- STABLE DIFFUSION -

CMPE 491
Analysis Report
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URL of the webpage: https://furkanozelge.github.io/seniorstedu/

1. INTRODUCTION

This is a Stable Diffusion project which is the program that convert the text to the image. A text-to-image model using deep learning is called Stable Diffusion. Although it can be used for various tasks including inpainting, outpainting and creating image-to-image translations directed by text prompts, its primary usage is to generate detailed visuals conditioned on text descriptions. So, with this information, we will create an application & tool that uses deep learning and artificial intelligence, which creates a design idea for the use of designers by using stable diffusion together with a model of pre-trained open-source data. While doing this, we will work on adding various features by going beyond what has been done. Stable Diffusion will reveal very creative ideas and images for designers. In this way, we will give designers a new perspective.

Application will be two window application which has text box window and the login page window. After the users logon the application, they will see the text-box window and when the user enters his/her text to the text box, the program will convert it to the image. For example, when you enter the input ‘’a photograph of an astronaut riding a horse’’, application will read that command and pull the related images from trained data and it will show the equivalent image. User will see a horse with the astronaut after that input.

Our overall goal is to introduce stable diffusion and AI to all users and make a good impression. The ability of people to draw their dreams to artificial intelligence with just a few words or sentences. At this point, our general scope is to reach the entire user base. Some reasons arising from this may lead the project to some restrictions. In order to appeal to the entire user base, there should be no +18 content in this AI project in general. This will have a positive impact on our market value. Because one of the rules of the market is to expand the user base. This will contribute to our budget because we will make a profit that will reduce the cost in the project. In addition, all users will have the right to produce a limited number of photos. Because it costs us a certain cost in each photo generate. For this reason, it is very important to have a border in the middle. At the same time, we will do this by registering and logging in. All users must have an account. There are many reasons for this. We also need this so that we can limit the number of uses. We will also offer suggestions based on previous searches in user accounts, while providing suggested photos to users. We will also get this with the user account. In addition, we will have a very strict limit on terrorism and violence. It will be forbidden to use words of this variety.

Time is also one of the most important issues in a project. This project is done in a team of 4 people and it will cost 4 people to work in various areas of this project for 4-5 months. We need to reflect this time positively on the project as quality. All team members will devote at least 10-15 hours per week to this project. It is very important to be able to use this as quality. If we can't spend the time we spend on making this project a successful one, it will cause a great waste of time. For this reason, the tasks and each branch of the project will be carefully divided and finished with a regular study.

Of course, like every project, this project has some risks. It is our greatest desire to make a project worth the effort we spend, the time we spend and the money we spend. But for this, various risk management should be done. We should consider what measures we can take in various scenarios. We will see this with various tests and reviews before it reaches the end user. On top of that, we will make the project perfect with many updates. All projects would be perfect with updates. We will fix the bugs in the first versions in the next versions. In this way, we will have a sustainable project. Sustainability is the most important thing for a project. Our project is not a project that can be consumed quickly. All kinds of users will get magnificent designs and drawings by pushing the limits of imagination.

Stable diffusion is not a subject that has too much diversity as a resource. For this reason, we will be very limited on research. But in this case, we will step in. In scientific studies or projects, you should be a resource yourself where the resource ends. For this reason, we will not be afraid to develop new technologies ourselves in places where there are no resources.

2. Proposed system

2.1. Overwiev

The ability of people to draw their dreams to artificial intelligence with just a few words or sentences. At this point, our general scope is to reach the entire user base. Some reasons arising from this may lead the project to some restrictions. All users will have the right to produce a limited number of photos. Because it costs us a certain cost in each photo generate. For this reason, it is very important to have a border in the middle. At the same time, we will do this by registering and logging in. All users must have an account. There are many reasons for this. We also need this so that we can limit the number of uses. We will also offer suggestions based on previous searches in user accounts, while providing suggested photos to users. Finally, we will use PostgreSQL as a database, express react node and python as a stack. We will create our own custom pipeline for stable diffusion through the Crud API node and it will be done as a separate API from python.

2.2. Functional/ Nonfunctional Requirements

No	Requariment	Functionality
	Home Screen	
1	when the user first opens our website if They are not logged in they see our home page.	Functional
2	the home page contains information about the application.	Non-Functional
3	On the home page, they can see the announcement and latest updates for our app	Non-Functional
4	There will be a how to use content on the home page	Non-Functional
5	In the navigation bar, they can see the contact info button.	Functional
6	In the navigation bar, they can see the login button.	Functional
7	In the navigation bar, the user can see the register button.	Functional
	Login and Sign Up	
8	Create a back-end for login	Functional
9	User face with username and passwords field	Functional
10	If the information matches our database user logged in to the app	Functional
11	There will be an keep me logged in the check box	Functional
12	If the user checks the keep me signed in user doesn't need to log in the for the next time	Non-Functional
13	If the information that the user gives us is missing or faulty. If the user faces an error message	Non-Functional
14	There will be a forgot my password button	Functional
15	If user clicks forgot my password button. They will be routed to the password recovery page	Functional
16	There will be a register button	Functional
17	If the user clicks the register button. They will be routed to the register page	Functional
	Register System	

18	creates a back-end for the registration page	Functional
19	user face with register input boxes	Functional
20	user provides e-mail, username, Name, Surname, and password information.	Functional
21	Bottom of the page there will be a register button	Functional
22	If the user fills correctly the required information user will be registered and added to the user database	Functional
23	If the user doesn't fill in successfully. The error message is sent to the user by the system.	Functional
24	After successful registration, they are routed to the login page.	Functional
25	User have to create strong password	Non-Functional
Password Recovery		
26	user face with an email input box to recover the password	Functional
27	the recovered mail will be sent to the users mail	Functional
28	Users see a verification area and put the code they receive from the e-mail	Functional
29	then they can face new passwords and repeat new password fields	Functional
30	If the user gives the same password in both fields user's password will be updated in the database	Functional
31	If the user gives the wrong password one of the fields users sees an error message	Functional
32	The user will be routed to the login page after a successful recovery	Functional
MVC Models		
33	Creates a MVC model to user-specific page	Functional
34	Models in the timelines containing the created content from other users. Creators' user info and content like counts.	Functional
35	Our controller is mainly a recommender system that uses the user search and liked posts	Non-Functional
Recommendation System		
36	We use a matrix factorization for the recommendation system	Functional
37	Each image that is created by stable diffusion has a label(keyword)	Functional
38	With help of users liked and disliked posts create a recommendation to the user	Non-Functional
User Timeline		
39	User timeline created dynamically	Non-Functional
40	The data came from the recommendation matrix shown in the user timeline	Non-Functional
41	User can like or dislike the posts in the timeline	Non-Functional
42	If users click the post's creators name, they will be routed to their profile	Non-Functional
Navigation Bar Update		
43	After a successful login navigation bar will be updated	Non-Functional

