

Department of Information Technology

NBA Accredited

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A Project Report on

Using AR/VR For Shopping

Submitted in partial fulfillment of the degree of

Bachelor of Engineering(Sem-8)

in

INFORMATION TECHNOLOGY

By

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1. Project Conception and Initiation

1.1 Abstract

The COVID-19 virus outbreak began in December 2019 and rapidly spread to every continent on Earth. The analysts have predicted that COVID-19 and other similar pandemics will continue in the coming decade and badly affect offline businesses. As a result, the offline platform is also shifting to the online platform and online demands are increasing daily. The traditional two-dimensional E-Commerce websites are designed to provide simple, browser-based interfaces to allow users to access available products and services. Whilst virtual representations are an essential consideration in establishing trust, most virtual representation sites fall short in mimicking real-life human representation.

1.2 Objectives

- To develop an android application.
- To advance the current Shopping system by providing user an immersive experience.
- To understand the concepts of VR and Unity and develop a prototype using the findings.
- To create the database for the retail items, shops and customers, demonstrating their relationships through queries and functions on the user interface.
- To integrate the store user interface under one application, to facilitate accessibility and time saving.

2. Literature Review

Sr. No.	Paper name and Authors	Findings
1.	G. M. Nielson and D. R. Olsen, "Direct manipulation techniques for 3d objects using 2d locator devices"1987.	Mouse and Keyboard : The ability to map a 2D mouse inter-action to a 3D space.
2.	A. Kitson, B. E. Riecke, A. M. Hashemian, and C. Neustaedter , “ Navichair: Evaluating an embodied interface using a pointing task to navigate virtual reality” 2015.	Specialized equipment: gaming input devices – joysticks and pads – or dedicated VR devices – tracked controllers and haptic arms – gives high user comfort and good accuracy.

Sr. No.	Paper name and Authors	Findings
3.	S. Gebhardt, S. Pick, H. Voet, J. Utsch, T. al Khawli, U. Eppelt, R. Reinhard, C. Bscher, B. Hentschel, and T. W. Kuhlen, "flapassist: How the integration of vr and visualization tools fosters the factory planning process,"2015.	Context-based approach is an interaction technique popular in computer games, in particular simulations (e.g., "The Sims" and "SimCity" series by Maxis)and adventure games.
4.	•J. Sokołowski and K. Walczak, "Semantic modelling of user Interactions in virtual reality environments," 2018.	CAVE (Cave automatic virtual enviornment)

1.4 Problem Definition

- **Problem Identified**

- With the 2D shopping websites used today, they have their natural limitations, which is a particularly important element of shopping.
- Malls and grocery shops are closed or there are many restrictions imposed on them due to ongoing pandemic.

- **Solution Proposed**

- We proposed creating a VR-based android application that would overcome the limitations of 2d shopping, such as a lack of "touch and feel" and uncertainty about product details. Users will be able to shop virtually in a brick-and-mortar setting from the comforts of their own homes.

1.5 Scope

- Can be used to make the use of immersive VR systems simpler for non-expert users, and therefore applicable in more application domains.
- Can be used to achieve a user-friendly content management by domain experts.
- Can be used to simulate in the real world environment and give the customer a flexibility to engage with the activities that are closer to experiencing the products and services.

