< IT PALADINS />

Private High School of Engineering and Technologies

MERN STACK PI

3D VIRTUAL FITTING ROOM

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INTRODUCTION

E-commerce (electronic commerce or EC) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. These business transactions occur either as B2B, B2C, C2C, or C2B. E-commerce shops have become part of our daily lives. Technological advancement has made it possible for people to sit in the convenience of their homes and still shop online without going to a physical shop, so this project is meant to design the next level eCommerce online shop so that the people in Tunisia and internationnaly will be able to purchase their goods and services online.
This project users are mainly divided into two main categories: The Administrators and the Customers.
The store manager and the staff members operate as administrators. They can add, edit, update products or, delete products thus they can change the names of products, change prices and, add or remove products.
The customer can search for product selection, update the cart, remove products from the cart and check out from the shop. The customer is also able to update his information such as names, addresses, and other data. but the key point in this project is the implementation of new technologies such as AI, ML, 3D body modeling, and AR that will deliver a whole new and unique experience to our customers.
This report will contain two chapters, we will start with the chapter "Preliminary study" which includes project goals, analysis of the existing solutions together with our proposed solution, and work plan. In the second chapter, we will describe the functional and technical needs with some insights on the uses cases, and UI.

Chapter 1

PRELIMINARY STUDY

1.1 Goals:

- Develop an easy-to-use web application where users can search for products, and try them on the avatar or in real-time.
- Make shopping online a pleasant and easier experience for everyone.
- Reduce the percentage of failed and mismatching purchases.
- Attract more clients.

1.2 State of the art:

1.2.1 Introduction:

In this chapter, we will start by presenting the study of the existing. Then show the problems within the already existing websites. Next, we will propose our solution with added value to the problems and at last, we will present a conclusion.

1.2.2 Study of the existing:

In this section we will describe the different existing solutions which have similarities with our project.

Style.me: [1]

- A pre-created standard avatar for all users.
- Manual input of measurements by users.

- Bad clothes fitting on the avatar.

MagicMirror: [2]

- This product gives bad measurements ratio as it sometimes chooses a wrong size for the user.
- Have a bad latency time which causes lagging and a phase shift between the real time and applied AR when used.
- This Solution only exists in stores and not on the web.
- Has a limited set of clothes.

Dress Former: [3]

- Only for women clothing.
- Only fixed avatar not a full solution.
- The measurements are inputs from the user.

Qfit: [4]

- Website it's too expensive to use.
- Need many heigth quality equipments.
- Way too complex and available only in store.

1.2.3 Benchmarking:

By visiting other websites such as Style.me, DressFormer, Qfr and MagicMirror we endup with this Benchmarking table:

	Dimension		Person		Measurements		Hardware	Web
	2D	3D	Avatar	Real	Input	Scan	Camera or sensor	-
Style.me		X	X		X			yes
DressFormer		X	X		X		camera	yes
QFit		X	X			X	Sensor	no
MagicMirror		X		X		X	Camera	no
3D VFR		X	X	X		X	Camera	yes

Figure 1.1: Benchmarking Table

1.2.4 Conclusion:

We conclude that our solution is unique and exhaustive and we should develop an easy to use solution that combines many best practices, and modern technologies.

1.3 Problematic:

In existing websites we found that client must consult several platforms to find everything he is looking for (clothes, shoes, hat. . .). We also noticed the way how to use these platforms and how to manage them is a bit difficult.In addition many applications use bad algorithms for body measurement and for determining the body shape and there who enters these measurements manual This is what leads to the wrong shape.
For this reason, we have to work on a solution that offers different real services and provides a guided experience with detailed steps and we will try to use better techniques and algorithms to determine the body shape accurately.

1.4 Proposed Solution:

The 3D VFR will be the evolutionary e-Commerce web application as it integrates many different concepts technologies such as AI, ML, human pose detection, virtual 3D modeling, Augmented reality, etc... to deliver a futuristic project that will overtake our competitors.
Our solution is a fully-fledged web app with an outstanding performance in terms of efficiency, adaptability, speed. A user-friendly interface guarantees easy accessibility

to different parts of the online store and our assisted sessions ensured by the virtual assistant will offer a unique experience to our clients.

1.4.1 Added Values:

- 3D body scanner: our web application will give our customers the possibility to try the integrated 3D body scanning module that redefines the human body measurement and makes a digital copy of the outside of the human body (3D Avatar), this process is called 3D virtual modeling.
- Real-time 3D virtual fitting: users will be able to try on different pre-selected clothes virtually using the device camera in real-time with the ability to record the session for future reference.
- Virtual assistant: to help users navigate through the app and give them product recommendations based on personal preferences, search history, and matching ration.

1.5 Work Plan:

The formal road map for our project:

Phase 1:

- Data scraping
- 3D Clothes Models development

Phase 2:

- Project initiation
- Template integration
- Crud development
- API integration

Phase 3:

- Implementation of AI and ML models
- Enhancement and application of Clothes fitting Algorithms
- Enhancement and application of avatar creation Algorithms

- Development of recommendation system and virtual assistant

Phase 4:

- Project overview and testing
- Bugs fixing and study of further development and enhancement
- Project deployment

1.6 Conclusion

Our main goal in this project is to deliver a whole new personalized and unique experience to our customers and the luxury of virtually trying clothes before buying them to minimize the failed purchases.

Chapter 2

PHASE 1: SPECIFICATION AND ANALYSIS

2.1 Introduction:

The requirements specification is the initial phase of any application to be developed in which we will identify the needs of our application. We distinguish functional needs that present the features expected from our application and nonfunctional needs to avoid the development of an unsatisfactory application and to find a common agreement between specialists and users to make the project a success.

2.2 Identification of functional and non-functional requirements:

This phase consists of understanding the context of the system. It determines the functionalities of the most relevant actors. It is a section dedicated for the explanation of the functional and non-functional requirements.

2.2.1 Identification of actors:

An actor is the modeling of a role played by an external person who interacts with the application. The different actors interacting with our application are:

- Super Administrator: This is the person with the highest level of privilege , he can manage Admin.
- Administrator: This actor can manage clients , products and ads.

- Client: The application is entirely dedicated to clients who want to buy clothes offer or create an avatar , manage real time dressing and many other features around virtual fitting room.
- Visitor: Able to use the application but with limited access.

2.2.2 Functional requirements:

In this part, we will identify the needs of the actors of the application.
A functional need (or a use case in terms of UML), expresses an action which the system must perform in response to a request.
The actor-identification phase allowed us to identify two types of actors which are the system administrator and the system user. Consequently, the functionalities that will be provided by the system are divided in two categories as follows:
User-specific features:
These features can be summed up in:

- Manage Account : Users should be able to consult or update profile and remove account
- Manage avatar Dressing : User will be able to create an avatar , try clothes on and change colors or size of clothes and visualize full outfit .
- Manage real time Dressing : User will be able to try clothes on real time , select clothes to try , change colors or size of clothes and visualize full outfit .
- Manage Basket : The system must allow users to manage their basket with the functions of consultation, search , addition , update , validation and payment . ‘
- Manage rating and claims : Users should be able to manage their claims also their reviews as well they will be able to evaluate the system and items and share their review.
- Manage Product : The system must allow users to consult and search products and filter them.
- Virtual assistant : The system will notify the user about promotions , unfinished orders . user should engage with customer service to get recommendations and help in matching clothes .In addition , He can communicate with Chatbot to get information and obtain help and updates.

Admin-specific features:
These features can be summed up in:

- Manage users : admins will be able to deactivate or activate user account , consult list of users and as super admin they can create or remove admin account.
- Product management : admin should be able to manage Products and categories with the functions of creation , update , consultation Besides they can assign product to categories.
- Manage Orders : The system must allow admin to consult , update and sort orders in addition it provides a view that allows admin to consult statistics of orders.
- Consultation of statistics: admin should be able to consult total analytic on the store and to add adds.
- Consultation claims and reviews : The system must allow admin to consult list of claims , reviews and to delete a review.

2.2.3 Non-functional requirements :

These are requirements that are not related to the behavior of the system but that identify the internal and external constraints of the system.
The main nonfunctional needs of our application can be summed up in the following points:

- Ergonomics: The application has to be easy and simple to use in order to make the users more comfortable and more engaged with the services.
- Data Access Security: This application must provide maximum security through the identification of users who have the right to access the application while ensuring the confidentiality of their data.
- Accuracy: Presenting accurate and fair research results.The application must be above all efficient in order to meet all the requirements of users in an ideal way.
- Performance : The application must be efficient, that is to say that the system must react within a specific time, whatever the action of the user.
- Human constraints: Our solution must take into account the needs of each actor involved in change management. It should facilitate their task and ensure their activity in good conditions.

- High availability needs: in the end, it is important that our solution can operate on a highly available platform that can handle a high number of requests.

2.3 Use case identification:

A use case represents a set of sequences of actions carried out by the system and producing an observable result for a particular actor.
It models a service rendered by the system. It expresses the interactions between an actor and the system.
In the rest of this section we will present the different use cases within our application.
Summary:
Actors: Visitor, Client, Administrator , Super Administrator
Detailed description:
Preconditions: All actors must log in in order to have access to all services except for the service of consulting advertisements.
Our applications allows :
The visitor is able to:

- Consult Products
- Sign up

The client is able to :

- Manage Profile
- Manage Avatar Dressing
- Manage real time Dressing
- Manage claims and reviews
- Manage Basket
- Consult Products
- Engage with customer Service

The admin is able to :

- Manage Clients
- Manage Products

- Manage Orders
- Consult list of claims and reviews
- Consult analytic
- add ads

the super admin is able to :

- Manage admins

2.4 Global Use Case Diagram:

To model a system, the most important aspect is to capture the dynamic behavior.
Dynamic behavior means the behavior of the system when it is running/operating.
In UML, there are five diagrams available to model the dynamic nature and use case diagram is one of them.
Use case diagrams consist of actors, use cases and their relationships. The diagram is used to model the system/subsystem of an application.
A single use case diagram captures a particular functionality of a system. Hence to model the entire system, a number of use case diagrams are used.
The following figure shows the global use case diagram of our application :

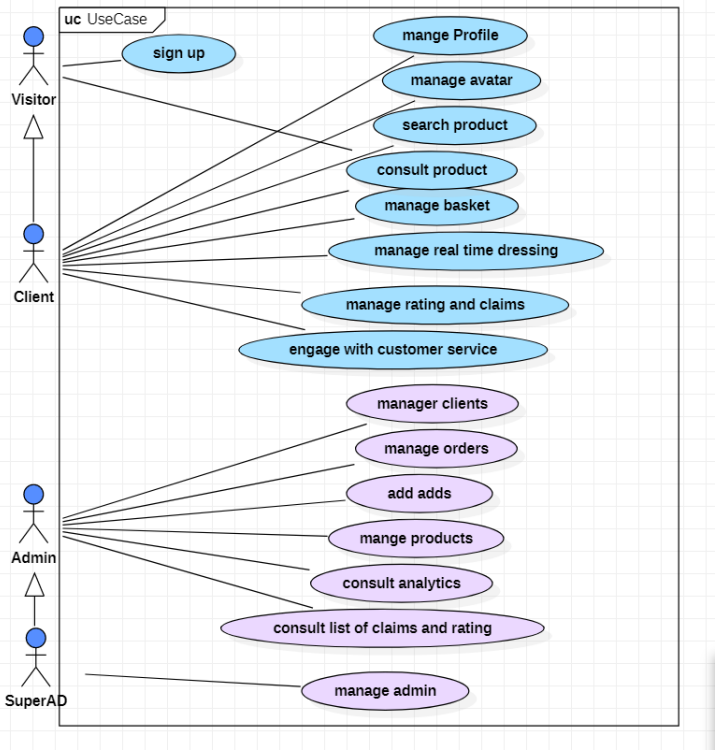

Figure 2.1: Global Use Case Diagram

Note: all the use cases include the condition of sign in

2.5 Detailed use case analysis:

2.5.1 Use case: Add Product

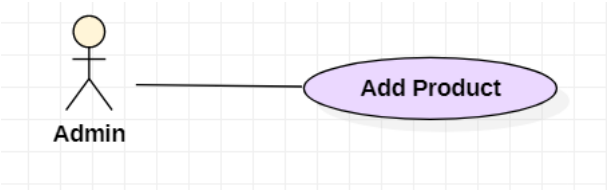

Figure 2.2: Use Case Diagram Add product

2.5.2 Detailed description of use case: Add Product

Name	Add Product
Primary Actor	Administrator
Preconditions	the admin must be connected to the app .
Postconditions	the product has been created .
Main Success Scenario	- After a successful login , the admin can access to app - he will consult the Products management interface - he will click on button add product - the system will display the interface of addition Product - the admin will enter all the form fields . -the system will validate all the fields and create the product - the system will send a successful message to the admin
Extensions	[Problem with fields of Product] the system will show an error message asking for another entering

Figure 2.3: Detailed description of use case: Add Product

2.5.3 Use case: Create Avatar

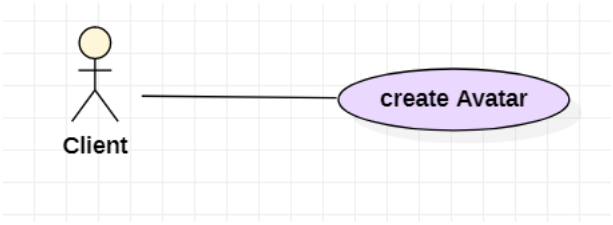

Figure 2.4: Use Case Diagram Avatar

2.5.4 Detailed description of use case : Create Avatar

Name	Create Avatar
Primary Actor	Client
Preconditions	the user must be connected to the app . the user must be standing 2m away from the camera
Postconditions	the avatar has been created .
Main Success Scenario	- After a successful login , the client can access to app -the system will direct him to home page - he will click on button create avatar - the system will display the interface of creation avatar - the user will open the webcam -the system will calculate the body measurements -the user must turn around -the system will detect the body shape - the system will create the avatar - the system will send a successful message to the client
Extensions	the system will show an error message asking for another try because the user is standing too close to the camera or because of the bad quality of camera

Figure 2.5: Detailed description of use case : Create Avatar

2.5.5 Use case : Try clothes in real time

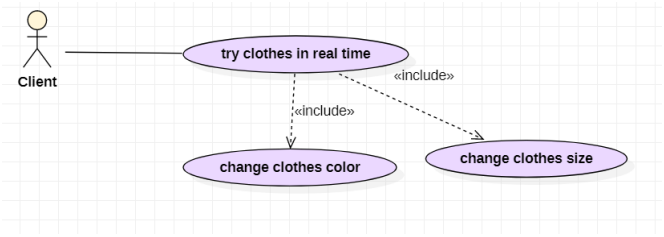

Figure 2.6: Use Case Diagram Try clothes in RT

2.5.6 Detailed description of use case :Try clothes in real time:

Name	Try clothes in real time
Primary Actor	Client
Preconditions	the user must be connected to the app . the user must be standing 2m away from the camera
Postconditions	
Main Success Scenario	- After a successful login , the client can access to app -the system will direct him to home page - client will select dressing room interface - the system will display the interface - the user will open the webcam -the user will select clothes to try -the system will put clothes on user accurately - the user can change colors by selecting the colors - the system will change the color -the user can change size by selecting the size -the system will change the size - the system will show a recommendation to client about clothes
Extensions	the system will show an error message asking for another try because the user is standing too close to the camera or because of the bad quality of camera

