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Leveraging Augmented Reality in E-Commerce

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Abstract

The effect of leveraging AR & VR in the retail and advertising sector can be transformative. Retailers and businesses can utilize AR as an expansion of the brand experience to engage clients using immersive tech and drive profits. By 2020, 100 Million clients will shop using AR, VR & MR. Our AR web based business framework is created as an Internet module, which can be broadcasted to people via various means. Study results show that the AR internet business framework can give more data and more straightforward encounters to online clientele, by joining physical condition data with virtual item models. Online customers can "test use" items while shopping online and gain more information about the items. In this way, clients can settle on better obtaining choices and have a superior opportunity to buy the "right" items at the right price.

Keywords: *Augmented Reality, AR, E-commerce, real world, virtual world, AR Core, ARKit,3D Models*

1. Introduction

In the previous decade, web based business and online shopping have become famous on the grounds that they make life simpler, particularly for individuals with incapacities and for other people, who experience issues engaging in on location shopping. Notwithstanding, web based business and online shopping still can't completely trade nearby shopping particularly for specific items, for example, furniture, garments, and beautiful products, games etc. 2D pictures or composed depictions utilized in conventional web based business frameworks frequently can't give enough item intel.

On most work area computer generated reality (VR) frameworks, clients control 3D models with mouse communications. Albeit earlier examinations show that VR can improve online business by giving more item in-arrangement, current VR techniques for internet business still can't let clients incorporate items into their physical surroundings. Dissimilar to VR, augmented reality (AR) upgrades physical reality by coordinating PC created virtual articles into a certifiable physical scene. Produced virtual items become, it could be said, an equivalent piece of the client's regular habitat. With an AR web based business framework, clients could put virtual item models into increasingly vivid perspectives on their home, office, or open air spaces.

As of late, much research has concentrated on creating AR applications. Be that as it may, there has been little research directed identified with utilizing AR to upgrade online business. What's more, the survey of Swan et al demonstrated that AR explore with client study was just a little part (under 8%) of the aggregate, and a large portion of the ease of use examines were neither formal nor precise. Among the set number of earlier AR web based business related investigations, Zhu et al. proposed AR in-store shopping gadgets. In any case, their investigation planned for utilizing AR innovation to upgrade in-store shopping rather than online shopping. Zhang et al further blended a 3D virtual item in with a genuine scene, tape the subsequent scene, and afterward send the tape to intrigued clients by email. Their application was restricted to showcasing itself clients still couldn't take a stab at themselves to make sense of whether items were appropriate for them in their genuine physical situations.

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Dempski utilized a transparent head-mounted showcase to execute AR to upgrade web based business. Dempski accepted that AR could give significantly a bigger number of settings in acquiring decisions than is conceivable utilizing a work area program. Be that as it may, the dad per didn't present any insights about the framework structure. Client criticisms were likewise not gathered. Chen et al. applied AR to shopper article of clothing take a stab at. This paper inferred that the expansion of AR innovation can improve the observation on the reasonable feeling on the items by clients and can abbreviate the sentiment of distance between the two.

In an examination, another AR online business framework was created to permit clients "test use" the items while shopping. The framework coordinates a virtual item model into an online customer's physical condition and gives strategies by which the clients can cooperate with the virtual items. Online customers can collaborate with the item models inside their environment in an increasingly characteristic manner. For instance, they can physically stroll around the virtual models to see, from any perspective, how the items fit in their own condition.

1.1 Need:
The effect of leveraging AR & VR in the retail and advertising sector can be transformative. Retailers and businesses can utilize AR as an expansion of the brand experience to engage clients using immersive tech and drive profits. By 2020, 100 Million clients will shop using AR, VR & MR. Additionally AR can be used outside of retail places to increase customer loyalty by innovation and uniqueness

1.2 Basic-Concepts:
The core Idea behind this Project is to leverage the Shopping Experience using an MR based Mobile Application. The effect of leveraging AR & VR in the retail and advertising sector can be transformative. Retailers and businesses can utilize AR as an expansion of the brand experience to engage clients using immersive tech and drive profits. By 2020, 100 Million clients will shop using AR, VR & MR. Additionally AR can be used outside of retail places to increase customer loyalty by innovation and uniqueness. It aims at lowers costs, real time visualization & feasible shopping from any location, any time.

Summing up, the application would add a virtual dimension of Interactiveness which would help buy a product with a clear picture in Mind, which could be visualized using a Smartphone or a VR headset.