44	Users can see text to image, image to image, transfer art, timeline, and profile buttons	Non-Functional
	Style Transfer API	
45	For style transfer API we create our models and use a pre-trained vgg19 model in python	Functional
46	Take content and style images and output the content image in each style	Functional
47	Our API adds the output content as	Functional
	Stable Diffusion API	
48	Our stable diffusion API we are going to use pre-trained weights and models.	Functional
	User Profile Page	
49	User profile picture	Non-Functional
50	The user can upload their own profile picture or select one of the preset photos	Non-Functional
51	User information	Non-Functional
52	At the top of the page, the user can see their own information.	Non-Functional
53	User-generated images	Functional
54	In the field below the user information, the user can see what he has selected among the visuals he has produced on his profile.	Non-Functional
55	Favorite visuals.	Non-Functional
56	The user can add likes to their favorites within the images produced by other users	Non-Functional
57	Following and Followers.	Non-Functional
	Text to Image Page	
58	Visuals will be produced with the entered key Word.	Functional
59	At the top of the page, there will be a text box for entering key Word or sentences	Functional
60	There will be images produced under the text box.	Non-Functional
	Image to Image Page	
61	With an image to be uploaded to the system, new visuals will be produced based on that image.	Functional
62	At the top of the page, there will be an upload area to upload sample images.	Non-Functional
63	It can be found on the Internet and a sample image can be uploaded with a link.	Functional
64	An image in the computer can be uploaded to the system as an example visual.	Functional
	Transfer Art Page	
65	New visuals will be produced based on the input entered based on the visuals of other users or based on the style of a famous artist.	Functional
66	There will be an area on the page where the user or artist will be selected as the basis.	Non-Functional

2.3. Pseudo requirements

2.3.1. Copyright check

2.3.1.1. To make copyright decisions using BASE64

2.3.2. Database

2.3.2.1. PostgreSQL, keeping copyright information of photos, keeping user information

2.3.3. Web domain

2.3.3.1. It is necessary for the web app to be published.

2.3.4. WEB SERVICE TO COMMUNİCATE BW DATABASE AND CLEINT

2.3.4.1. Java script and python will be used for server side back-end to comunicate client and database.

2.3.5. Train data model

2.3.5.1. The data model required for our AI to use for Stable Diffusion. Is provided from stable difusion.

2.3.6. DOWNLOAD REQUIREMENTS

2.3.6.1. A GPU with at *least* 6 gigabytes (GB) of VRAM

2.3.6.1.1. This includes most modern NVIDIA GPUs

2.3.6.1.2. least 4GB VRAM

2.3.6.2. 10GB (ish) of storage space on your hard drive or solid-state drive

2.3.6.3. The Miniconda3 installer

2.3.6.4. Several different Python libraries

2.3.6.5. The Stable Diffusion files from GitHub

2.3.7. The Latest Checkpoints (Version 1.4, as of the time of writing, but 1.5 should be released soon)

2.3.7.1. The latest checkpoint should be downloaded first.

2.3.7.2. The “sd-v1-4.ckpt” link will launch the download

2.3.7.3. Although “sd-v1-4-full-ema.ckpt,” the other file, is roughly twice as large

2.3.8. The Git Installer

2.3.9. RUN STABLE DIFFUSION AI

2.3.9.1. Install Git

2.3.9.2. Install Miniconda3.

2.3.9.3. Download the Stable Diffusion GitHub repository and the Latest Checkpoint

2.3.10. Custom pipeline

2.3.10.1. With the help of stable diffusion repository we will create our own pipline in python.

2.3.11. Style transfer

2.3.11.1. We use tensorflow and get helped by google’s vgg 19 arcitecture for our neural style transfer and vgg 19’s pre-trained weights.

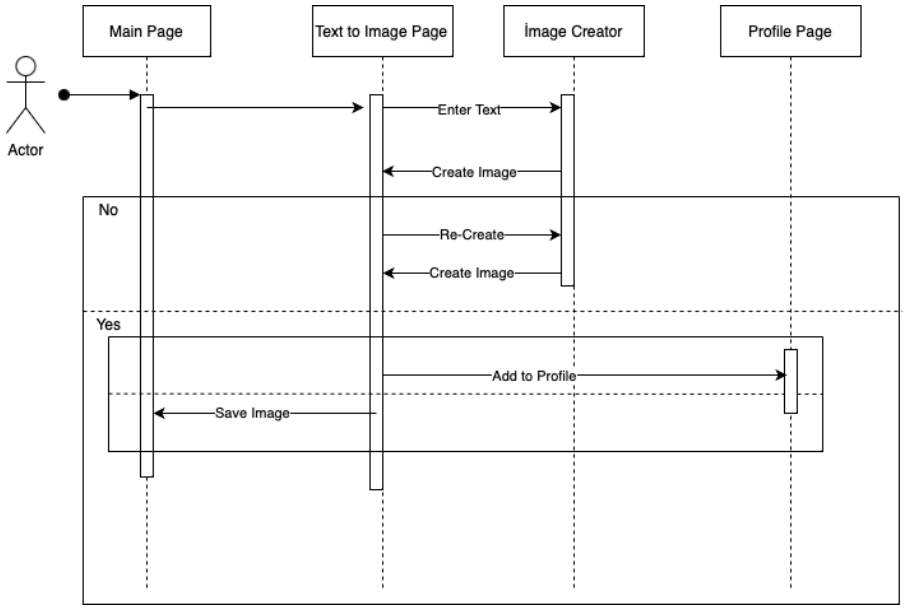
2.3.11.2. Gram matrix style transfer algorithm will be used.