Figure 2.7: Detailed description of use case :Try clothes in real time

2.5.7 Class diagram:

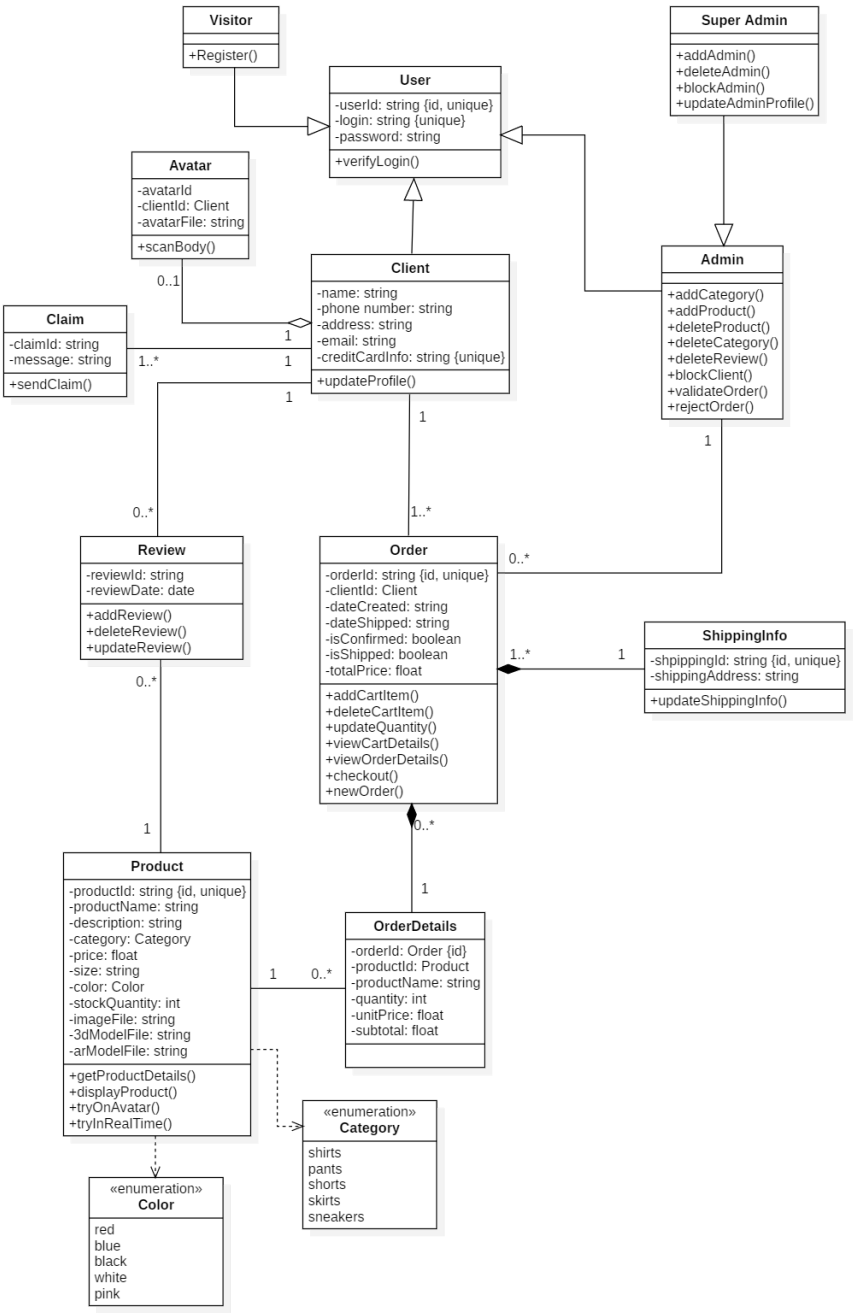

Figure 2.8: Class diagram

2.6 Technical requirements:

2.6.1 Technical architecture:

Technical architecture associates application components from application architecture with technology components representing software and hardware components.

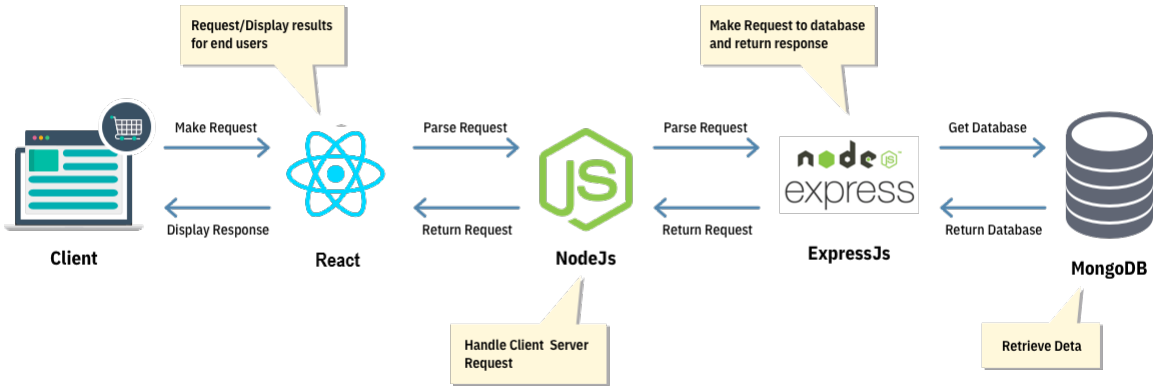

Figure 2.9: MERN stack technical architecture diagram

2.6.2 Softwares:

Mongo Compass

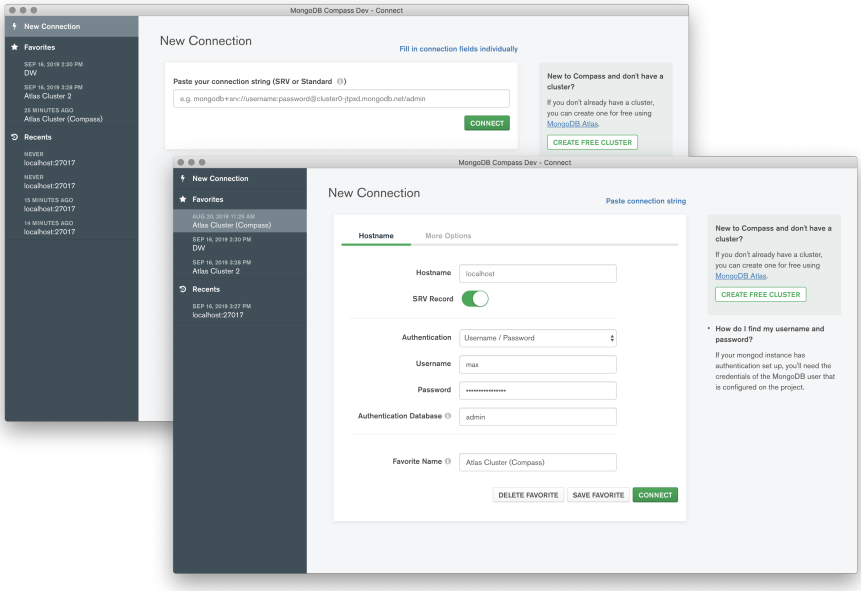

Figure 2.10: Mongo Compass
[5]

The GUI for MongoDB. Visually explore your data. Run ad hoc queries in seconds. Interact with your data with full CRUD functionality. View and optimize your query performance. Available on Linux, Mac, or Windows. Compass empowers you to make smarter decisions about indexing, document validation, and more.

VScode (IDE)

Figure 2.11: VScode
[6]

Visual Studio Code is a freeware source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git

Blender

Figure 2.12: Blender
[7]

Blender is a free and open-source 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, motion graphics, interactive 3D applications, virtual reality, and computer games

Pycharm:

Figure 2.13: Pycharm
[8]

PyCharm is an integrated development environment used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains.

2.6.3 FrameWorks and libraries:

Express. js:

Figure 2.14: Express.js
[9]

Express.js, or simply Express, is a back end web application framework for Node.js, released as free and open-source software under the MIT License. It is designed for building web applications and APIs. It has been called the de facto standard server framework for Node.js

React.js:

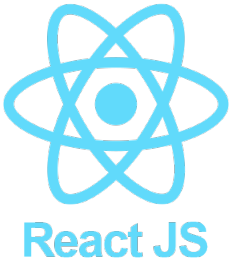

Figure 2.15: React.js
[10]

React is an open-source, front end, JavaScript library for building user interfaces or UI components. It is maintained by Facebook and a community of individual developers and companies. React can be used as a base in the development of single-page or mobile applications

Node.js :

Figure 2.16: Node.js
[11]

Node.js is an open-source, cross-platform, back-end JavaScript runtime environment that runs on the V8 engine and executes JavaScript code outside a web browser.

MongoDB

Figure 2.17: MongoDB
[12]

MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas. MongoDB is developed by MongoDB Inc. and licensed under the Server Side Public License.

Open cv

Figure 2.18: OpenCV
[13]

OpenCV is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage

then Itseez. The library is cross-platform and free for use under the open-source Apache 2 License.

Three js

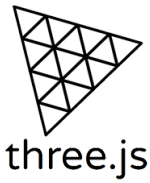

Figure 2.19: Three.js
[14]

Three.js is a cross-browser JavaScript library and application programming interface used to create and display animated 3D computer graphics in a web browser using WebGL. The source code is hosted in a repository on GitHub.

Unity:

Figure 2.20: Unity
[15]

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Inc.39;s Worldwide Developers Conference as a Mac OS X- exclusive game engine. As of 2018, the engine had been extended to support more than 25 platforms.

Vuforia:

Figure 2.21: Vuforia
[16]

Vuforia is an augmented reality software development kit for mobile devices that enables the creation of augmented reality applications. It uses computer vision technology to recognize and track planar images and 3D objects in real time.

Tensorflow js

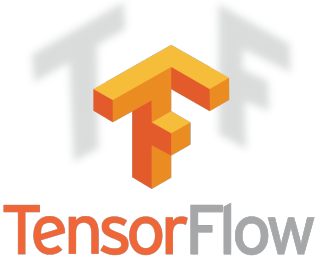

Figure 2.22: TensorFlow.js
[17]

TensorFlow is a free and open-source software library for machine learning. It can be used across a range of tasks but has a particular focus on training and inference of deep neural networks. Tensorflow is a symbolic math library based on dataflow and differentiable programming.

2.6.4 Hardwares:

- High processing CPUs and GPUs
- Phone camera and webcam

2.6.5 Algorithms and datasets:

Natural language processing (NLP) algorithm:

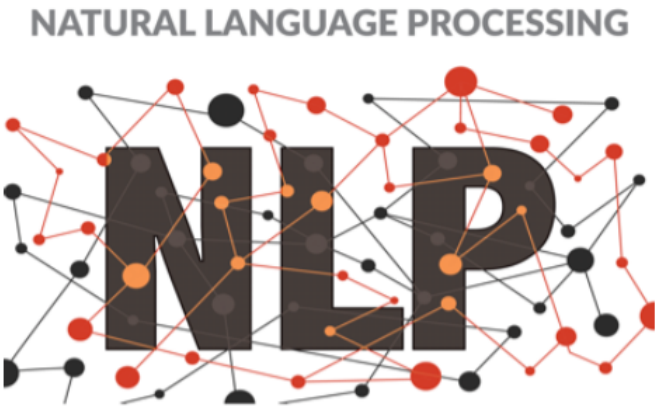

Figure 2.23: NLP
[18]

Natural language processing is a subfield of linguistics, computer science, and artificial intelligence concerned with the interactions between computers and human language, in particular how to program computers to process and analyze large amounts of natural language data.

Neural networks and regression algorithms

1 neural networks:

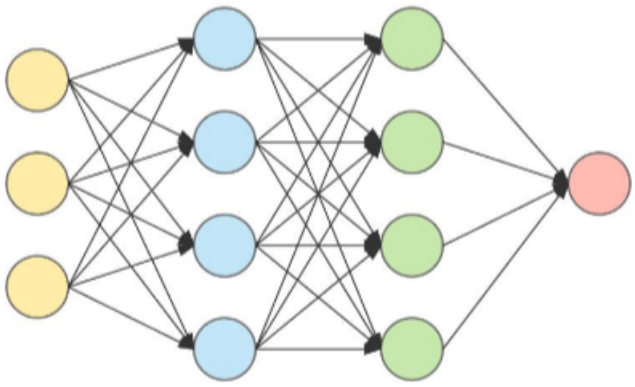

Figure 2.24: Neural networks
[19]

Artificial neural networks, usually simply called neural networks, are computing systems vaguely inspired by the biological neural networks that constitute animal

brains. An ANN is based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain.
2 regression algorithms:

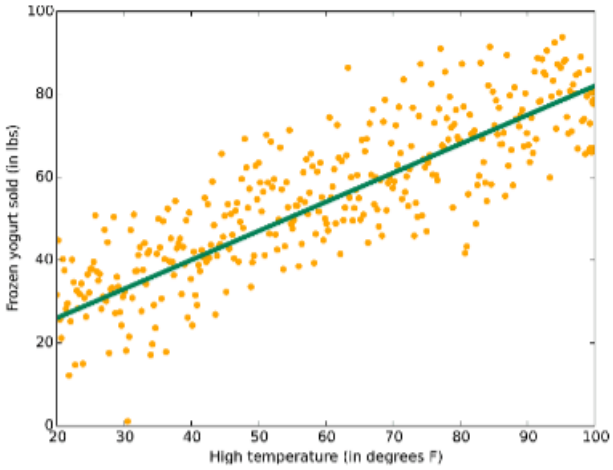

Figure 2.25: Regression algorithms
[?]

Regression algorithms predict the output values based on input features from the data fed in the system. The go-to methodology is the algorithm builds a model on the features of training data and using the model to predict the value for new data.

Vocal recognition algorithm :

Figure 2.26: Vocal recognition algorithm
[20]

Speech recognition is an interdisciplinary subfield of computer science and computational linguistics that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers.

Speech synthesis algorithm :

Figure 2.27: Speech synthesis algorithm
[21]

Speech synthesis is the artificial production of human speech. A computer system used for this purpose is called a speech computer or speech synthesizer, and can be implemented in software or hardware products.