1.6 Technology stack

Software Constraint

- Platform used:-Windows 10
- Unity
- Mongo DB
- Node JS

Hardware Requirement

- Laptop or computer
- Processor:-Intel core i3
- RAM:-8GB

Front End

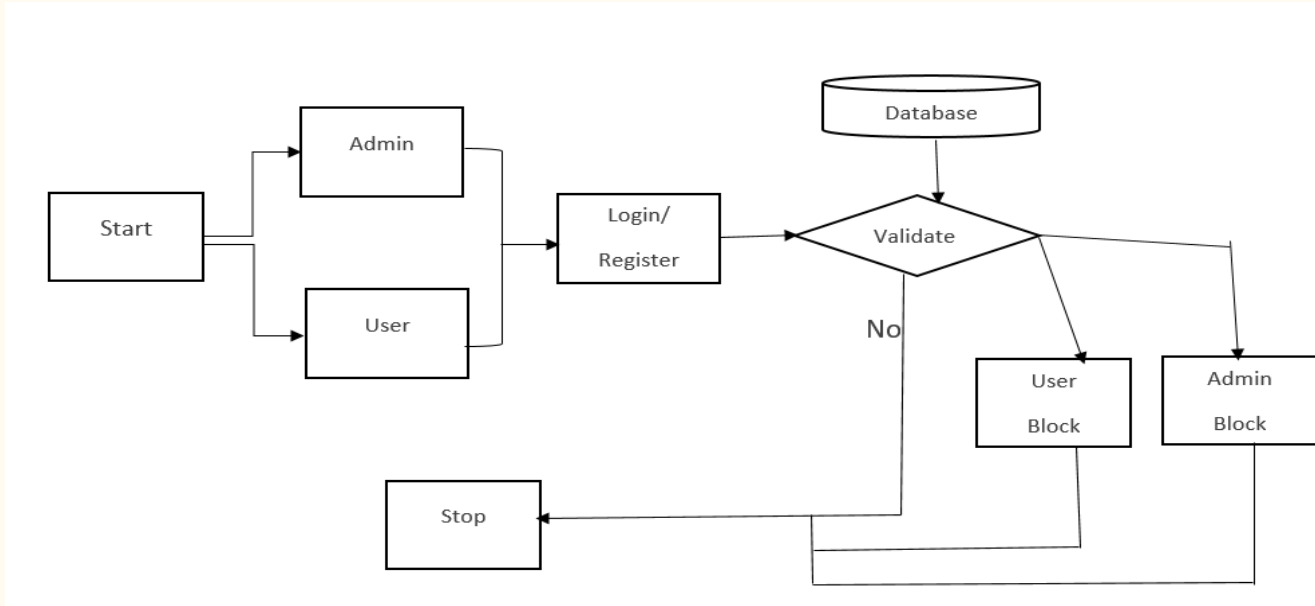
- Bootstrap, HTML, CSS, jQuery, JS:- Used to develop a website.
- Google cardboard: for running the VR applications in real-time.

1.7 Benefits for environment & Society

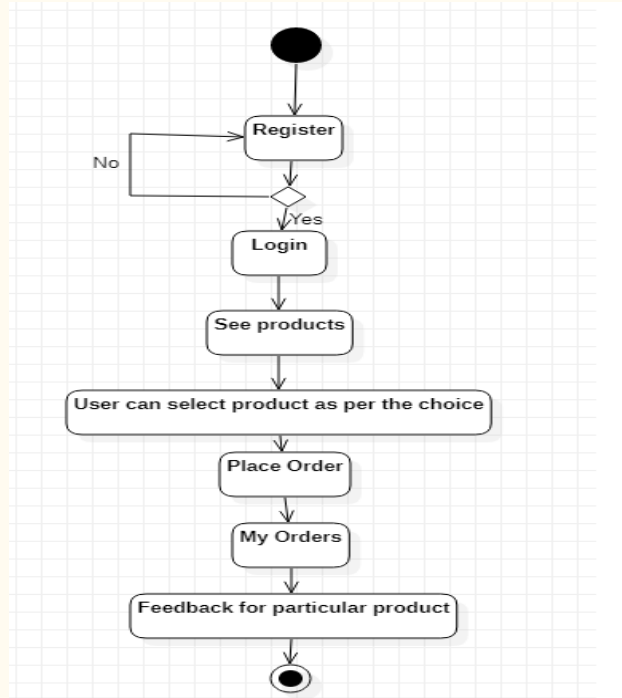
- VR lets customers take their shopping experience outside of the store.
- Shoppers could explore a virtual store, picking up and examining items in 3D before deciding to purchase them with just a look.
- Visualising products online with an added element of personalisation lets people fully engage and invest in your business.
- People can shop like they do in brick-and-mortar stores from the comfort of their own homes if another pandemic strikes.