2.4. System Models

2.4.1. Scenarios

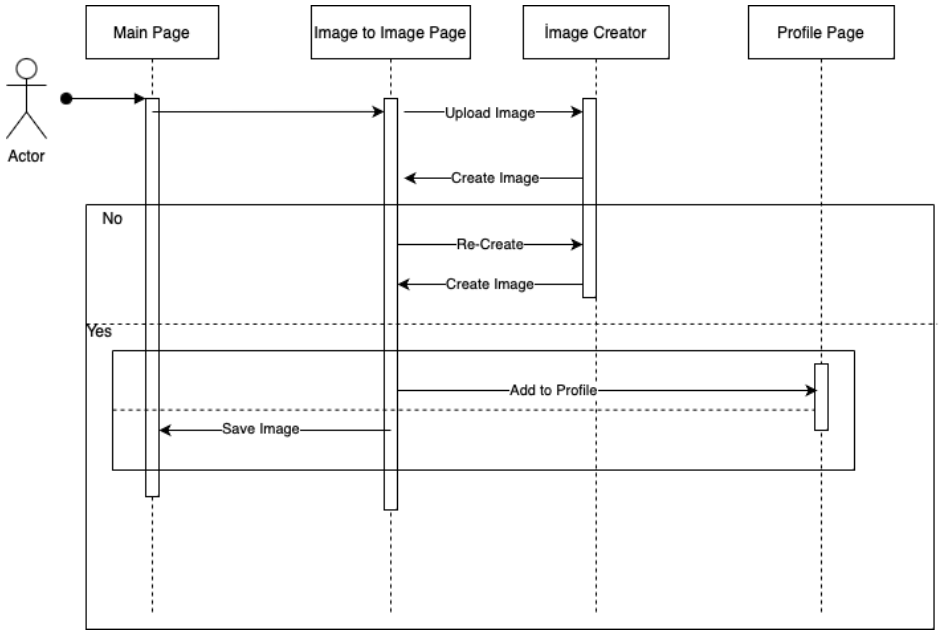
2.4.1.1. Create Image From Text

It allows us to create an image that we want using words or sentences. If the user does not like the created image, he can create new visuals with the same input. They can also save the images they like or share them with other users.



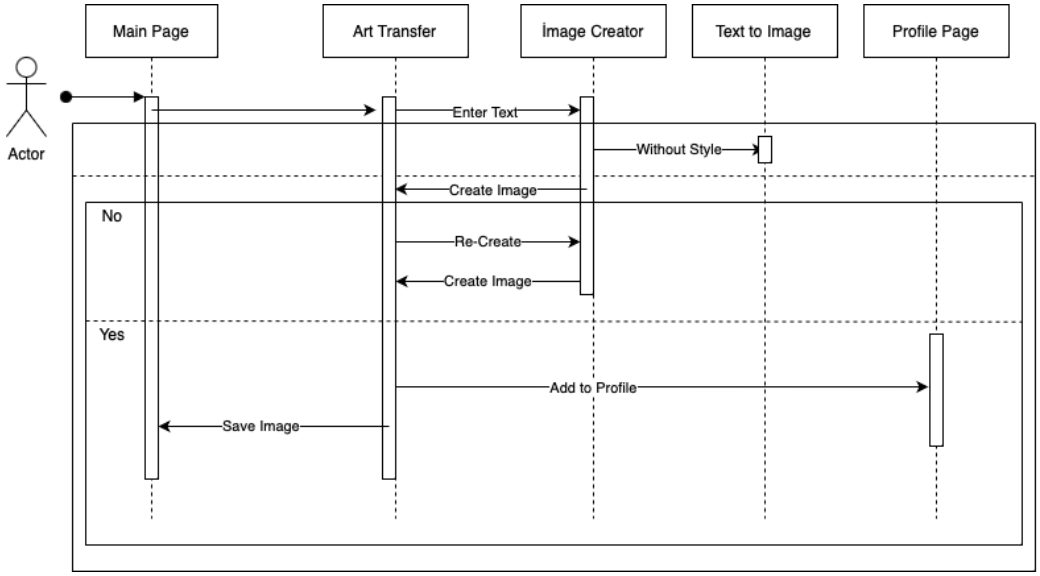
2.4.1.2. Create Image From Image

It allows us to create new visuals that look like it using a sample image. If the user does not like the created image, he can create new visuals with the same input. They can also save the images they like or share them with other users.