2. Related work

2.1 An Adaptive Virtual Reality Architecture for Shopping Malls *Author: George Lepouras, Costas Vassilakis*
The proposed engineering gives a conventional system to building an adaptive VR- shopping center, undertaking the assignments identified with client profiling and monitoring, selection of the things most appropriate to the client profile, relationship of the relevant interaction techniques and dynamic detailing of the VR-universes.
The design proposed in this article permits internet business locales to benefit from the upsides of versatile and VR advancements, and simultaneously addresses various difficulties for the most part connected with such frameworks. The proposed framework consolidates modules that embrace client observing, reasoning of preferences, determination of the most unmistakable things

2.2 In-Place Augmented Reality

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Author: Nate Hagbi, Oriel Bergig,
In this paper, the author has presented the possibility of an In-Place Augmented Reality, which is camera-based transmission of AR content independent of an independent library. The idea depends on embedding 3D models into photos and extricating them during runtime, where the embedded picture is intuitive and sensible for a human without utilizing an AR framework. 3D Models are inserted in the modelled world itself, so there is no requirement of a database to store these models. In this way, measure of models that can be expanded doesn't have direct ramifications on the arrangement and upkeep of the framework. Moreover, the amount of concurrent customers doesn't impact the AR system and is in this way vast.

2.3. Digital Online Shopping Using 3D in Augmented Reality *Author: R.Priyah, Viji Vinod*
This AR framework is produced for normal work area or laptop PCs with no special hardware support. Likewise, with a benevolent user interface, a sales rep can get any 3D item model and make customized advertisement video pieces. It is unsurprising that we can more remote improve the real-time execution of the AR framework by using better catching gadget or managing with video of less shading pictures.

3. Requirements Analysis

3.1 Functional Requirements:

Overview of Functional requirements (Modules) –

1. **Start Camera: -** Accessing the app through the camera. The camera in work can be back camera as well as front camera according to the convenience of the user.

2. **Detect Plane:-**The camera will point towards the surface and detect it(the user doesn't have to take the picture, the picture will be taken automatically for the history log

3. **Gather Information: -** After detecting the plane, all the related information should be loaded. Details of information are given in next section.

4. **Collect Sensor Data:-** When the object is getting detected, the mobile will store the sensory data from the mobile (sensors like gyroscope and accelerometer)

5. **Create AR objects :-** Based on the object detected it will create an AR object and will show on the screen
6. **Place AR objects: -** According to the collected sensor data, the object is shown besides the object after doing following check accordingly.
7. **Check Obstruction (sub function):-** The information to be shown should not obstruct the user's view. If it does, the way of displaying information should adapt to the view.

3.2 Non-Functional Requirements:

Non-functional requirements are those that do not directly affect the functioning of the system but affect, the performances of the system. Non-functional requirements are those requirements, such as, detail constraints, control mechanisms. They include the following:

1. Performance
2. Scalability
3. Responsiveness
4. Use-ability
5. Security

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6. Documentation
7. Availability

3.3 Hardware Requirements:

3.3.1 User End – Any Android or IOS mobile handset with ARkit or ARcore

3.3.2 Server – Virtual Private Server with minimum following specifications

1. Processor - Pentium or higher
2. Ram - 1 GB Ram or Higher
3. Space - 20 GB or Higher
4. Network Uplink - 100 Mbps or more
5. Operating software – Cloud linux or any linux distribution like CentOS, Ubuntu, Redhat
6. Apache or Nginx Servlet
7. Softwares Installed - PHP 7.4, MySQL

3.4 Software Requirements:

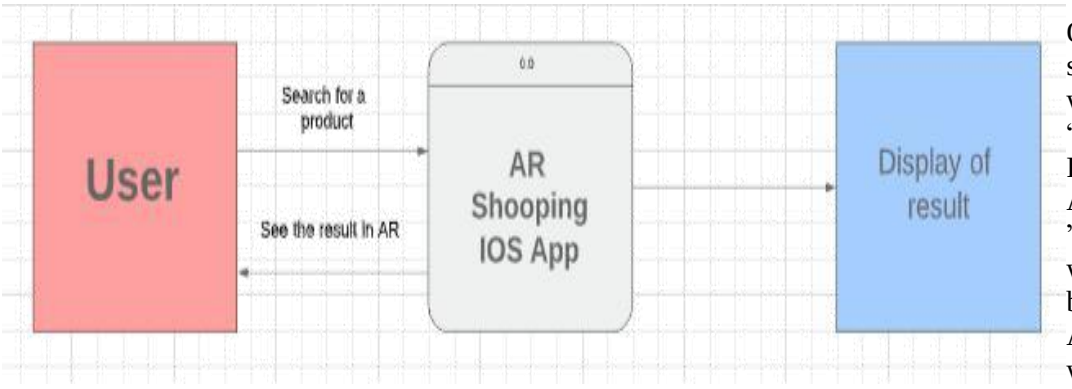
3.4.1 Programming languages – PHP (Laravel Framework), SCSS, HTML, XML, JS