2. Project Design

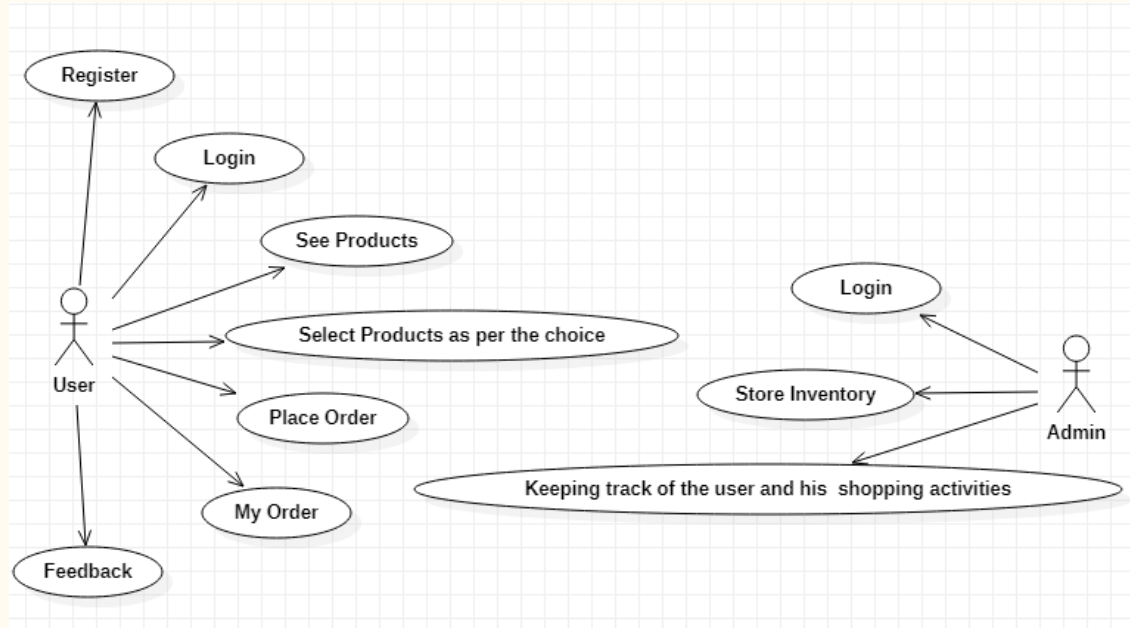
2.1 Proposed System



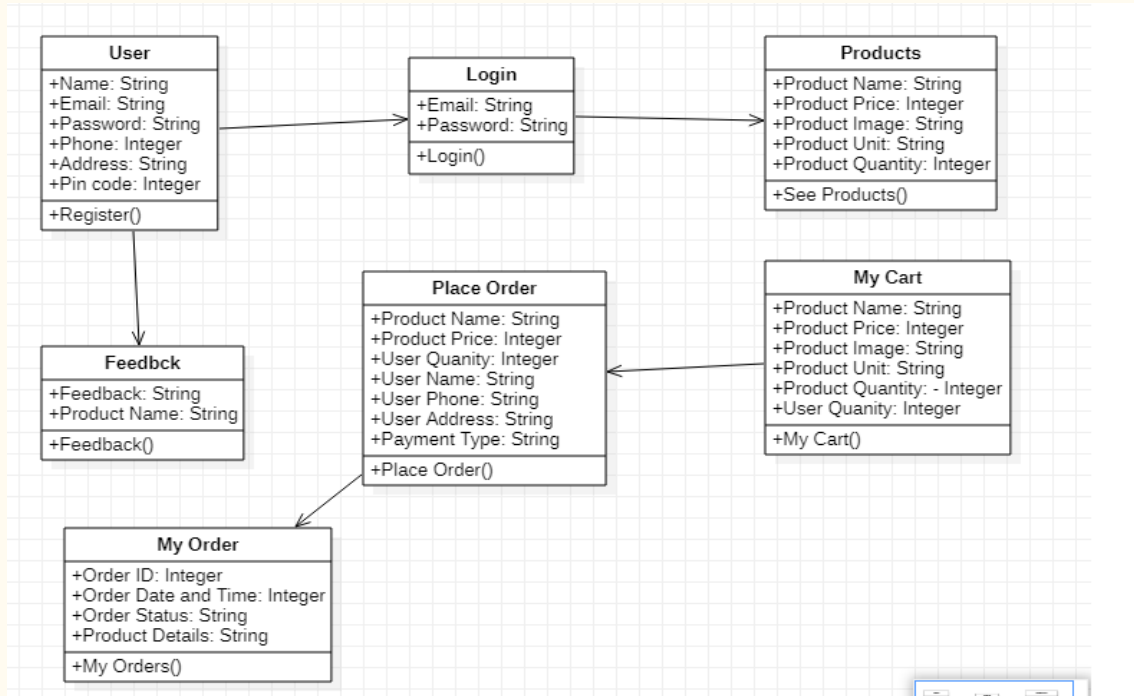
2.2 Design(Flow Of Application)