2.4.1.3. Create İmage From Art Transfer

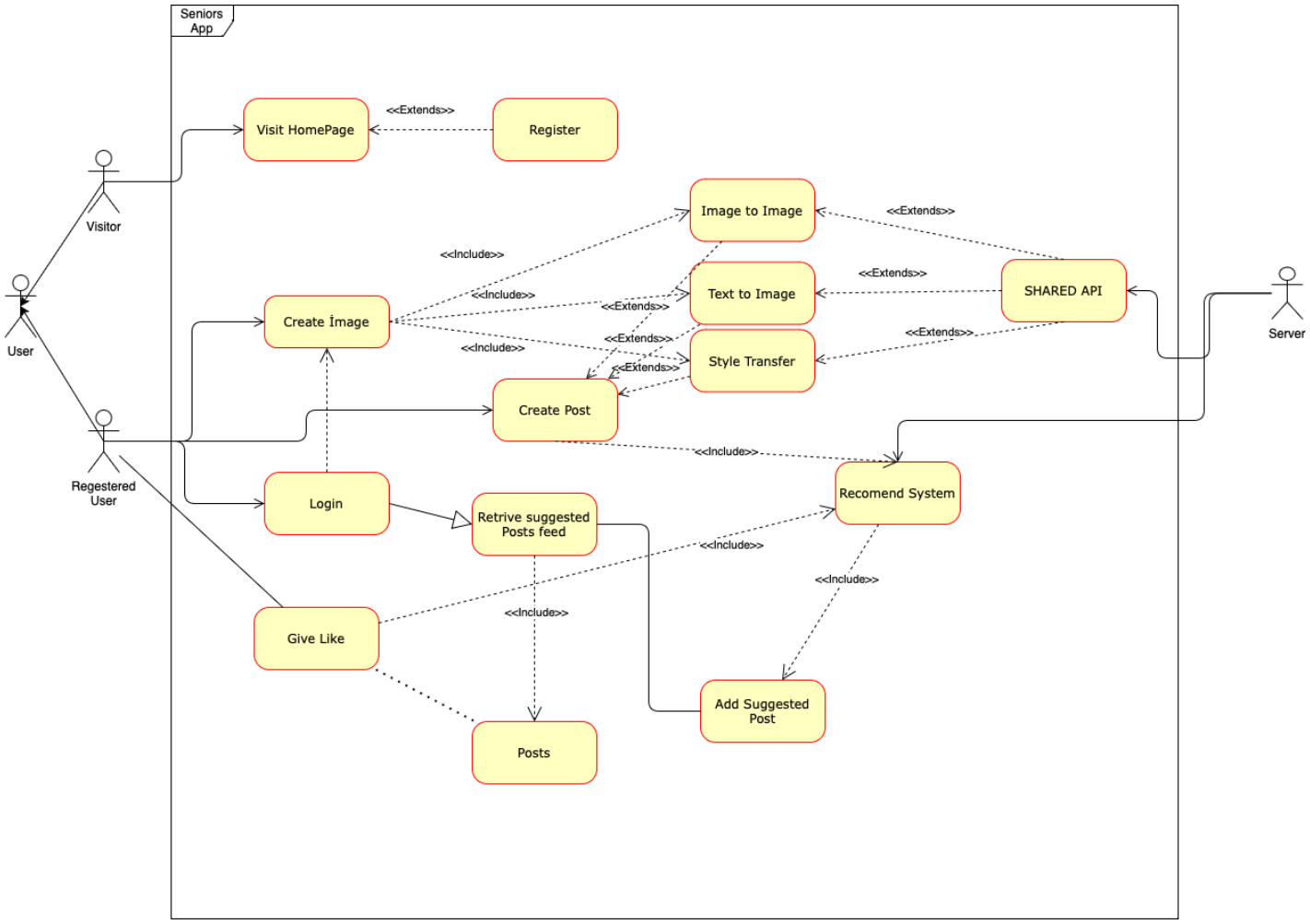
It allows us to create visuals in the style of a famous artist. If the user does not like the created image, he can create new visuals with the same input. They can also save the images they like or share them with other users.



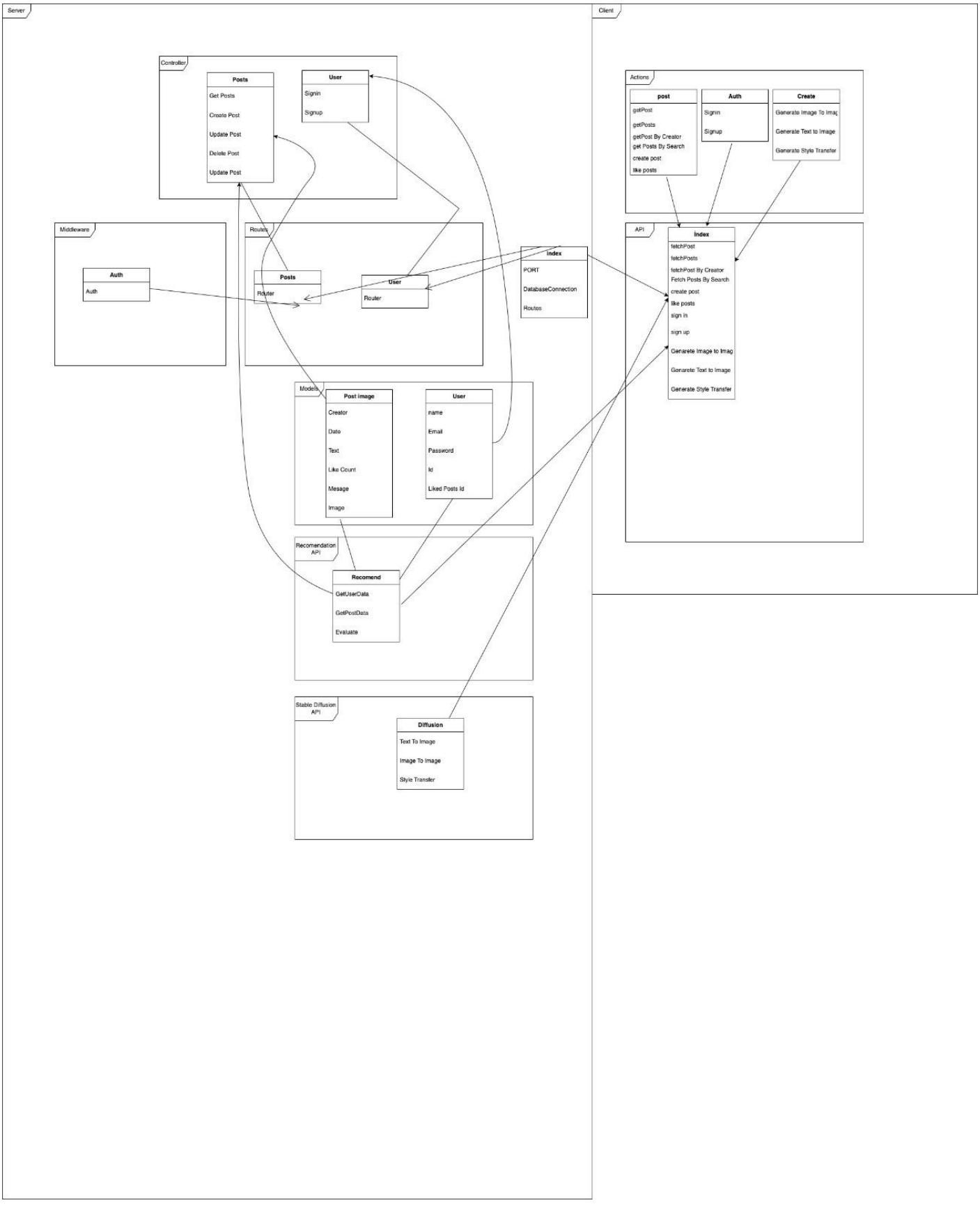
2.4.1.4. Follow Other User

You can follow other users, produce them and see and review the images they share on your home page.