Pose detection algorithm:

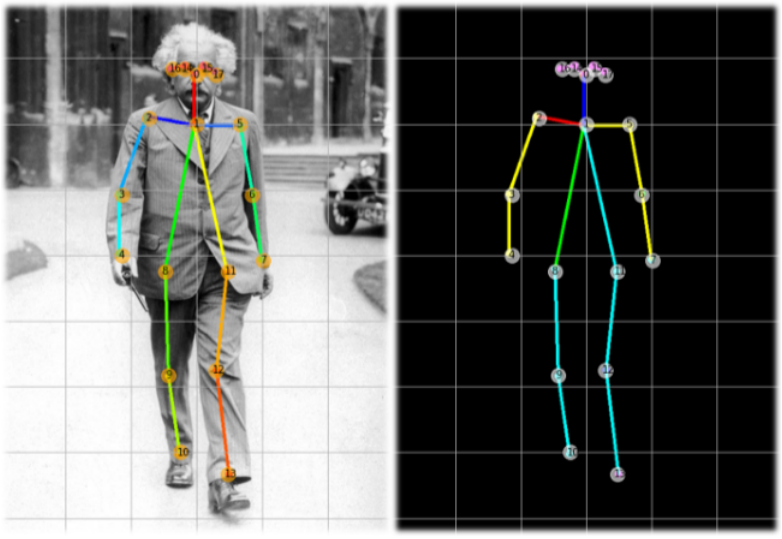

Figure 2.28: Pose detection algorithm
[22]

3D pose estimation is a process of predicting the transformation of an object from a user-defined reference pose, given an image or a 3D scan.

Body parts detection algorithm(Bodypix):

Figure 2.29: Bodypix
[23]

quot;Bodypix is an open-source machine learning model which allows for person and body-part segmentation in the browser with TensorFlow.js. In computer vision, image segmentation refers to the technique of grouping pixels in an image into semantic areas typically to locate objects and boundaries. The BodyPix model is trained to do this for a person and twenty-four body parts (parts such as the left hand, front right lower leg, or back torso). In other words, BodyPix can classify the pixels of an image into two categories: 1) pixels that represent a person and 2) pixels that represent background. It can further classify pixels representing a person into any one of twenty-four body parts.

Body Measurements DATASET BY ROBERT HOYT MD:

	bmxwaist	bmiwaist	bmxsad1	bmxsad2	bmxsad3	bmxsad4
1	81	No data.	17,7	17,9	No data.	No data.
2	45,4	No data.	No data.	No data.	No data.	No data.
3	64,6	No data.	15,6	15,5	No data.	No data.
4	80,1	No data.	18,3	18,5	No data.	No data.
5	86,7	No data.	21	20,8	No data.	No data.
6	59,8	No data.	13,5	13,5	No data.	No data.
7	No data.	No data.	No data.	No data.	No data.	No data.
8	54,4	No data.	No data.	No data.	No data.	No data.
9	69,6	No data.	16,4	16,3	No data.	No data.
10	69,4	No data.	14,8	14,7	No data.	No data.
11	71,6	No data.	16,3	16,2	No data.	No data.
12	120,4	No data.	26,6	26,7	No data.	No data.
13	49,8	No data.	No data.	No data.	No data.	No data.
14	116,5	No data.	29,7	29,8	No data.	No data.
15	56,7	No data.	No data.	No data.	No data.	No data.
16	89,4	No data.	17,6	17,9	No data.	No data.
17	81,1	No data.	19,8	20	No data.	No data.

Figure 2.30: Body Measurements DATASET
[24]

Contains measurements like height and weight but also BMI and other more detailed measurements.