2.3 Use Case for V-Mart App

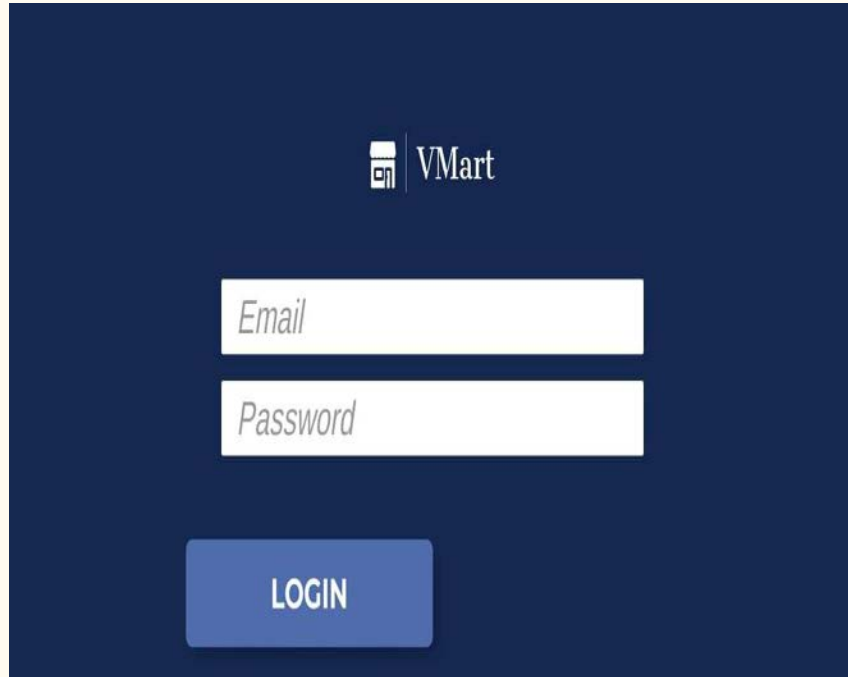


2.5 Class Diagram for V-Mart App



3. Implementation

3.1 V-Mart Application



The image shows a login interface for the V-Mart application. It features a dark blue background. At the top center is the V-Mart logo, which consists of a small icon of a building with a checkmark and the text "VMart". Below the logo are two white input fields. The first field is labeled "Email" in a light gray font. The second field is labeled "Password" in a light gray font. Below these fields is a blue button with the word "LOGIN" in white capital letters.