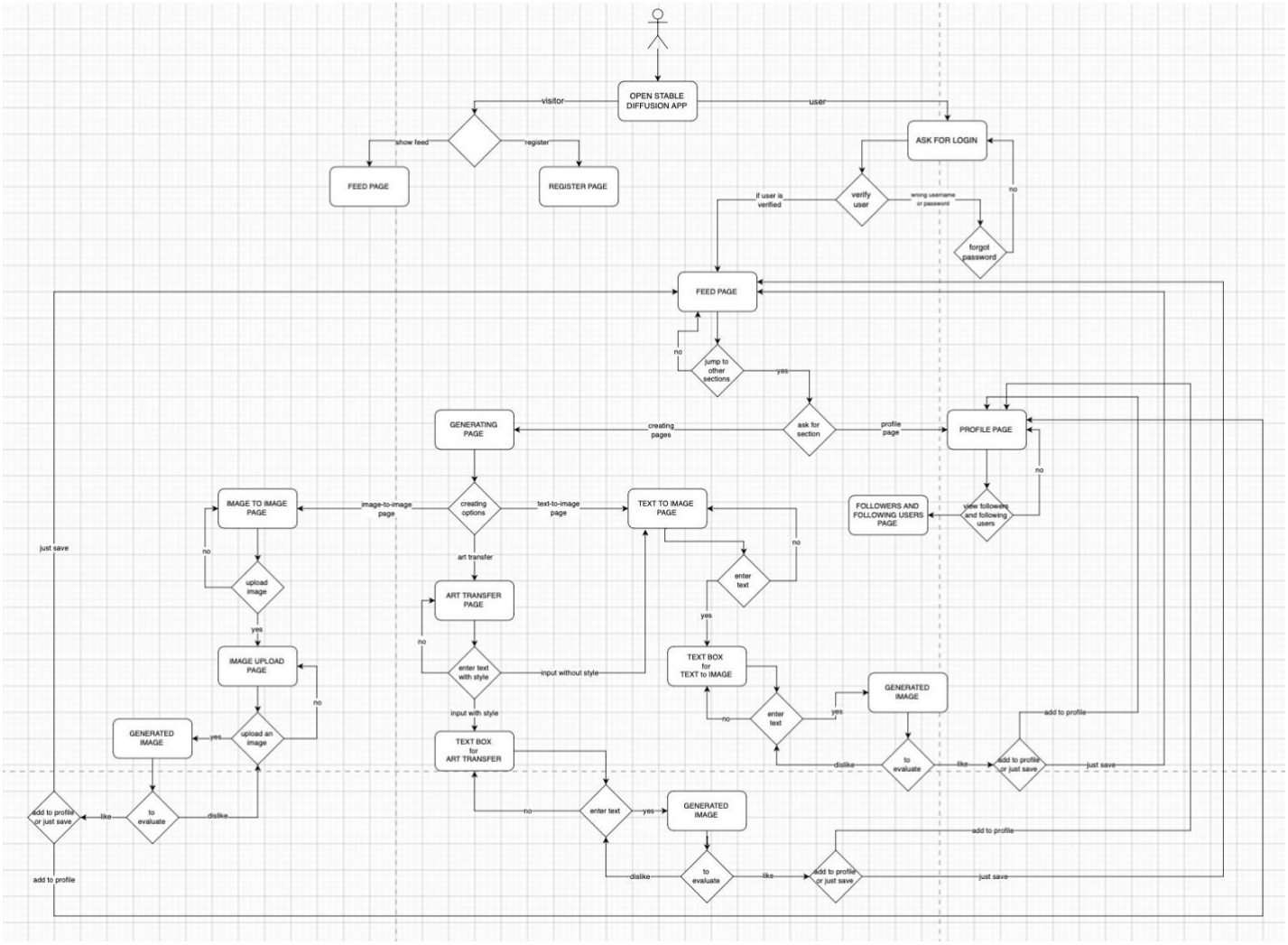
2.4.2. Use Case Model



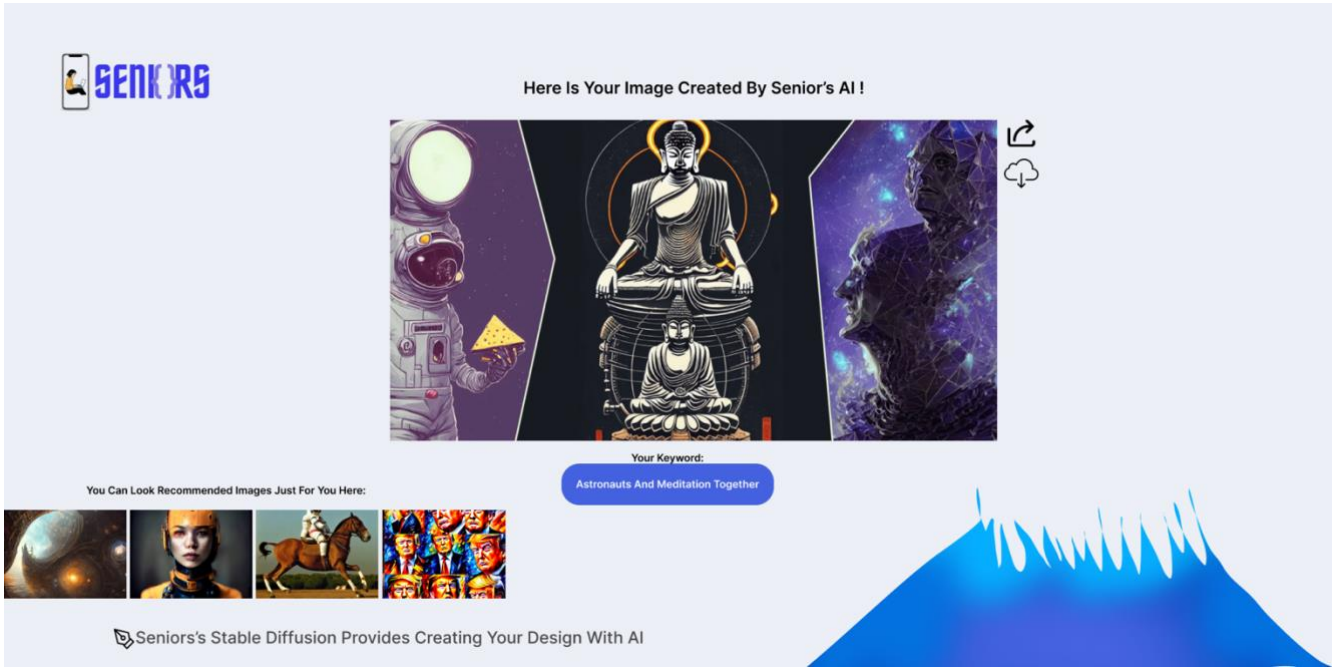
2.4.3. Object and Class Model