2.7 Prototyping:

2.7.1 Logo:

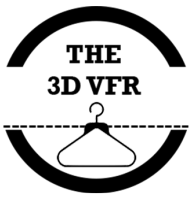

Figure 2.31: Logo 3D VFR

2.7.2 UI:

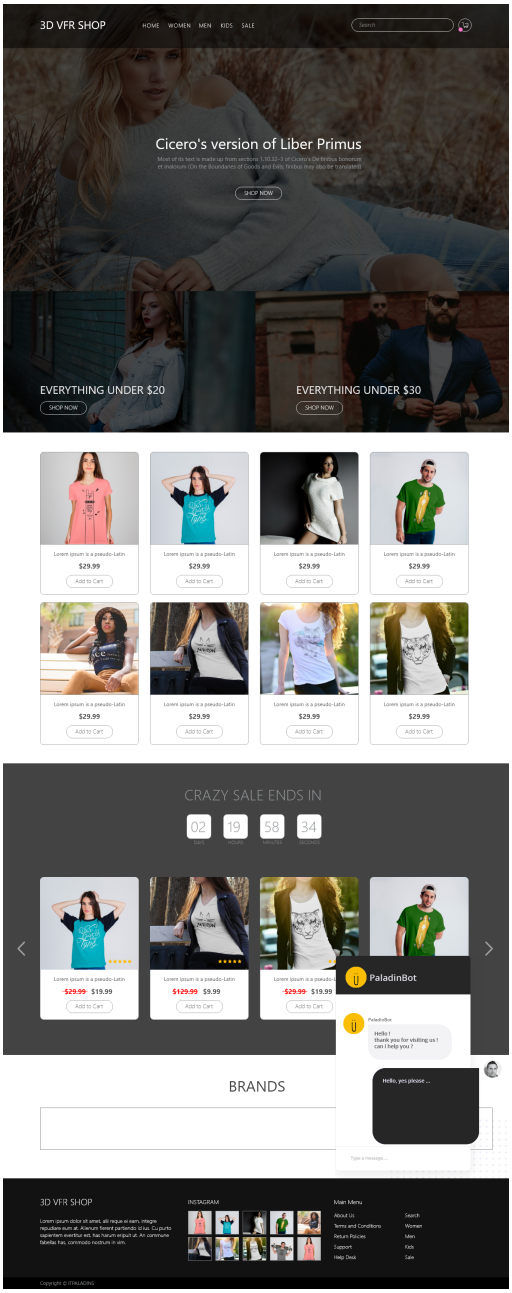

Figure 2.32: Home page

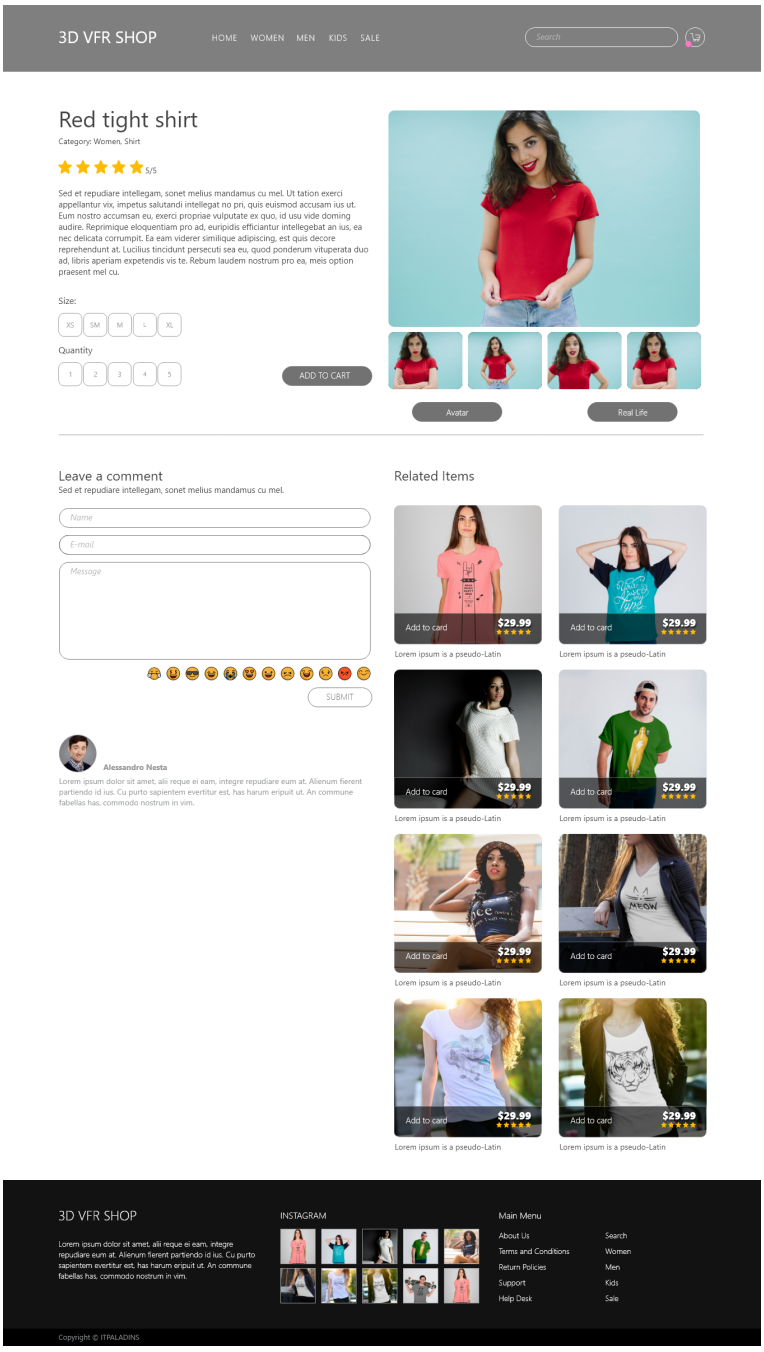

Figure 2.33: Product page

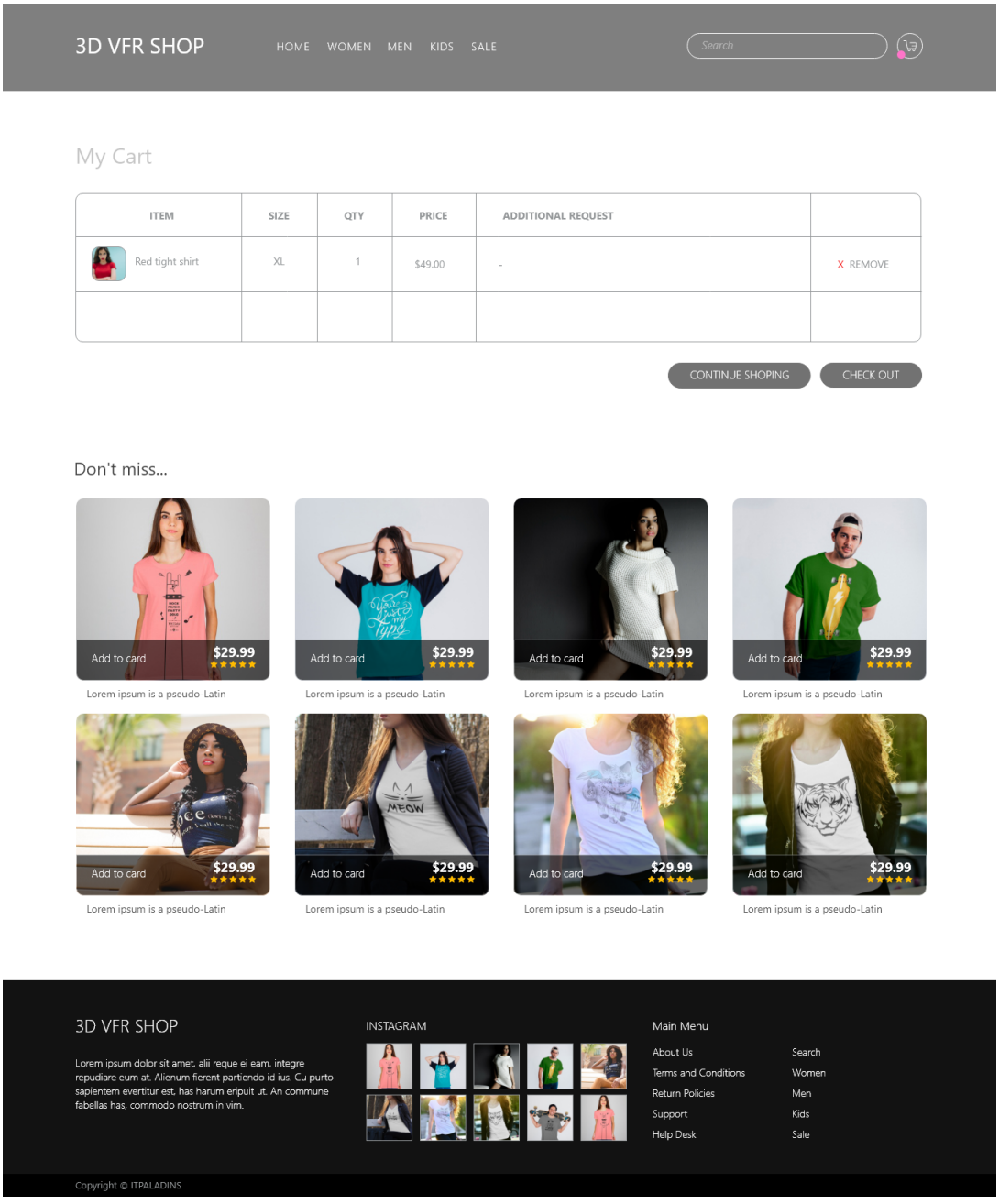

Figure 2.34: Cart page

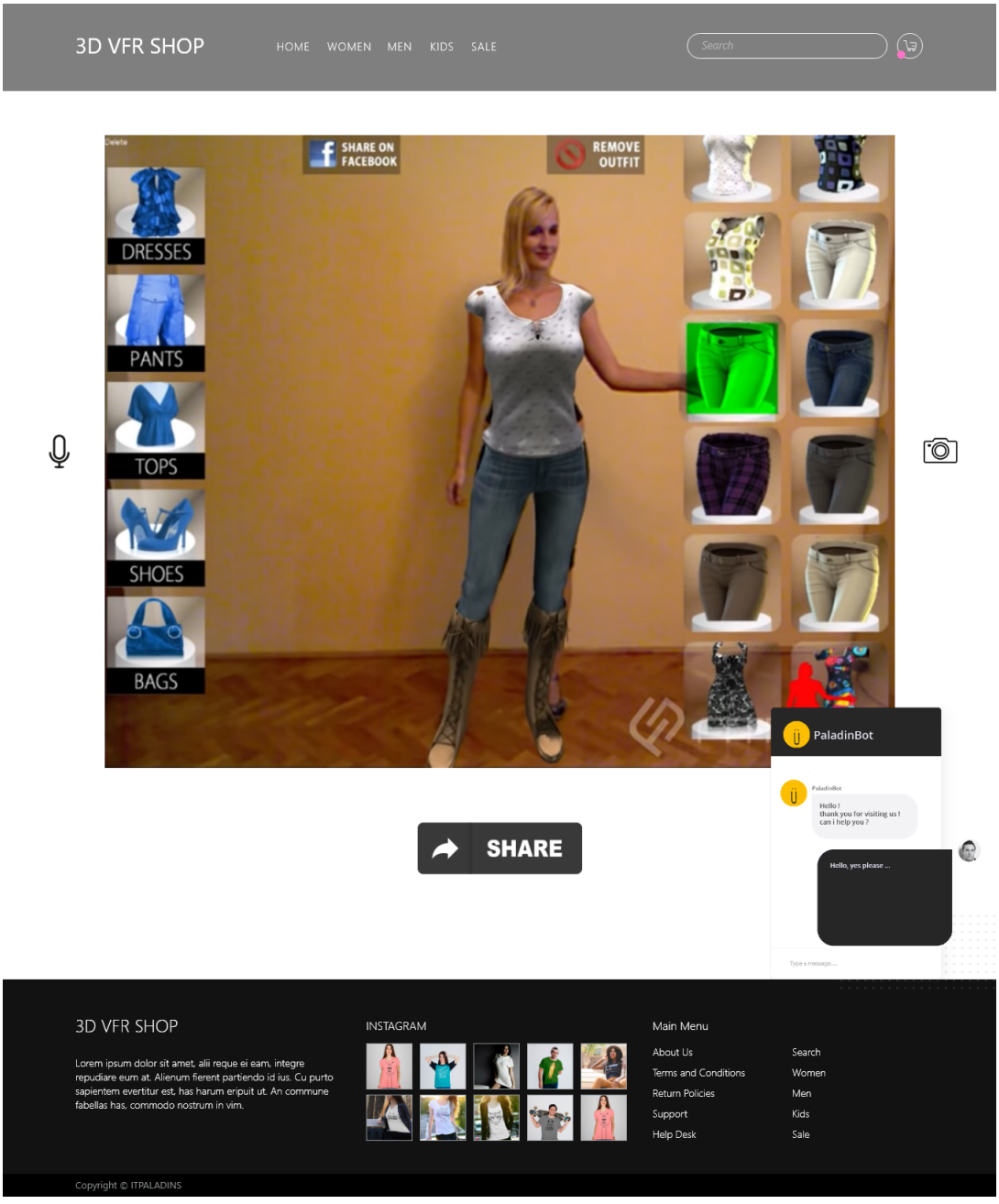

Figure 2.35: RealTime page

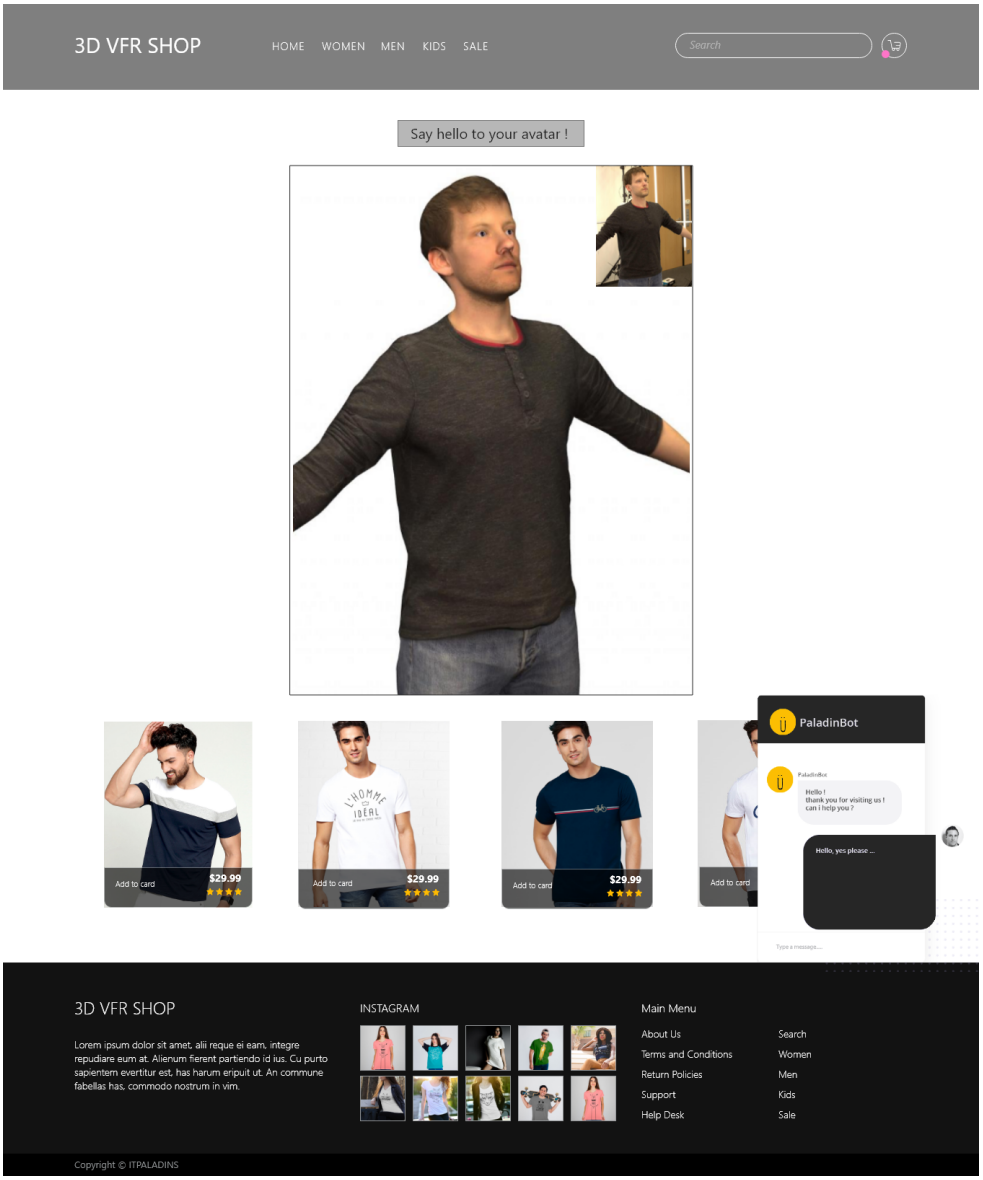

Figure 2.36: Avatar page

2.8 Conclusion

At the end of the implementation phase, we defined solution where it will become a real application.
We have presented some user interfaces in this part to give a precise idea.

Chapter 3

PHASE 2: TECHNICAL DELIVRABLES

3.1 Introduction:

A feasibility study is an analysis that takes all of a project's relevant factors into account—including economic, technical, legal, and scheduling considerations—to ascertain the likelihood of completing the project successfully.
A task is a named construct which defines a certain job that should be performed by members.
A task defines both the operations to be performed (such as starting programs, operations with files, displaying onscreen messages etc.)

3.2 Feasibility Study

Business Model Canvas is a strategic management and lean startup template for developing new or documenting existing business models.
It is a visual chart with elements describing a firm39;s or product39;s value proposition, infrastructure, customers, and finances.
It assists firms in aligning their activities by illustrating potential trade-offs.

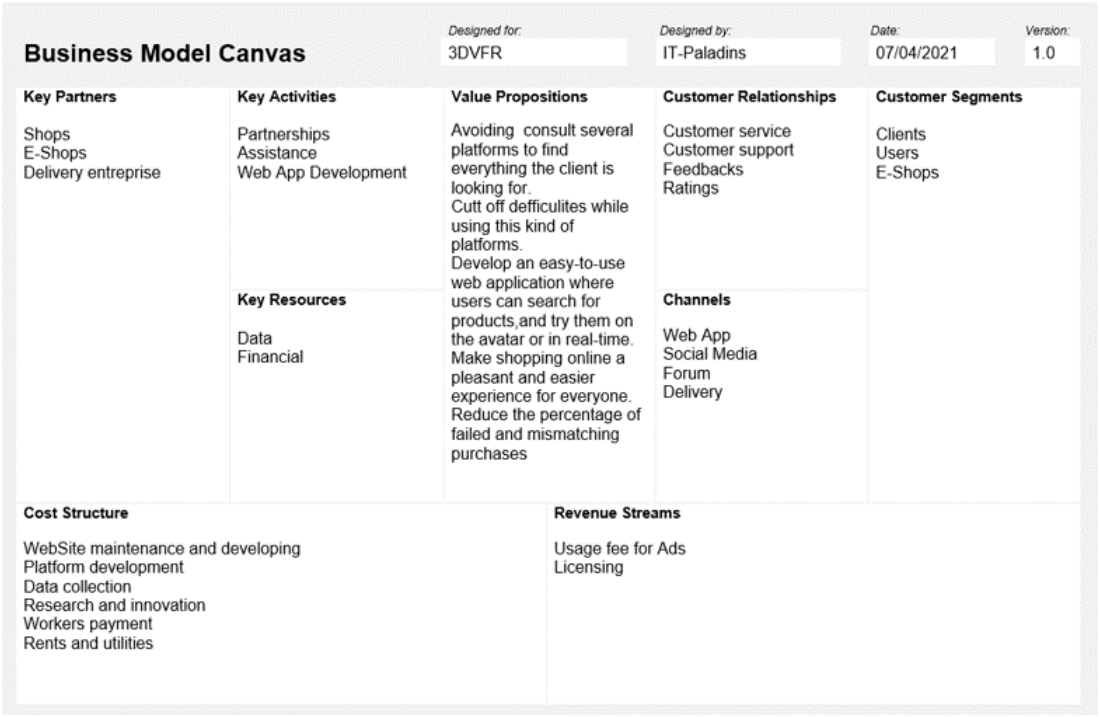

Figure 3.1: BMC

3.3 Tasks distribution:

Cases Studies	Description	Difficulties	Results
Simple Login	As a user i can Login	1	Loged in
Google Login	As a user i can Login with Google	2	Loged in
Sign Up	As a user i can Sign Up	1	Signed Up
Profile	As a user i have access to my profile and i can update it	1	Profile
Create Avatar	As a user i can create my avatar	2	Avatar created
Real Time Image	As a user i can use Realtime Sim	2	Realtime used
Consult Product	As a user i can consult the products	1	Products consulted
Buy Product	As a user i can buy a product	1	Product buyed
Search Product	As a user i can search for products	1	Product found
Filter Product	As a user i can filter the products	1	Products filtred
Product Crud	As a admin i have full product crud	1	CRUD
Categories Crud	As a admin i have full categorie crud	1	CRUD
Review	As a user i can write a review	1	Review written
Ratting	As a user i can rate a product	1	Product ratted
Reviews Crud	As a admin i have full reviews crud	1	CRUD
Claims	As a user i can add a claim	1	Claim Added
Claims Crud	As a admin i have full claims crud	1	CRUD
Notifications	As a user i can get a notification	1	User notified
Weather	As a user i can get consult the Weather	2	Weather consulted
Map	As a user i can get consult the Map	1	Map consulted
Contact	As a user i can get contact admin	1	Admin contacted
Contact Crud	As a admin i can list and delete messages	1	CRUD
Basket	As a user i have a basket	1	User Basket
Card	As a user i have a card	1	User card
Basket crud	As a admin i have basket full crud	1	CRUD
Card crud	As a admin i have card full crud	1	CRUD
Payment	As a user i can pay for my products	2	Products payed
Payment consult	As a admin i can conult payment proc	2	Payment consulted
Analytics	As a admin i can get site analytics	1	Analytics consulted
Position	As a user i can know my position	1	Position known
ChatBot	As a user i can use the ChatBot	2	ChatBot used
Speech	As a user i can use the speech recog	2	Speech used
Ads	As a admin i can Add Ads	2	Ads Added
Categories	As a user i can see all categories	1	Cotegories seen
Details	As a user i can consult a product details	1	Details consulted
Discount	As a user i can get a discount	2	Discount given
Orders	As a user i can checkout	1	Checkout
Orders Crud	As a admin i have full orders crud	1	CRUD
Logout	As a user i can logout	1	Logout

Figure 3.2: CS

3.3.1 Main Tasks:

Authentication: In our website we are using authentication to manage which users have access to which pages. So, We did picked one of many favorite ways to manage authentication.
Goals For This Authentication System are Private and public routes, redirect to login, Redirect to referrer, Authentication Tokens, UI is intuitive and straightforward.

Template Fixing and integration: 2 Templates will be user for users and admins, redirection automatically works for both.

Chat Bot: Increase customer experience by enabling customer assistance.

Avatar: The Avatar Program technology enables the transfer of human consciousness into cloned human, we will be using this Avatar to help our client in testing the clothes.

Real Time: An interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, our client we be able to wear clothes directly throw the camera and see him self.

Products: A nice Product grid equipped with filter (Category, Size) and search, the client will be able to see the product details and rate the chosen product with stars (1-5).
The product is determined by category, price, color, images and many other options. Also it's equipped with pagination system.

Categories: Categories for the products, full crud and helps while filtering.

Users: Speaking about Users management, each role will have his access priorities (admin, client...), also the User Crud and Profile.

Baskets: Basket Management with full Crud and templates, the Baskets will be provided to all users since the account creation.

Orders: Orders Management with full Crud and templates.

Payment: Represent our customer's payment instruments and recurring revenue businesses, we can use Stripe Billing to manage subscription logic and invoices, and give customers the ability to pay their invoices with bank debits or other preferred payment methods.

Contact: The client will be able to send a direct message to the admins throw the Contact page, the admin will receive those message in the back-end and can manage them.

Claims: An effective claim system with crud.

Reviews: An effective Reviews system with crud.

3.3.2 Other Tasks:

Speech recognition: Speech recognition is an interdisciplinary subfield of computer science and computational linguistics that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers. Using React speech recognition, it's possible to transfer the client speech into text it may help us with chat-bot and more.

Weather: Visiting other websites we find out that client use a weather app before buying clothes especially wen they are in hurry.
We used WeatherApp API.

Position: We will help our client to know his exact position or address in order to make sure that his product make it to him because the percentage of losing the product while delivering it is height in many Websites.
GeoPosition Api is used here.

Map: Our client well be able see the map (Google Map API) for more Geo Details.

Analytics: Analytic can help optimise our website, so we will be using Google Analytics,it's a web analytics service offered by Google that tracks and reports website traffic. Will be Showed in Admin consol.

Ads: We will be putting ads on our website when we've had a solid week of growth by using Google AdSense.

Stars and Rating: Ratings provide insight regarding others opinions and experiences with a product, Stars will allow to make the rating more effective and better.

Notifications: We have personalised Notifications that are prettier than normal ones to get the client attentions and the color impacts.

Testing: Checking our web application or website for potential bugs before its made live and is accessible to general public.
Web Testing checks for functionality, usability, security, compatibility, performance of the web application or website. During this stage issues such as that of web application security, the functioning of the site, its access to handicapped as well as regular users and its ability to handle traffic is checked same for the avatar and 3D modelling.

3.4 Advanced features specification

- Avatar creation and customization
- Try Clothes on Avatar
- AR : Try clothes On Real time
- Chatbot
- Product recommendations and suggestions

3.5 Conclusion

We have presented in this last chapter , our tasks distribution , our advanced features then we developed our Feasibility Study

Chapter 4

PHASE 3: REALIZATION OF ADVANCED FEATURES, DEPLOYMENT AND TESTS

4.1 Introduction:

Going through our project realization, we are now heading to the last part which is the realization of advanced features, deployment, and tests, in this chapter we will be introducing our remarkable work and speak about the last points.

4.2 Deployment Diagram

A deployment diagram is a UML diagram type that shows the execution architecture of a system, including nodes such as hardware or software execution environments, and the middleware connecting them. Deployment diagrams are typically used to visualize the physical hardware and software of a system.