VMart

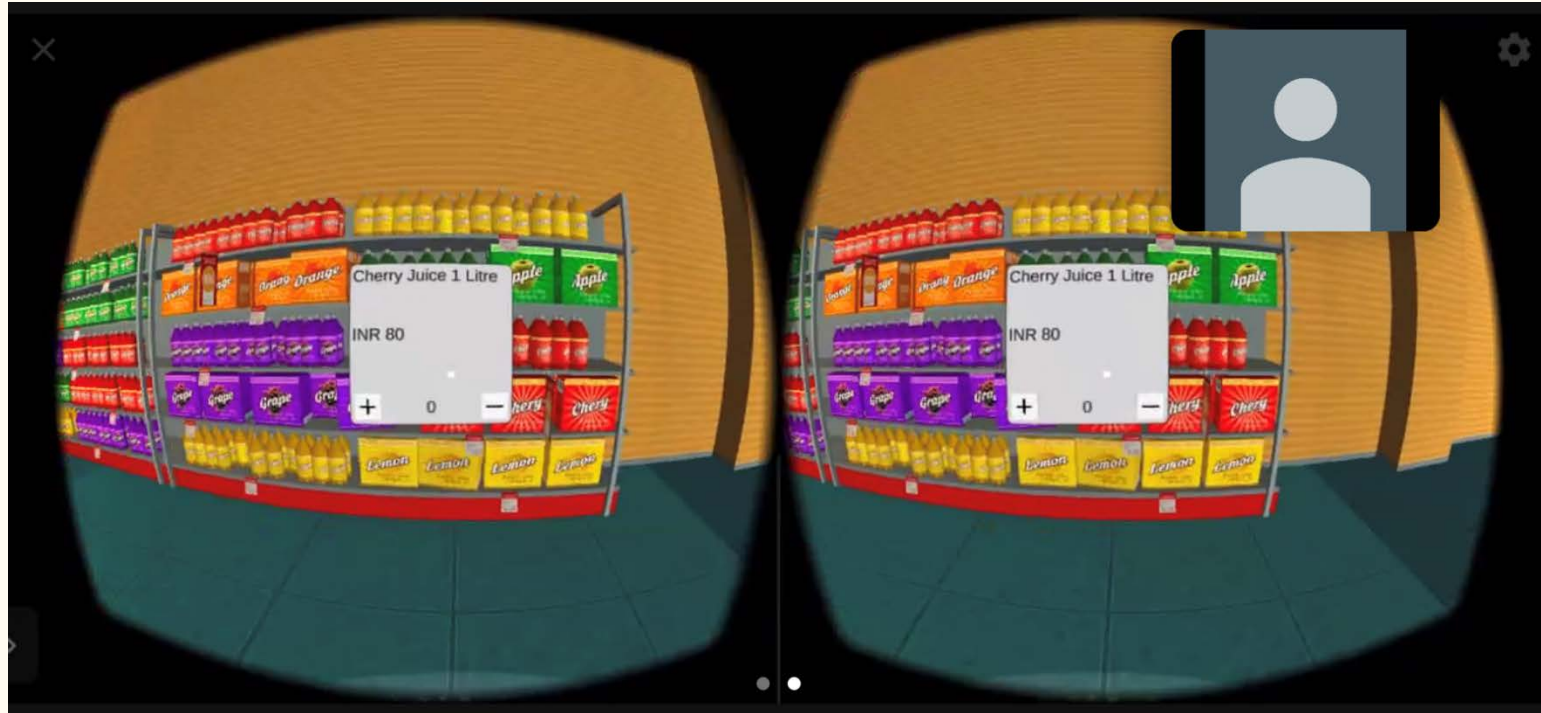
Email

Password

LOGIN



Adding products to cart



Checkout Activity



Payment Activity



3.2 V-Mart Admin Dashboard

☰

VMart

Dashboard

PRODUCTS

Products

USERS

All Users

ORDERS

All Orders

Good Morning, Admin

Dashboard

VMart Admin

Email	Items	Total Bill
jaalekadam@gmail.com	Cherry Juice 1 Litre - x1	₹ 80
jaalekadam@gmail.com	Cherry Juice 1 Litre - x2	₹ 160
jaalekadam@gmail.com	Cherry Juice 1 Litre - x2 Lemon Juice 1 Litre - x3 Apple Juice 1 Litre - x2	₹ 580
jaalekadam@gmail.com	Cherry Juice 1 Litre - x2 Orange Juice 1 Litre - x1 Lemon Juice 1 Litre - x1	₹ 310

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VMart



Products

USERS



All Users

ORDERS



All Orders

Good Morning, Admin

Dashboard



All Products

[+ Add Product](#)