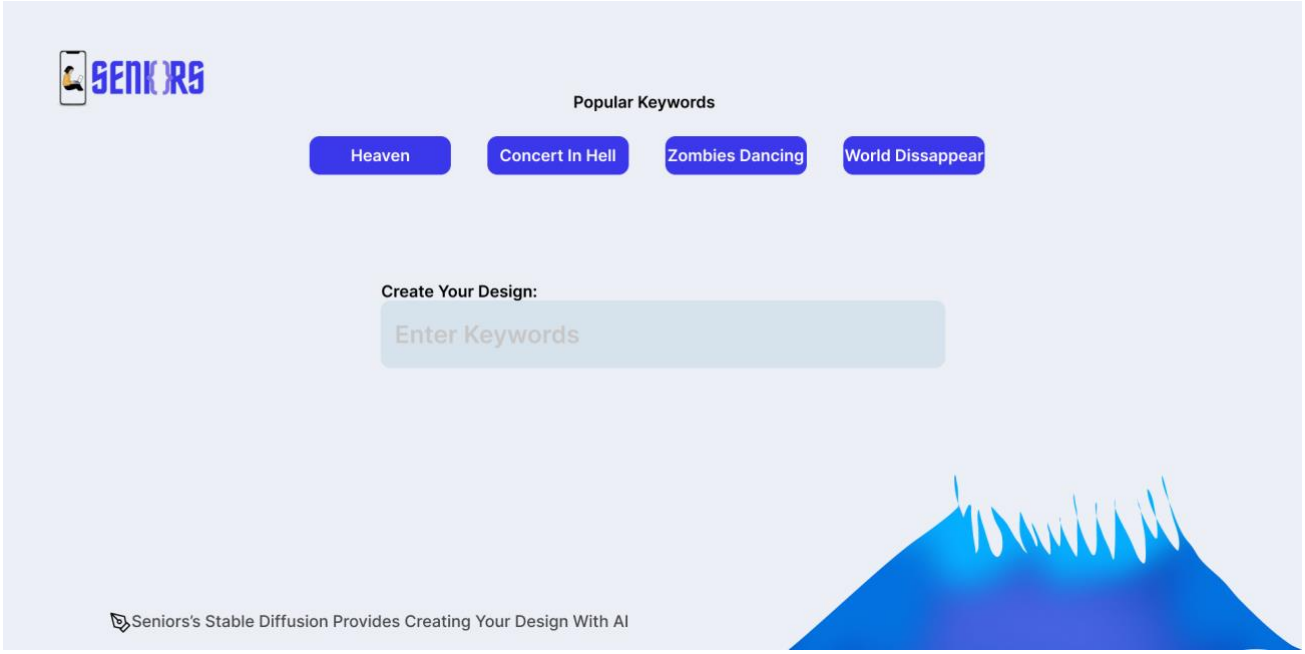


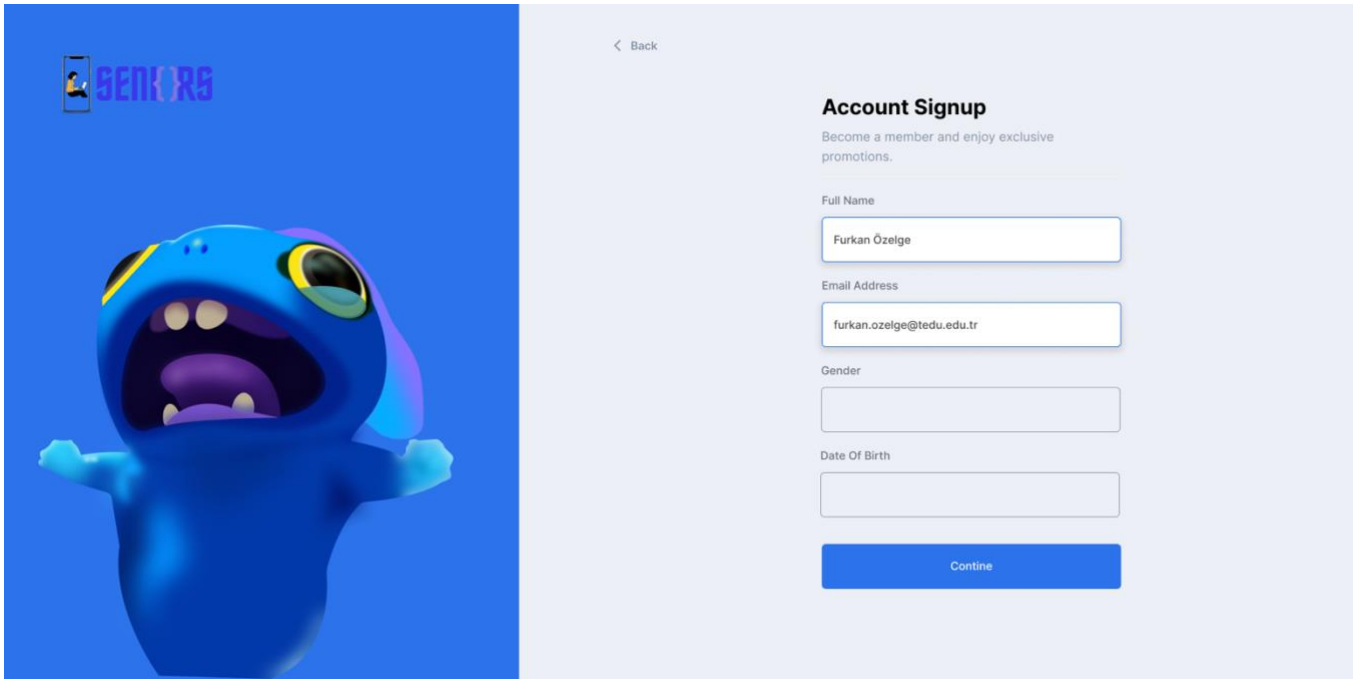
2.4.4. Dynamic Models

