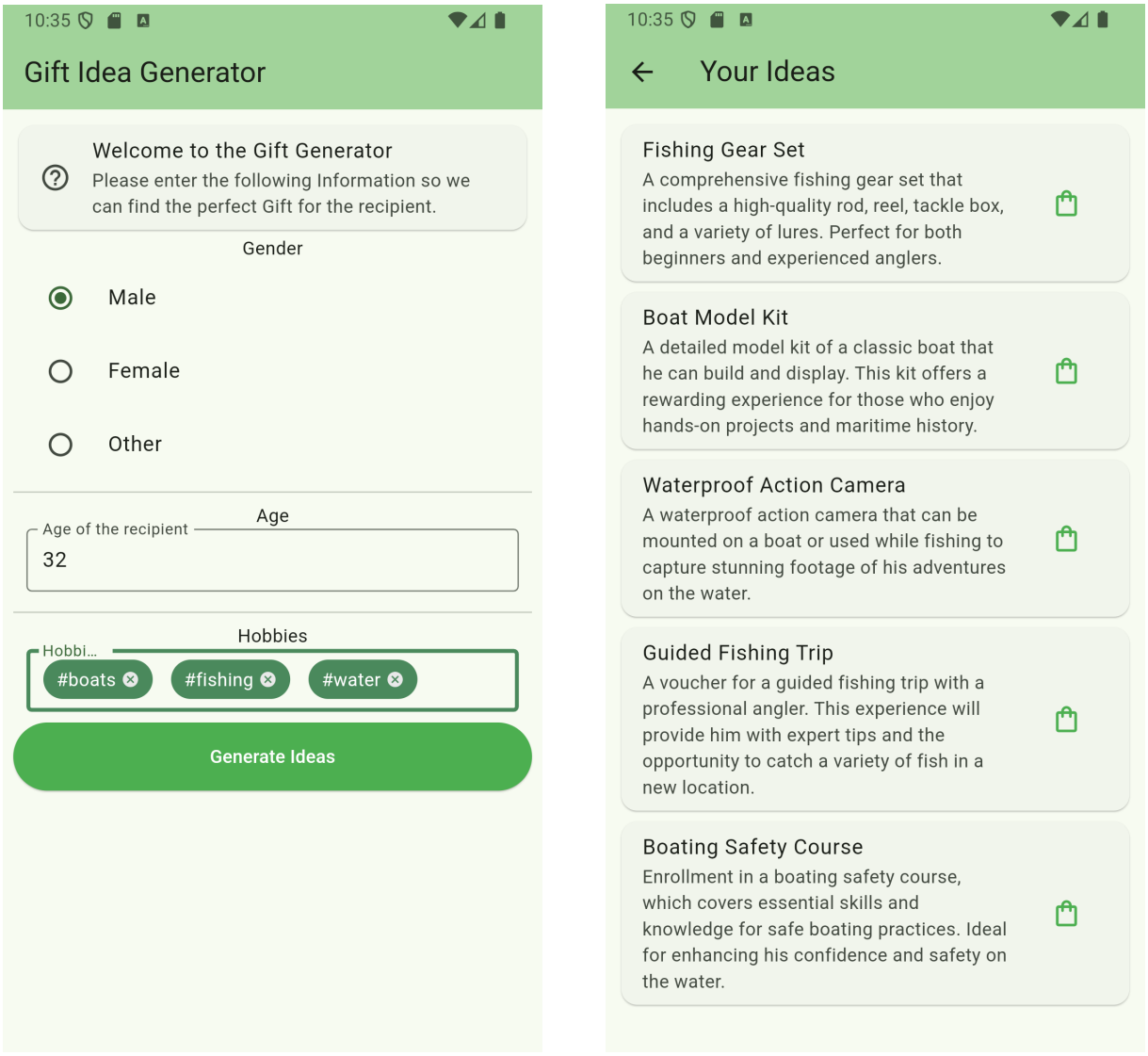
User Interface

For the Design, we wanted a simple but clear User Interface. We used the Material Design Guidelines to ensure a consitent Design. At first, we created a simple UI which allows us to test the functionality of the app.

After building the First version of the app as shown in Figure 3.2, we proceeded to test the functionality of the API Manager, which provides the conversion from JSON Response to visually appealing Widgets.

Once the functionality has been confirmed, we focused on improving the UI. Although not our main focus of this project, we felt that a better UI can improve the overall impression of the Application significantly. We therefore implemented the following changes:

- A small infobox which instructs potential first-time users.



(a) `DetailsView` **(b)** `ResultsView`

Figure 3.3: Final Version of the Application

- Improved display of input fields age and hobbies.
- The option to specify the Gender when selecting "Other"
- Title for each Idea to improve overview
- A button to instantly search for a gift on `galaxus.ch`

This results in the final version of the App as seen in Figure 3.3.

4

Conclusion

A conclusion...

A

Source Code Example

Adding source code to your report/thesis is supported with the package `listings`*. An example can be found below. Files can be added using* `\lstinputlisting[language=<language>]{<filename>}`*.*

```
"""
ISA Calculator: import the function, specify the height and it will return a
list in the following format: [Temperature,Density,Pressure,Speed of Sound].
Note that there is no check to see if the maximum altitude is reached.
"""

import math
g0 = 9.80665
R = 287.0
layer1 = [0, 288.15, 101325.0]
alt = [0,11000,20000,32000,47000,51000,71000,86000]
a = [-.0065,0,.0010,.0028,0,-.0028,-.0020]

def atmosphere(h):
    for i in range(0,len(alt)-1):
        if h >= alt[i]:
            layer0 = layer1[:]
            layer1[0] = min(h,alt[i+1])
            if a[i] != 0:
                layer1[1] = layer0[1] + a[i]*(layer1[0]-layer0[0])
                layer1[2] = layer0[2] * (layer1[1]/layer0[1])**(-g0/(a[i]*R))
            else:
                layer1[2] = layer0[2]*math.exp((-g0/(R*layer1[1]))*(layer1[0]-layer0[0]))
    return [layer1[1],layer1[2]/(R*layer1[1]),layer1[2],math.sqrt(1.4*R*layer1[1])]
```

B

Task Division Example

If a task division is required, a simple template can be found below for convenience. Feel free to use, adapt or completely remove.

Table B.1: Distribution of the workload

	Task	Student Name(s)
	Summary	
Chapter 1	Introduction	
Chapter 2		
Chapter 3		
Chapter *		
Chapter *	Conclusion	
	Editors	
	CAD and Figures	
	Document Design and Layout	