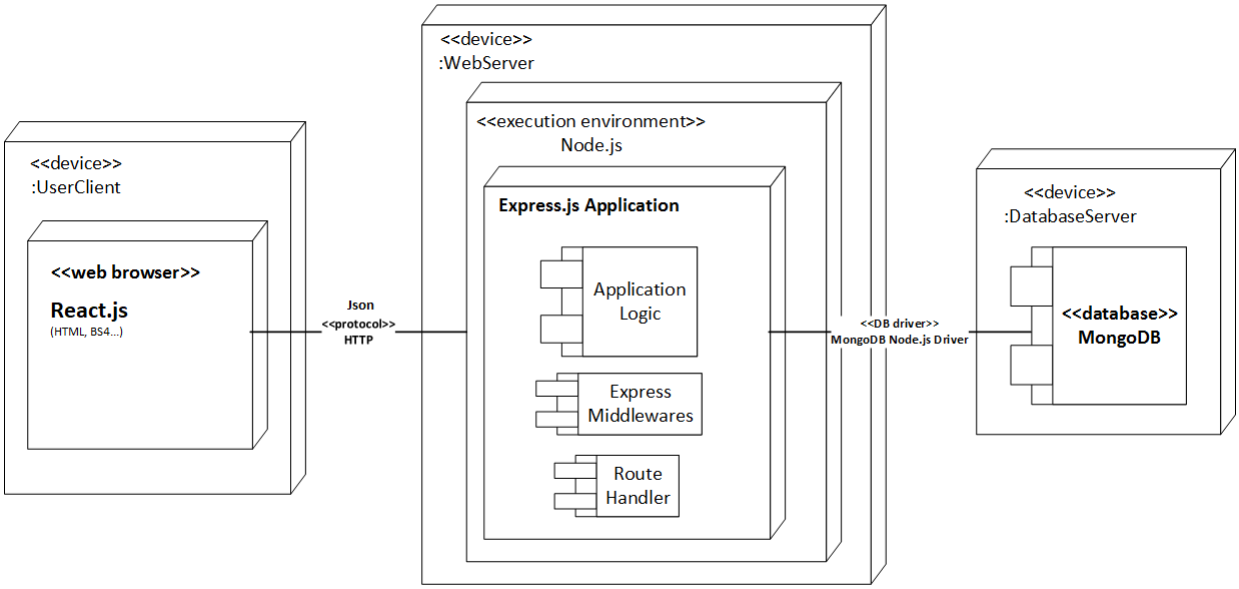

Figure 4.1: Deployment Diagram

For MERN Deployment:

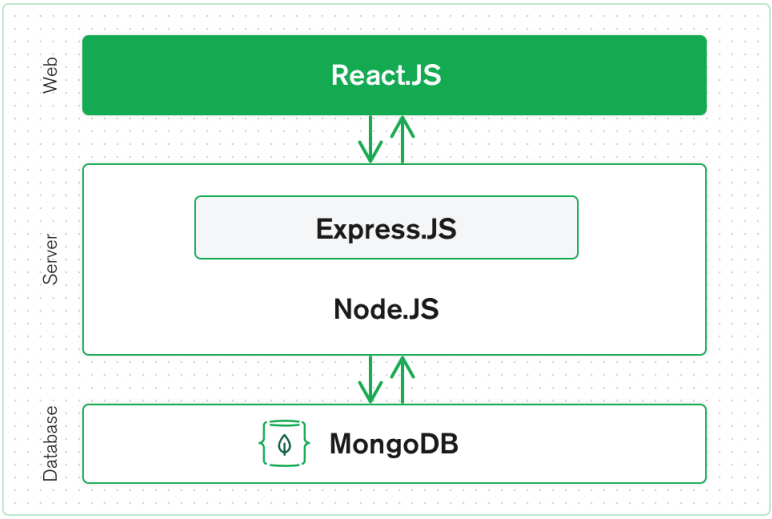

Figure 4.2: Deployment Diagram MERN

4.3 MERN Stack architecture

It assists firms in aligning their activities by illustrating potential trade-offs

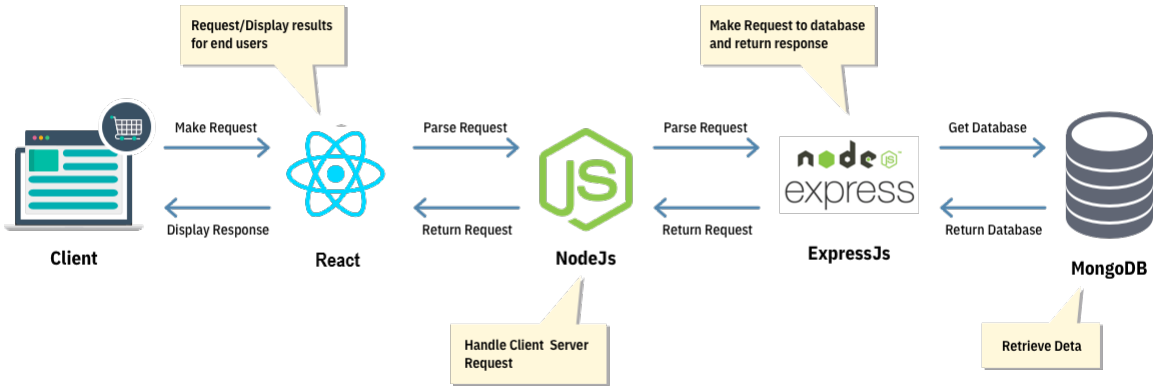

Figure 4.3: MERN Stack architecture

4.4 Tools and Libraries

4.4.1 Tools:

Development Tool is a software application which helps developers to build attractive website layouts and apps with ease. Those tools help to accelerate the web development process by providing drag and drop elements and various built-in features to create a more attractive web design layout. Starting with Visual Studio Code [6] is a free code editor redefined and optimized for building and debugging modern web and cloud applications

Figure 4.4: VScode
[6]

PyCharm [8] is an integrated development environment (IDE) used in computer programming, specifically for the Python language.

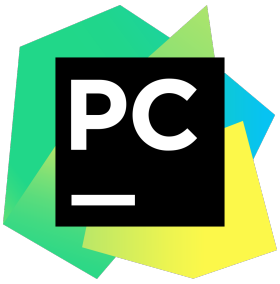

Figure 4.5: PyCharm
[8]

Google APIs [25] are application programming interfaces (APIs) developed by Google which allow communication with Google Services and their integration to other applications.

Figure 4.6: Google Apis
[25]

MERN is a free and open-source JavaScript software stack for building dynamic web sites and web applications. Because all components of the MERN stack support programs that are written in JavaScript, MEAN applications can be written in one language for both server-side and client-side execution environments.

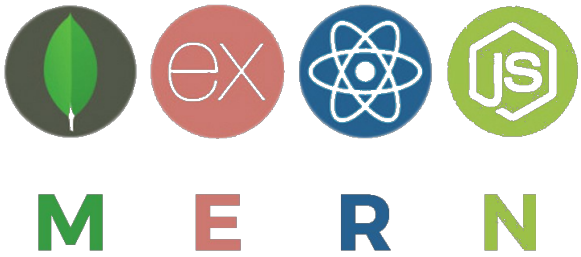

Figure 4.7: Mern

JSON [26] (JavaScript Object Notation), is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects consisting of attribute–value pairs and arrays (or other serializable values).

Figure 4.8: Json
[26]

Sass [27] is the CSS extension language that is most mature and stable. It will allow you to use variables, nested rules, mixing, and functions. Sass [27] will help you with sharing design within and across projects.

Figure 4.9: Sass
[27]

Bootstrap [28] is one of the most popular open-source CSS frameworks. I was created by Twitter developers and initially released in 2011. Bootstrap [28] includes HTML, CSS and JavaScript components and allows to create responsive websites of all complexities and sizes. It's also very accessible to those who are just getting started in web development.

Figure 4.10: BootStrap
[28]

Python [29] is an interpreted, object-oriented, high-level programming language with dynamic semantics.

Figure 4.11: Python
[29]

Flask [30] is a web framework, it's a Python module that lets you develop web applications easily. It's has a small and easy-to-extend core: it's a microframework that doesn't include an ORM (Object Relational Manager) or such features. It does have many cool features like url routing, template engine.

Figure 4.12: Flask
[30]

Redux [31] helps you write applications that behave consistently, run in different environments (client, server, and native), and are easy to test.

Figure 4.13: Redux
[31]

Postman [32] is a collaboration platform for API development, currently used by over 8 million developers and leading companies worldwide. Postman's [32] features aim to simplify each step of creating APIs and streamline the collaboration.

Figure 4.14: Postman
[32]

NPM [33] is the default package manager for the JavaScript runtime environment NodeJS [11]. The release of Yarn strongly affected the popularity of NPM [33],

but it started to come back with the release of NPM [33] 5 halfway through 2017, which fixed many of the initial shortcomings.

Figure 4.15: NPM Package Manager
[33]

Yarn [34] is one of the newest package managers out there, built by Facebook. It's loved by the community for its superior to most other package managers speed, reliability and security.

Figure 4.16: YARN Package Manager
[34]

Trello [35] is a visual collaboration platform that gives teams perspective on projects. Trello [35] can be used to organize, collaborate, communicate and coordinate.

Figure 4.17: Trello
[35]

GitHub [36] is the Software development platform. It will help you to manage the projects. GitHub [36] will allow you to create a review processes for your code and fit it into your workflow. It can be integrated with the tools that you are using already. It can be deployed as a self-hosted solution or cloud-hosted solution.

Figure 4.18: GitHub
[36]

4.4.2 Libraries:

Many JS and Python libraries has been used to deliver this application Statring with CommonJS [37] which is a module formatting system. It is a standard for structuring and organizing JavaScript code. CJS assists in the server-side development of apps and it's format has heavily influenced NodeJS's module management.

Figure 4.19: CommonJS modules
[37]

P5.js [38] is a JavaScript library for creative coding, with a focus on making coding accessible and inclusive for artists, designers, educators, beginners, and anyone

Figure 4.20: P5
[38]

PyTorch [39] Geometric is a library for deep learning on irregular input data such as graphs, point clouds, and manifolds.

Figure 4.21: PyTorch
[39]

The argparse [40] module makes it easy to write user-friendly command-line interfaces. The program defines what arguments it requires, and argparse [40] will figure out how to make it work.

Figure 4.22: Argparse
[40]

Beautiful Soup [41] is a Python [29] library for pulling data out of HTML and XML files. It works with your favorite parser to provide idiomatic ways of navigating, searching, and modifying the parse tree. It commonly saves programmers hours or days of work.

Figure 4.23: Beautiful Soup
[41]

Three.js [14] is a cross-browser JavaScript library and application programming interface (API) used to create and display animated 3D computer graphics in web.

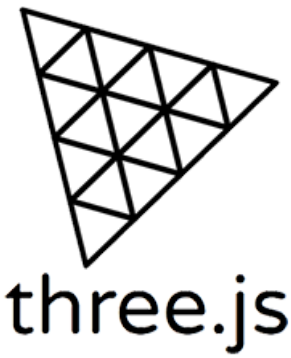

Figure 4.24: Three.js
[14]

ml5.js [42] aims to make machine learning approachable for a broad audience of artists, creative coders, and students. The library provides access to machine learning Db's.

Figure 4.25: ML5.js
[42]

Trimesh [43] is a pure Python [29] library for loading and using triangular meshes with an emphasis on watertight surfaces. The goal of the library is to provide a full featured and well tested Trimesh [43] object which allows for easy manipulation and analysis, in the style of the Polygon object in the Shapely library.

Figure 4.26: Trimesh
[43]

TensorFlow [17] is an end-to-end open source platform for machine learning. It has a comprehensive, flexible ecosystem of tools, libraries, and community resources.

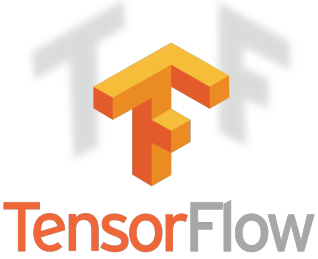

Figure 4.27: TensorFlow.Js
[17]

4.5 Realization

4.5.1 REST Api description:

A REST API (also known as RESTful API) is an application programming interface (API or web API) that conforms to the constraints of REST architectural style and allows for interaction with RESTful web services. REST stands for representational state transfer and was created by computer scientist Roy Fielding.

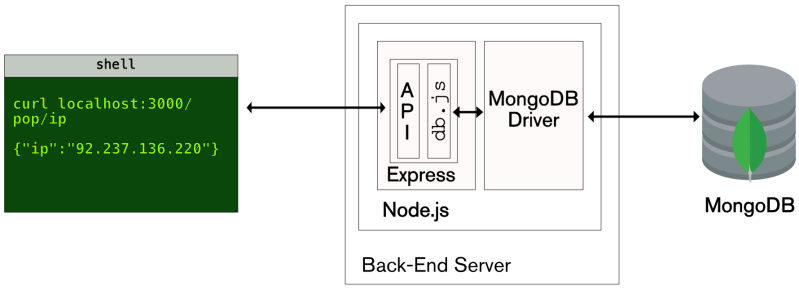

Figure 4.28: REST Api

4.5.2 User interfaces:

Simple User:

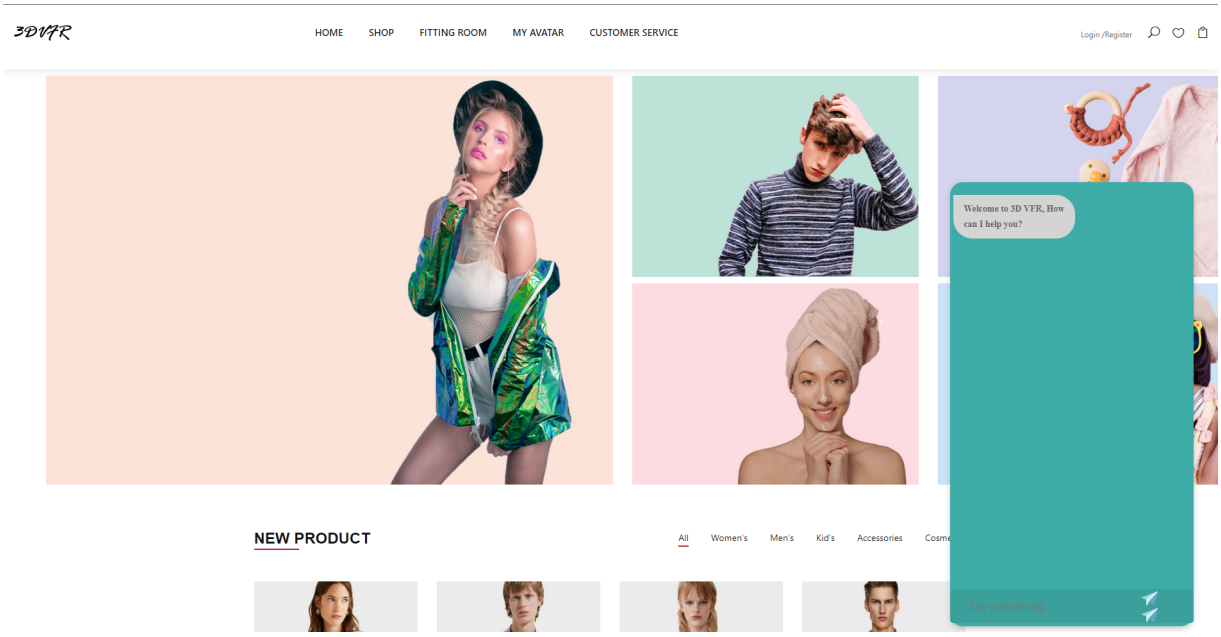

Figure 4.29: Home

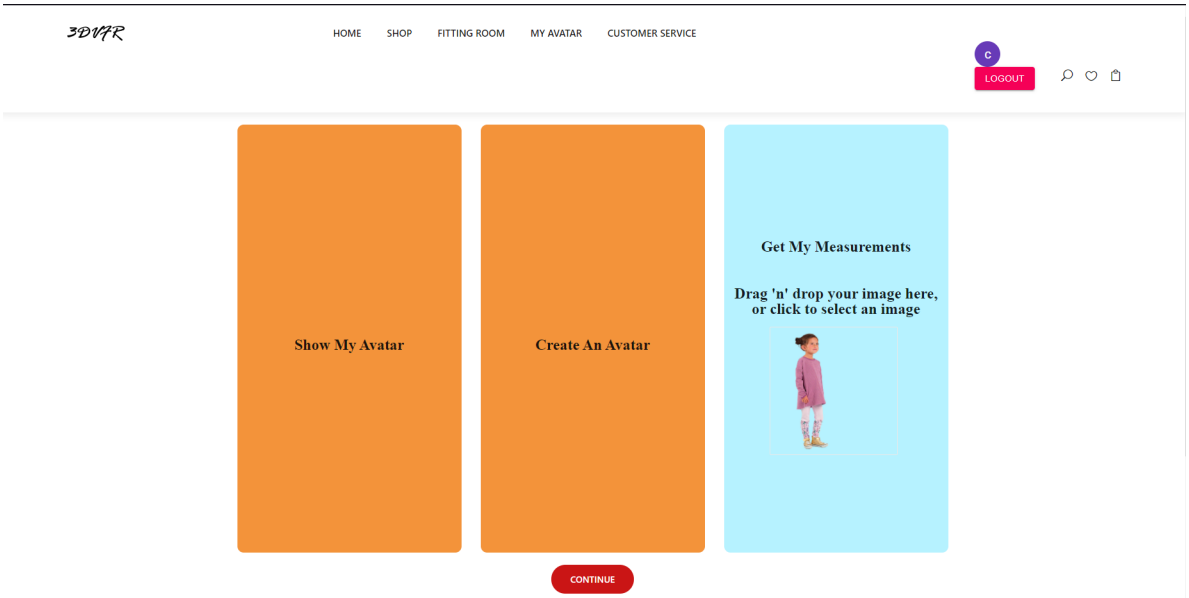

Figure 4.30: My Avatar

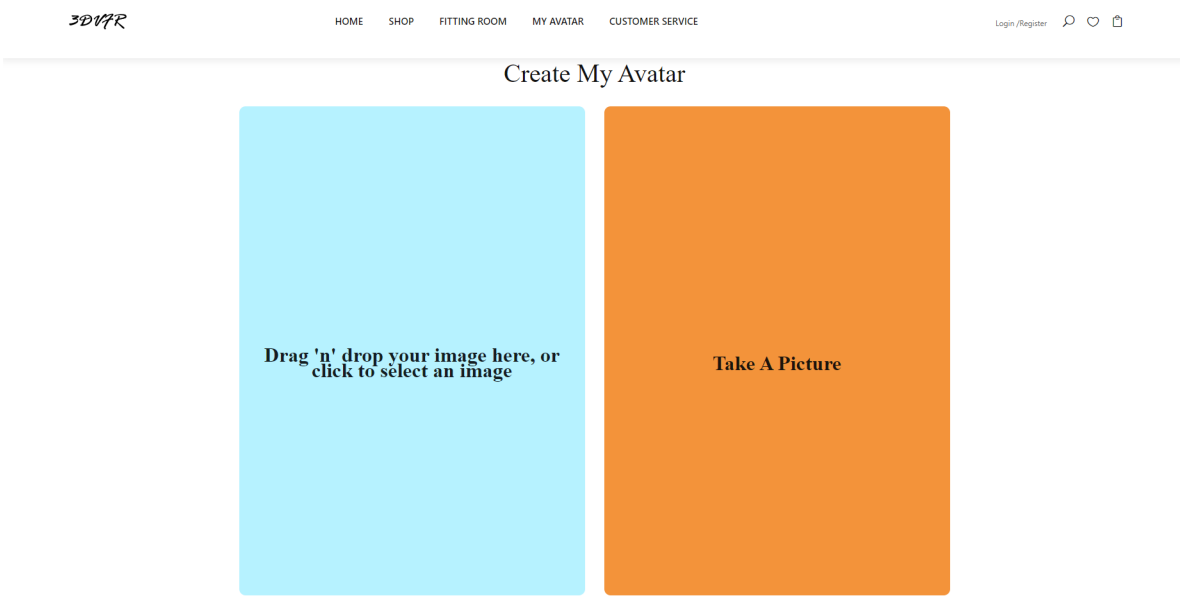

Figure 4.31: Create Avatar

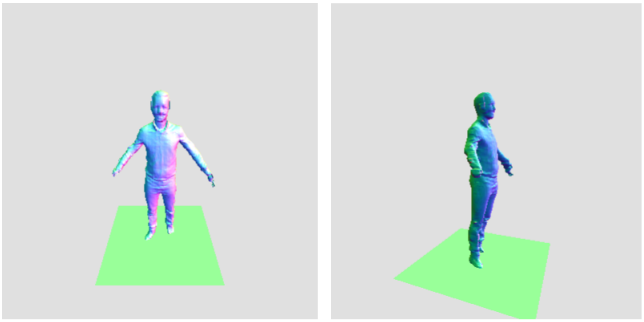

Figure 4.32: Show Avatar

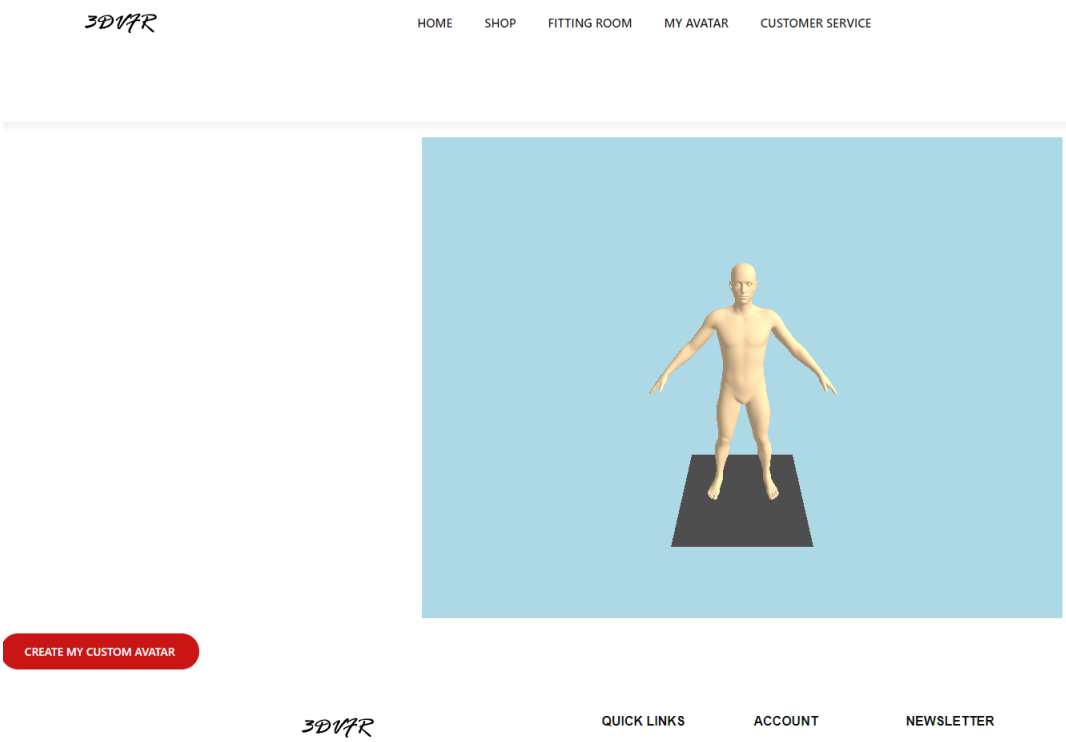

Figure 4.33: Show Standard Avatar

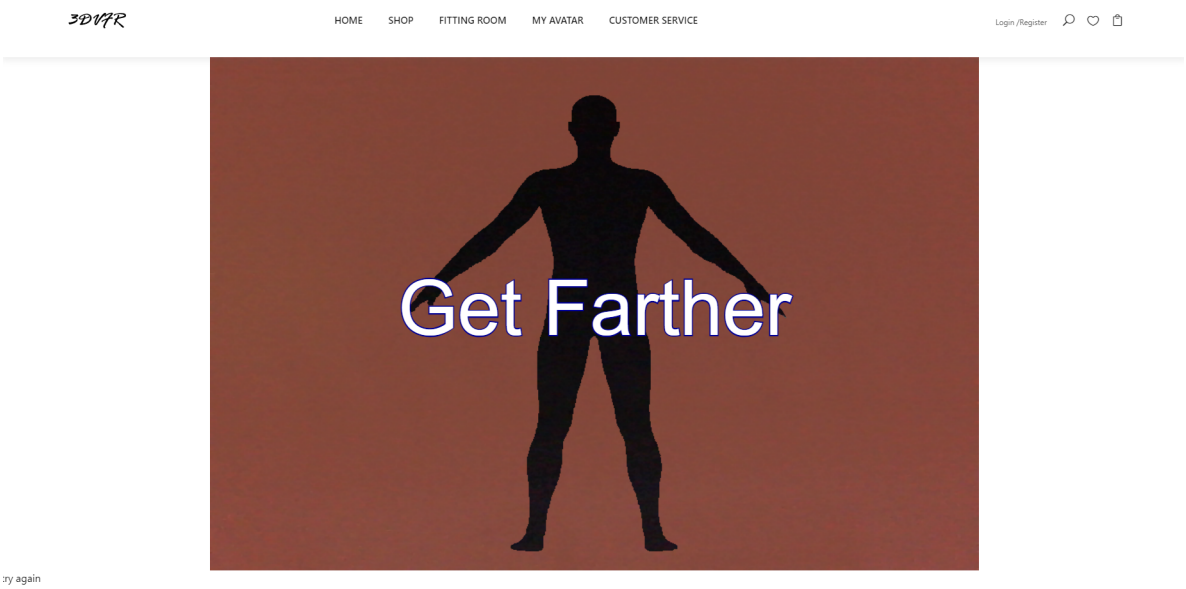

Figure 4.34: Take Picture

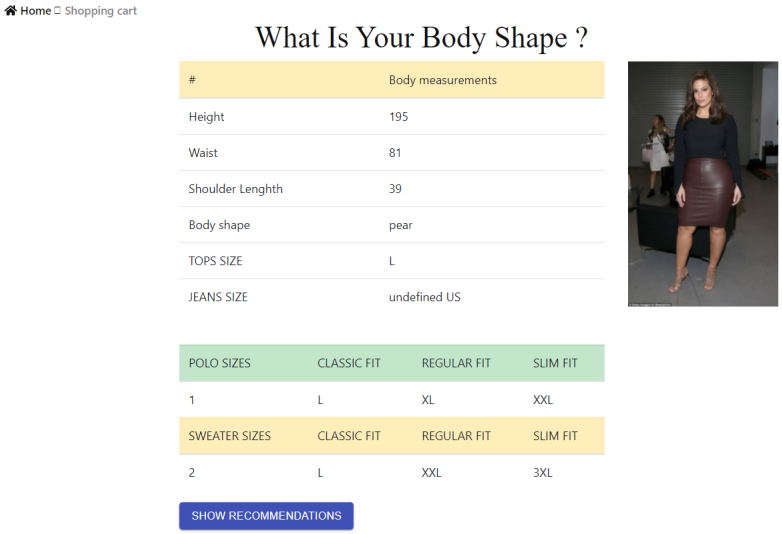

Figure 4.35: Body Measurement

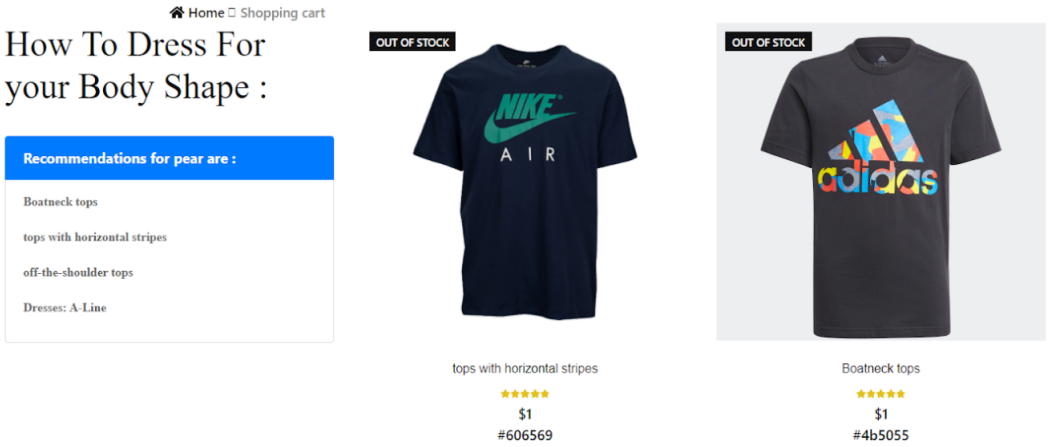

Figure 4.36: Recommendation based on Body shape

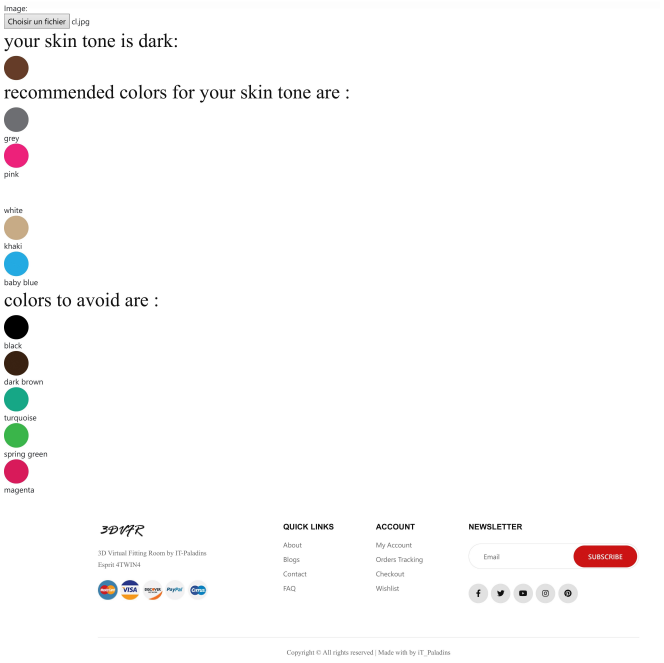

Figure 4.37: Skintone

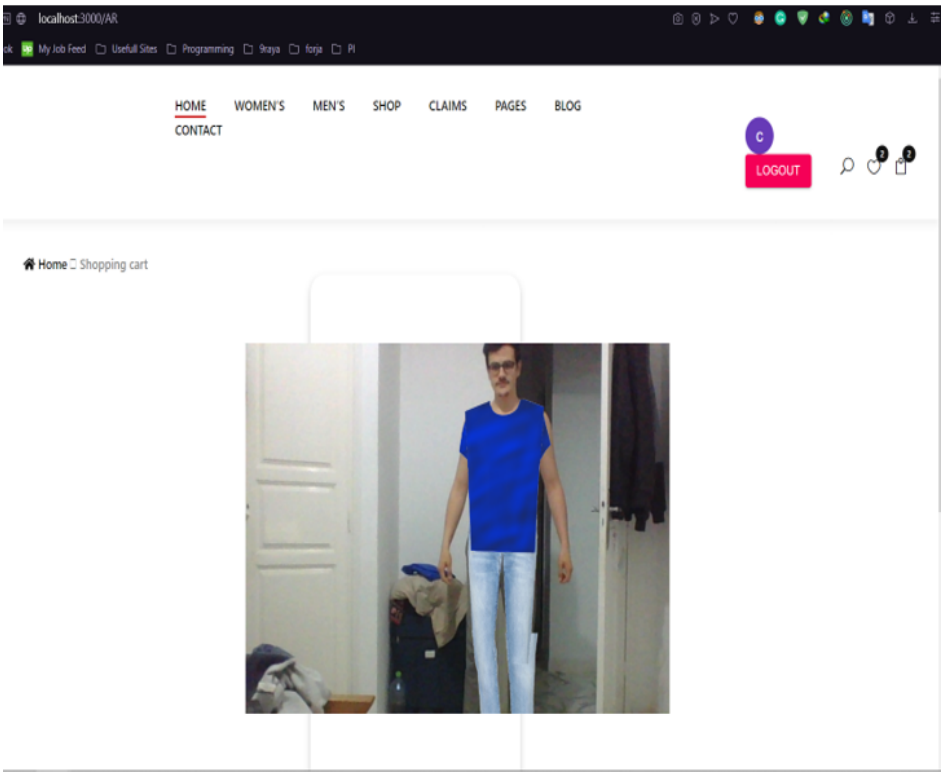

Figure 4.38: Real Time

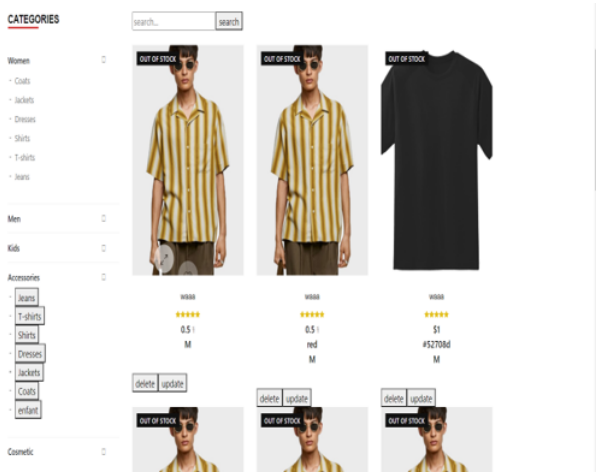

Figure 4.39: Products

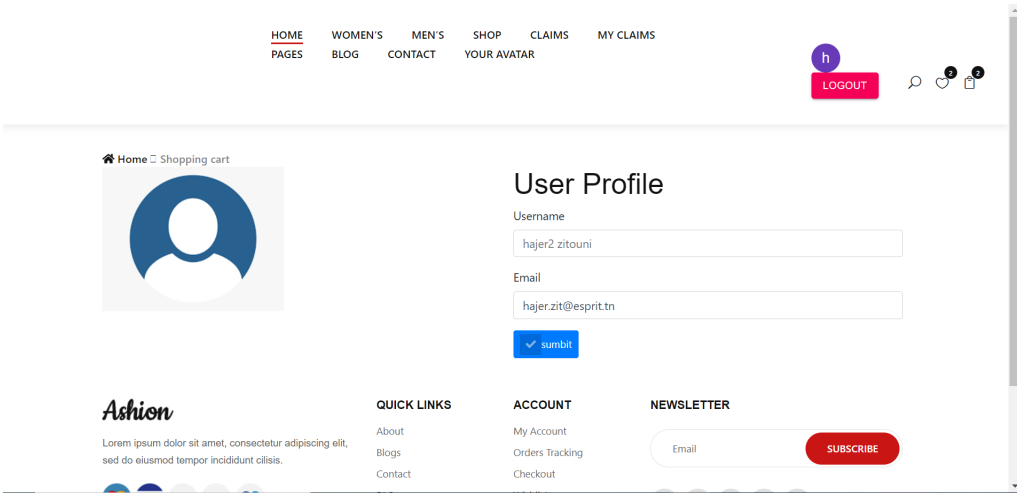

Figure 4.40: Profile

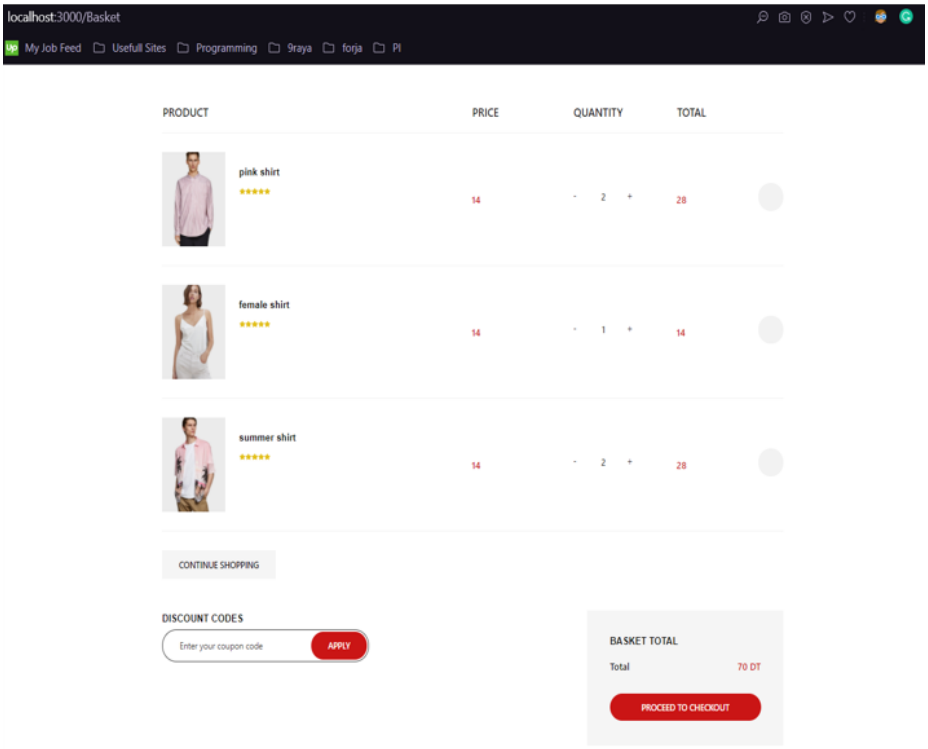

Figure 4.41: Baskets

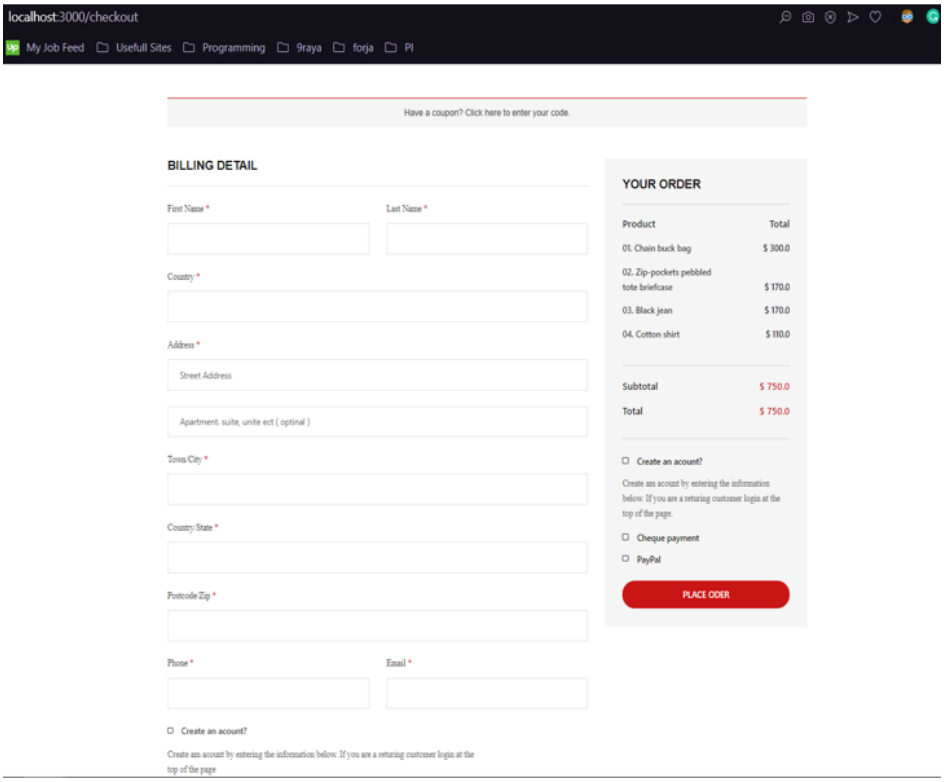

Figure 4.42: Payment

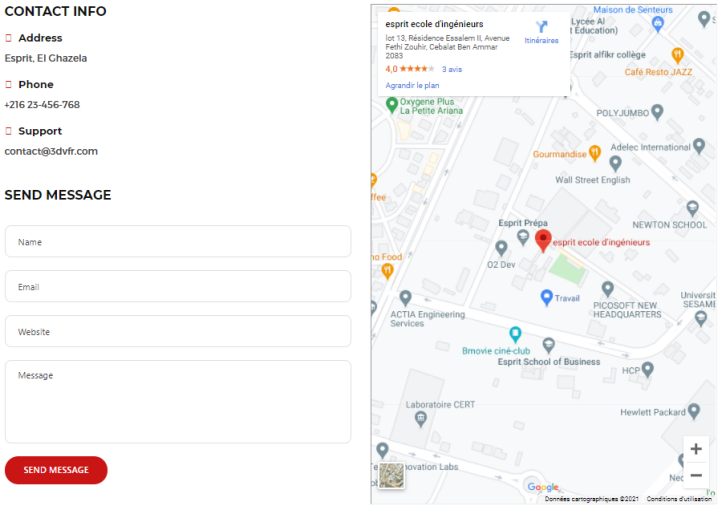

Figure 4.43: Contact

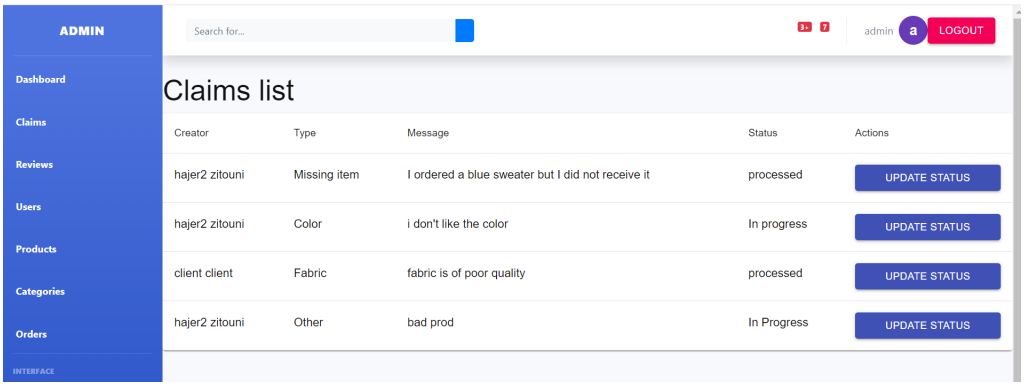

Figure 4.44: Claims

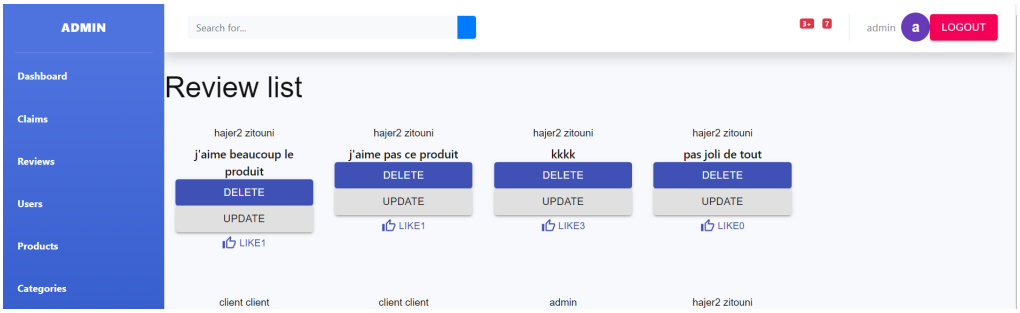

Figure 4.45: Reviews

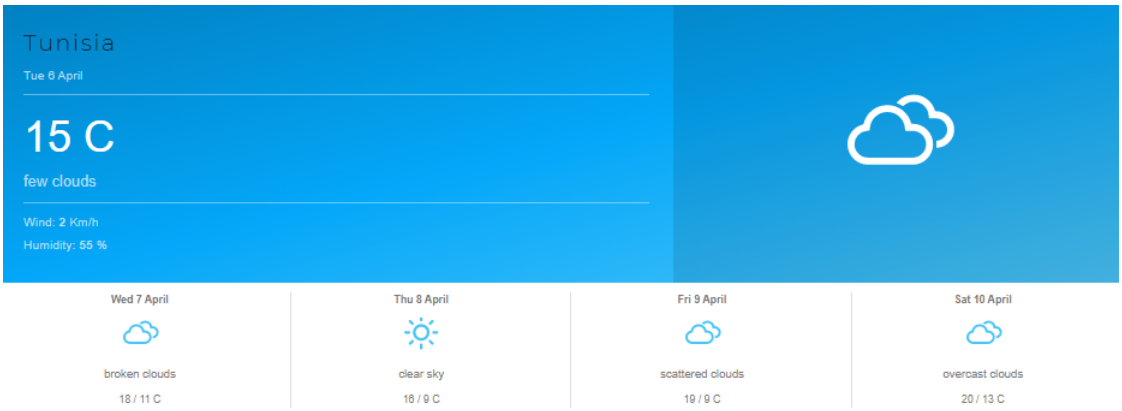

Figure 4.46: Weather

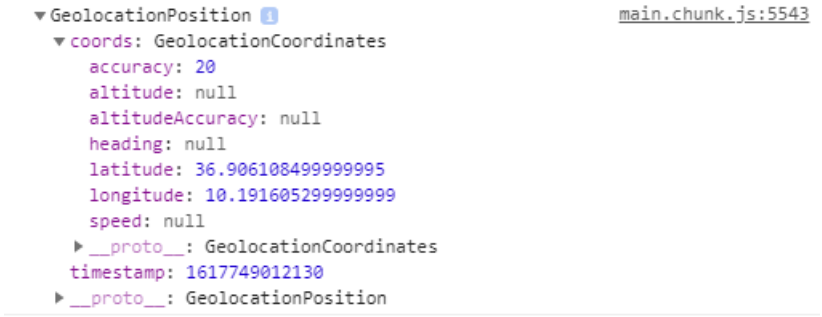

Figure 4.47: Position

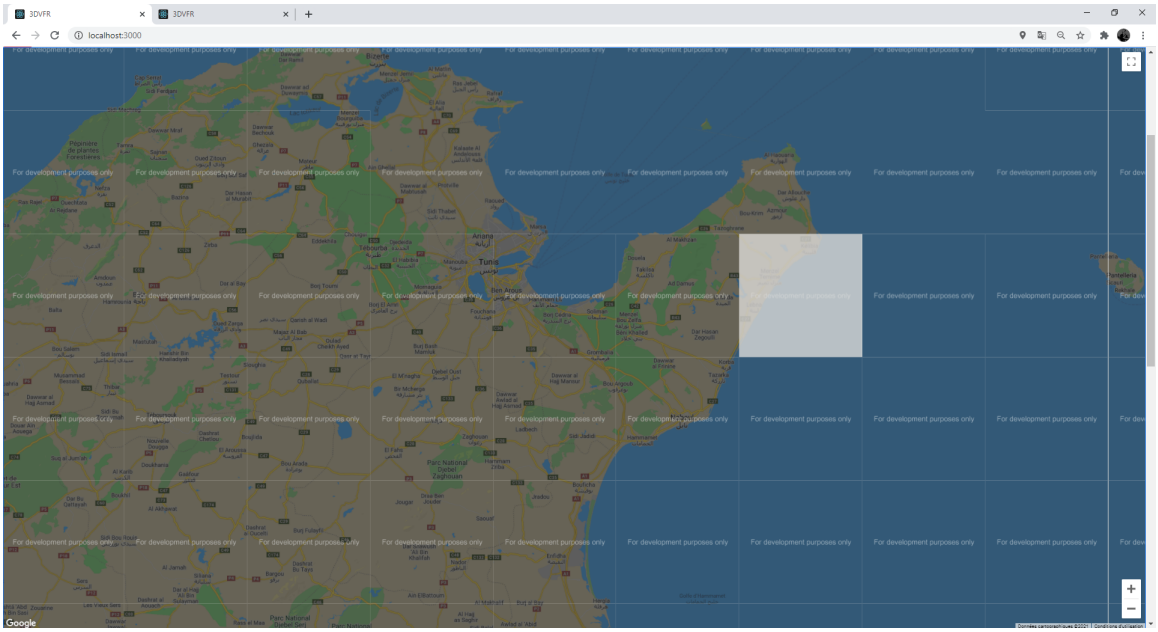

Figure 4.48: Map

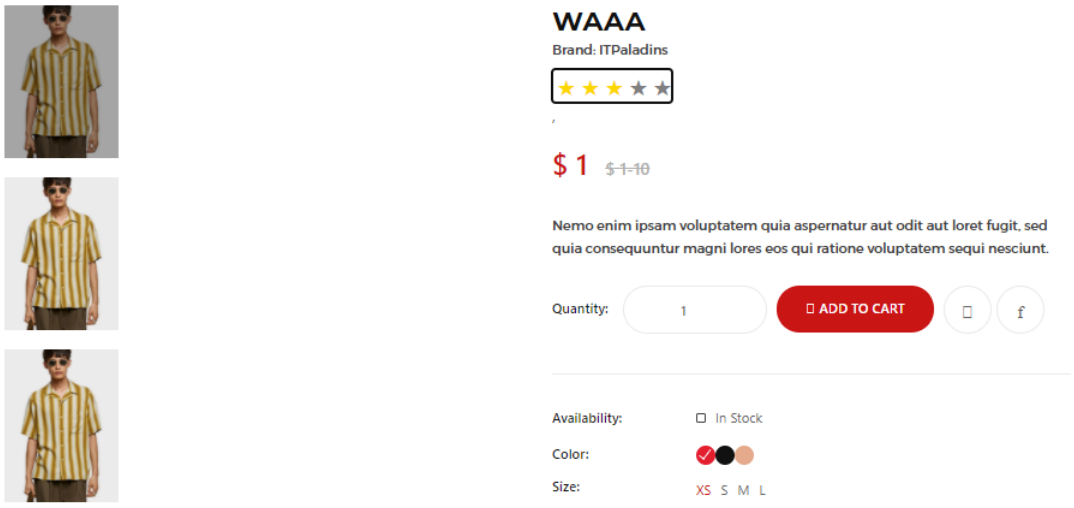

Figure 4.49: Stars and Rating

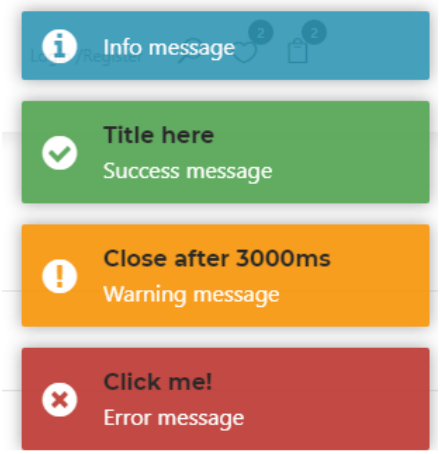

Figure 4.50: Notifications

Admin:

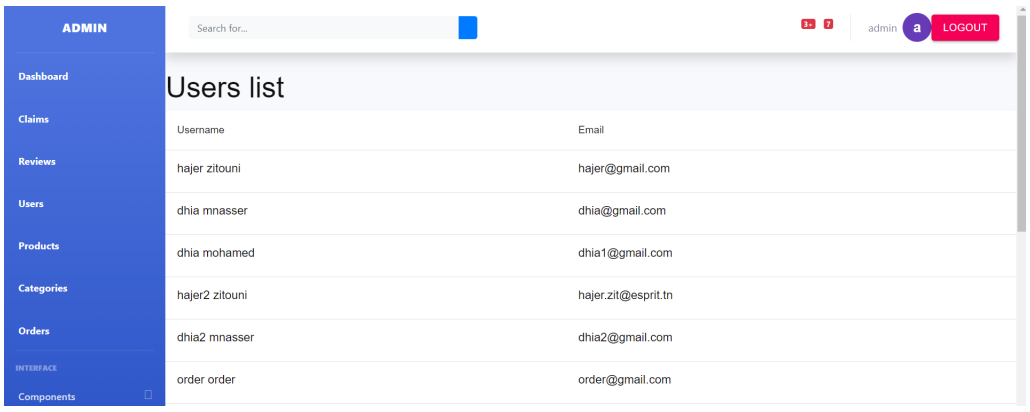

Figure 4.51: Users

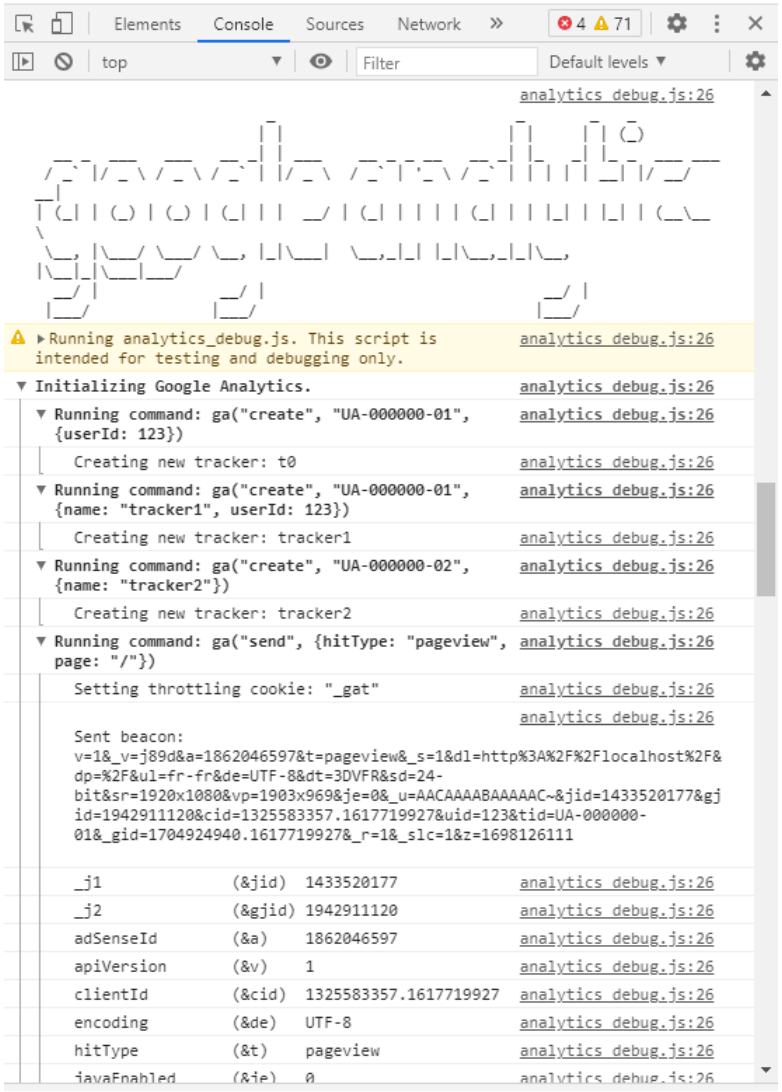

Figure 4.52: Analytics

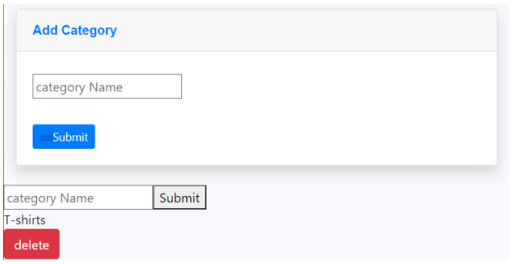

Figure 4.53: Categories

4.6 Deployment and Tests

4.6.1 Tests:

Checking our web application or website for potential bugs before its made live and is accessible to general public.