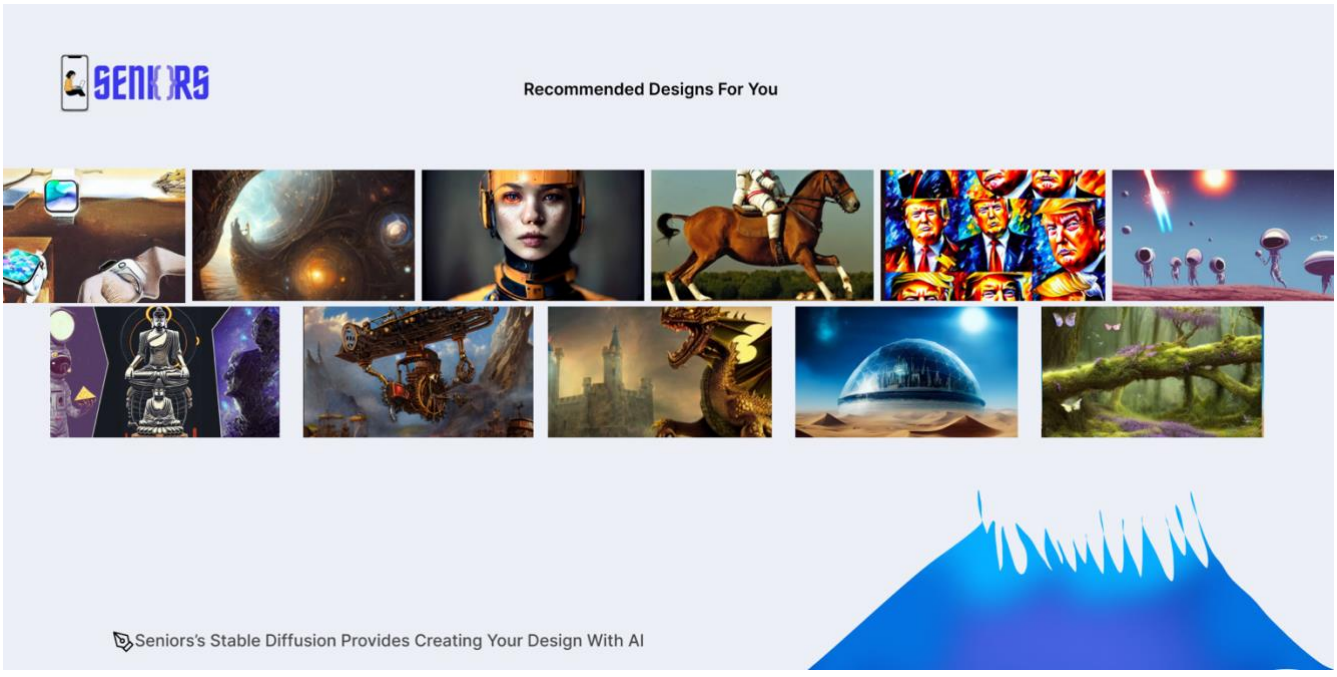


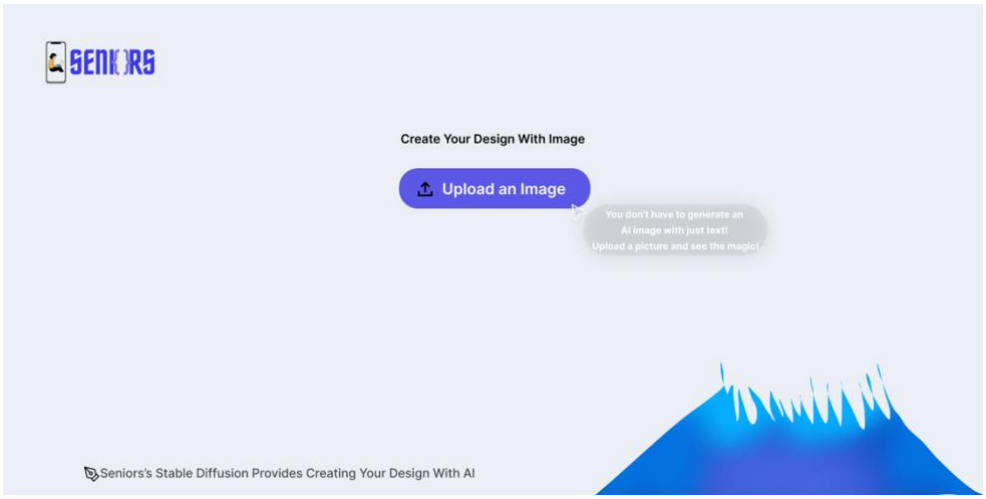
2.4.5. User Interface - Navigational Paths and Screen Mock-Ups