Product Name	Description	Price
Apple Juice 1 Litre	Fresh Organic Apple Juice	₹ 120
Cherry Juice 1 Litre	Fresh Organic Juice	₹ 80
Grapes Juice 1 Litre	Fresh Organic Grapes Juice	₹ 95
Lays 100g Cream Onion	Cream Onion Lays Potato Chips	₹ 50
Orange Juice 1 Litre	Fresh Organic Juice	₹ 90
Tomatoes 1 kg	Fresh Tomatoes	₹ 40
Lemon Juice 1 Litre	Fresh Organic Lemon Juice	₹ 60

3.3 V-Mart Database

The screenshot displays the MongoDB Compass interface for a database named 'cluster0.erk5l.mongodb.net/vmart'. The left sidebar shows the 'Local' database structure with three collections: 'orders', 'products', and 'users'. The main panel shows the 'Collections' tab with a table of collection statistics.

Collection Name	Storage size	Documents	Avg. document size	Indexes	Total index size
orders	20.48 kB	4	250.00 B	1	36.86 kB
products	20.48 kB	7	158.00 B	1	20.48 kB
users	20.48 kB	2	196.00 B	1	36.86 kB

4. Testing

Unit Testing:-

Unit testing is the testing of an individual unit or group of related units. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input. In this application actual functionality is place order. In this application user can see multiple products. Unit testing checks that whether the products appear in the screen or not. User can select their products as per the choice. After that they can place the order. Unit testing checks that whether the order is placed or not.

Integration Testing:-

Integration testing is to check whether the application is working or not. In VR shopping application every feature is check. After unit testing each module, all the modules are tested simultaneously. In VR shopping application the first activity is login screen. If the he/she is new user then they need to first register themselves. If the user login is successfully then only user can see products. Integration testing checks that whether the products appear in the screen or not. User can select their products as per the choice. After that they can place the order. Integration testing checks that whether the order is placed or not. Integration testing checks whether the user is able to make payment or not.

5. Result

Test Case ID	Test Case Condition	Input	Expected Result
1.	Enter Name	John Mathew	Field should contain only text
2.	Enter Email	abc@gmail.com	Field can contain all types of characters
3.	Enter password	abc12345	Field can contain all types of characters
4.	Enter confirm password	abc12354	Please Confirm the Password
5.	Enter phone number	9874561230	Field should contain only numbers
6.	Enter address	4,Sharda Apartment, Ganesh Nagar,Bhandup (w)	Field should contain text and number
7.	Enter city	Mumbai	Field should contain only text
8.	Enter pin code	415263	Field should contain only numbers

Test Case ID	Test Case Condition	Input	Expected Result
9.	If the name, email, password, phone number, address, city and pin code is field empty.	Name:-_____ Email ;:-_____ Password:-_____ Confirm Password:____ Address:-_____ City:-_____ Pin code:-_____	Please fill all the details.
10.	If the user enter an email without @ sign	johngmail.com	Enter valid email.
11.	If the user enter password is below 8 digit number	123456	Password must be 8 digits.
12.	If the password and confirm password do no match	a) 12345678 b) 1234567	Please Confirm the Password
13.	If the enter pin code is below 6 digits	41526	Pin code must be 6 digits.
14.	If the enter email Id and password is valid	Click on login	Login successfully and home screen will be displayed.

Test Case ID	Test Case Condition	Input	Expected Result
15.	In my cart, user can see their added products.	User can see their added products	Multiple products will be displayed and user can place the order.
16.	In place order user can see total price and personal details. And user needs to select a payment type.	Total Price:-5000 Payment Type:- Cash/Debit/Net Banking	Order placed successfully.
17.	User can see order status	See orders status	See orders status

6. Conclusion and Future Scope

- Users will be able to interact with products in person, inspect them, walk through them, and search for them just like they would in a traditional brick-and-mortar store, with the added benefit of an e-commerce website's search and navigation, all for a reasonable price using a low-cost virtual reality device.
- 3D virtual fitting technology, also known as virtual fitting technology, can be implemented in the future. This allows consumers to try on garments for size, fit, and style without having to physically wear them.

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Paper Publication

Paper entitled: "**Experimental Study On Virtual-Reality Based Retail Mall Called V-Mart**", is presented at "ICCIIT-2022 / Journal Name: Elsevier SSRN" by Jaaie Kadam, Prachi Manera.

Thank You