Web Testing checks for functionality, usability, security, compatibility, performance of the web application or website.
During this stage issues such as that of web application security, the functioning of the site, its access to handicapped as well as regular users and its ability to handle traffic is checked same for the avatar and 3D modelling.

Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings. This method of test can be applied virtually to every level of software testing: unit, integration, system and acceptance.

White-box testing (also known as clear box testing, glass box testing, transparent box testing, and structural testing) is a method of software testing that tests internal structures or workings of an application, as opposed to its functionality (i.e. black-box testing).

Grey-box testing is both at the same time so you will be using or testing the application as a simple user.

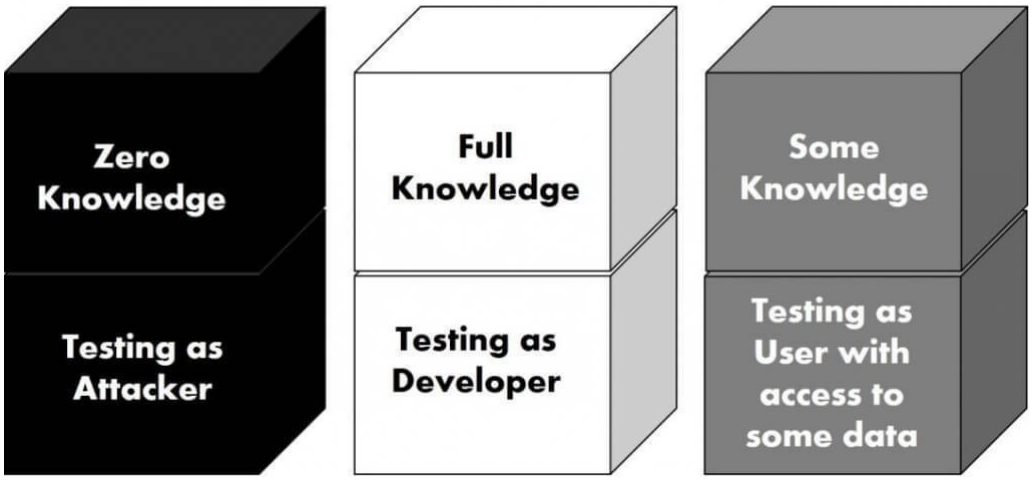

Figure 4.54: Testing

4.6.2 Deployment:

Reaching the process when we've finished developing the site, tested to make sure it works, and are ready to push it to a live web server, the main point is to get a smooth deployment of our website and a happy client to spread the word of our business.
For that we will bes using Heroku, Heroku is a cloud platform as a service (PaaS) supporting several programming languages and it manages app deployments with Git, the popular version control system.
To deploy our website, we typically use the git push command to push the code from our local repository's master or main branch to our heroku remote.
Heroku support HTTP Git authentication, SSH Git transport and Using subversion or other revision control systems.

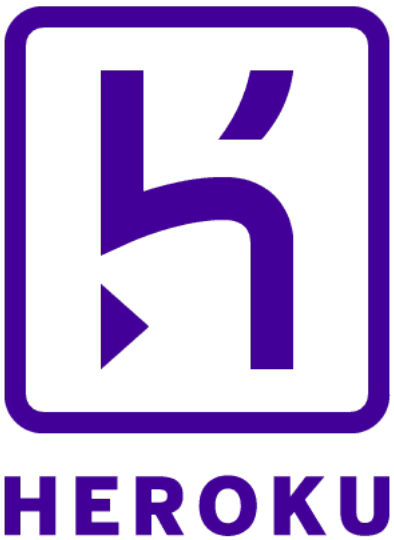

Figure 4.55: Heroku
[44]