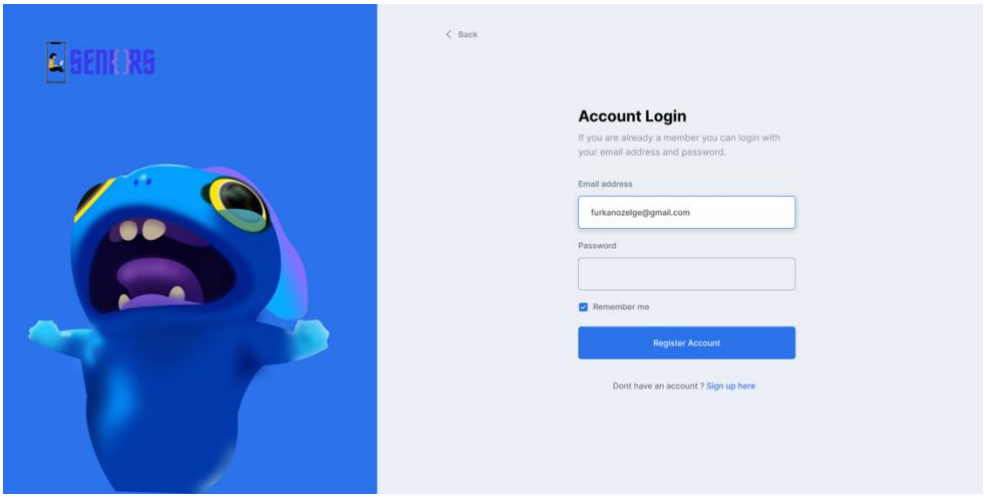


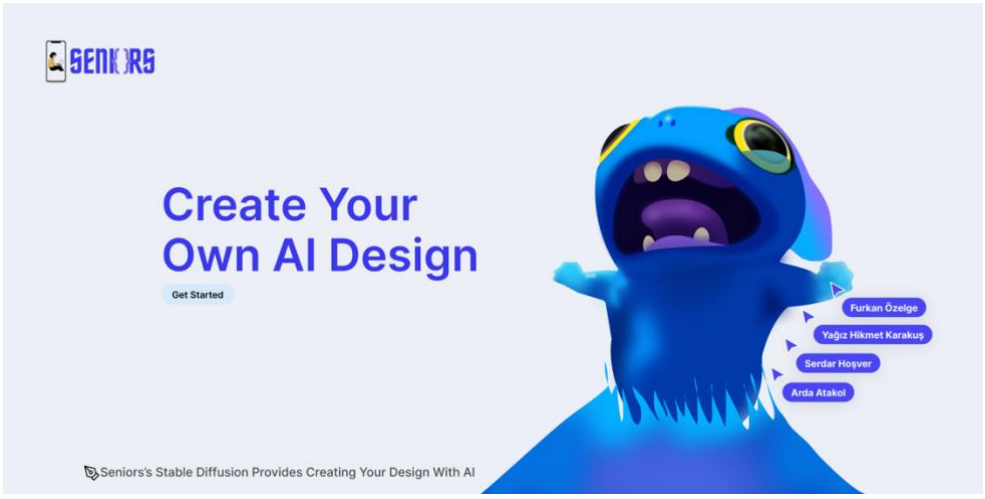



Back
Account Signup
Become a member and enjoy exclusive promotions.
Full Name
Furkan Özelge
Email Address
furkan.ozelge@tedu.edu.tr
Gender
Date Of Birth
Contine


Recommended Designs For You
Seniors's Stable Diffusion Provides Creating Your Design With AI


SENIORS
Create Your Design With Image
Upload an Image
You don't have to generate an AI image with just text! Upload a picture and see the magic!
Seniors's Stable Diffusion Provides Creating Your Design With AI


SENIORS
Back
Account Login
If you are already a member you can login with your email address and password.
Email address
furkanozelge@gmail.com
Password
Remember me
Register Account
Dont have an account ? Sign up here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Create Your Own AI Design
Get Started
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Serdar Hoşver
Arda Atakol
Seniors's Stable Diffusion Provides Creating Your Design With AI

3. Glossary

3.1. Stable Diffusion: Stable Diffusion is a deep learning, model released in 2022. It is primarily used to generate detailed images conditioned on text descriptions, though it can also be applied to other tasks such as inpainting, outpainting, and generating image-to-image translations guided by a text prompt.

3.2. AI(artificial intelligence): Artificial intelligence (AI) is intelligence—perceiving, synthesizing, and infering information—demonstrated by machines, as opposed to intelligence displayed by animals and humans. Example tasks in which this is done include speech recognition, computer vision, translation between (natural) languages, as well as other mappings of inputs.

3.3. Deep learning: Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised.

3.4. MVC Model(Model-View-Controller): Model–view–controller (MVC) is a software architectural pattern commonly used for developing user interfaces that divide the related program logic into three interconnected elements. This is done to separate internal representations of information from the ways information is presented to and accepted from the user.

3.5. vgg19 model: VGG-19 is a convolutional neural network that is 19 layers deep. You can load a pretrained version of the network trained on more than a million images from the ImageNet database. The pretrained network can classify images into 1000 object categories, such as keyboard, mouse, pencil, and many animals.

3.6. API(Application Programming Interface): An application programming interface (API) is a way for two or more computer programs to communicate with each other. It is a type of software interface, offering a service to other pieces of software. A document or standard that describes how to build or use such a connection or interface is called an API specification. A computer system that meets this standard is said to implement or expose an API. The term API may refer either to the specification or to the implementation.

3.7. Pipeline: In computing, a pipeline, also known as a data pipeline, is a set of data processing elements connected in series, where the output of one element is the input of the next one. The elements of a pipeline are often executed in parallel or in time-sliced fashion. Some amount of buffer storage is often inserted between elements.

3.8. BASE64: In computer programming, Base64 is a group of binary-to-text encoding schemes that represent binary data (more specifically, a sequence of 8-bit bytes) in sequences of 24 bits that can be represented by four 6-bit Base64 digits.

4. References

4.1. https://dataconomy.com/2022/09/stable-diffusion-ai-art-generator/

4.2. https://www.howtogeek.com/830179/how-to-run-stable-diffusion-on-your-pc-to-generate-ai-images/#autotoc_anchor_1

4.3. https://www.freepik.com/free-photos-vectors/3d-illustration

4.4. https://www.diagrams.net/