4.6.3 Advertising:

For the Client Deployment part, we will be using ads and social media such as Facebook, Instagram and LinkedIn.
Also we are going to work with some graphique support like flayers and cards with QR codes that redirect you directly to our application.
Our slogan will be "THE FUTURE IS HERE".

Figure 4.56: Flayer

Figure 4.57: Card

4.7 Conclusion

In this last chapter , our tasks were the realization of advanced features, deployment and tests.
We did our best and realized many important basic Website features and our special touch to make our application unique, the test phase was with 3 different test methods but it never ends same for the deployment we will be always adding and fixing things to update and get a better functions.

GENERAL CONCLUSION

Lastly, to sum up, all the ideas mentioned before, our solution will be the next big thing in e-commerce that will take the world by storm, because it mixes AR and e-commerce.
This mix is advantageous and highly strategic considering that the innovation is always welcome and can make the application easily marketable as it's susceptible to become a trend.
We are thrilled to move on to the next step which is the development phase and the implementation of all the new technologies we're going to use to make our idea come true, we hope that all the work goes as planned.
However, this application will be fully upgradeable and optimize to further explain this is only a prototype and we will work more in the long term to get a deeper view on the weak points to improve it and make it more user friendly and can be viewed from a whole other perspective or be turned into a mobile app that can be used on phone or tablet.
Last but not least, we wish that our work has gained your appreciation.

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