3.4.2 Database – MySQL for live applications and Sqlite for offline applications

3.4.3 API – Google Poly API, PayPal Payments API

3.4.4 Development tools – Blender, XAMPP

4. Proposed System



Our solution will be a "Mixed Reality Application" which will work across both Android as well as iOS devices with a web based Admin Content Management System panel which will leverage the use of both VR & AR technologies by definition. The MR app will allow a user to simplify the shopping experience by using relevant options available which includes a 3D model of the Product, VR Content, AR Content or maybe an Animation of the product in use. The user gets to choose from a plethora of existing products on the Application.

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Fig. 1: Block Diagram

The proposed methodology includes the system block diagram, flow of the application and an overview of the designed system

A. Block Diagram

The block diagram of the designed system consists of specific modules and their relationships on a higher leve

B. Flowchart

The flow chart is like an algorithm specifying the system flow for various processes.

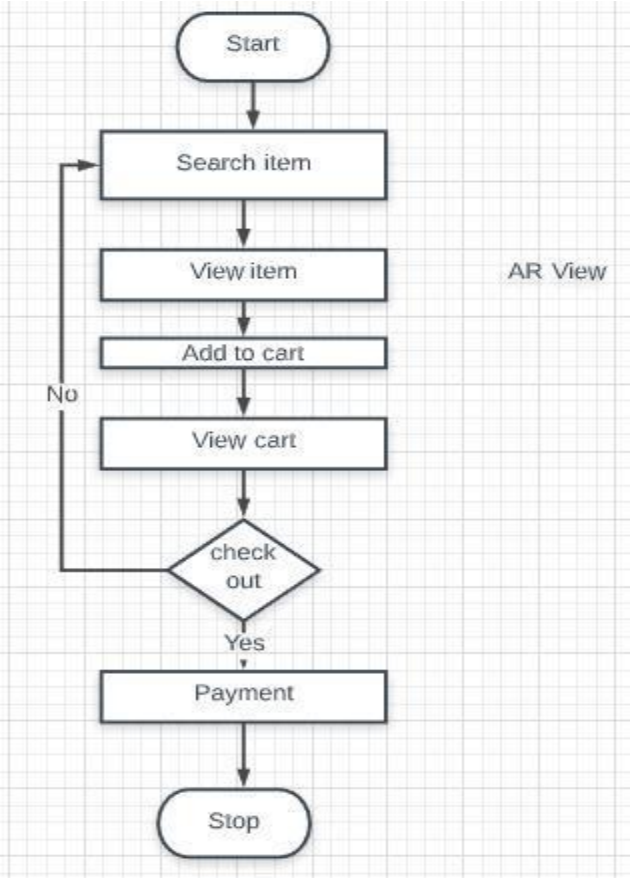

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Fig. 2: Flow Chart (Working Process)

5. Implementation

We are proposing a Technology-Rich effective MR based application to replace the problem of ineffective, boring & vague shopping experiences.

- The planning phase involves the planning of various activities, team tasks, conditions, and time period followed by the actual creation of HLD and deciding on the architecture.
- The execution phase of the project will involve actual designing, coding and delivering modules as decided during the planning phase.
- Throughout these steps, project stakeholders and other important people will be kept in loop of the project's progression via the agreed upon format of communication.
- Finally, a quality plan will be documented, which would include quality targets, assurances, and control measures, along with a test acceptance plan, highlighting the criteria and conditions to be met to be accepted by the customer.
- The main requirement is an ARkit or ARcore enabled smartphone which is a must to implement this project

1. Configure and Run the AR Session

The ARSCN View class is a SceneKit module that incorporates an AR Session that tracks the motion of a real world object while processing input images from the camera. However, configuring a session is compulsory.

2. Plane Detection

The ARWorld Tracking Configuration class provide functions for tracking of motion with high precision and detection of planes in the real world. A plane is any falt surface which can be used as a plane reference in the AR world. While starting an Ar Session, create an object with session configuration details (such as plane detection).

3. Placing 3D Content

With the enabling of plane detection, AR Kit manages (Adds, Deletes, Updates) anchor points for the detected planes. By default, an SCN node object is added for every anchor in the scene. You can implement the renderer :did Add Node :for Anchor: method to add 3D models and graphics to the scene. Plane detection continually updates markers for every anchor as the camera moves and so does the plane. These updated markers are considered to move the 3D object accordingly in the augmented world.

6. Results and Discussion

6.1 Shopping interface to interact with user:

A shopping cart page is displayed to the clients for them to choose the 3D model of the furniture with relevant details about the product.

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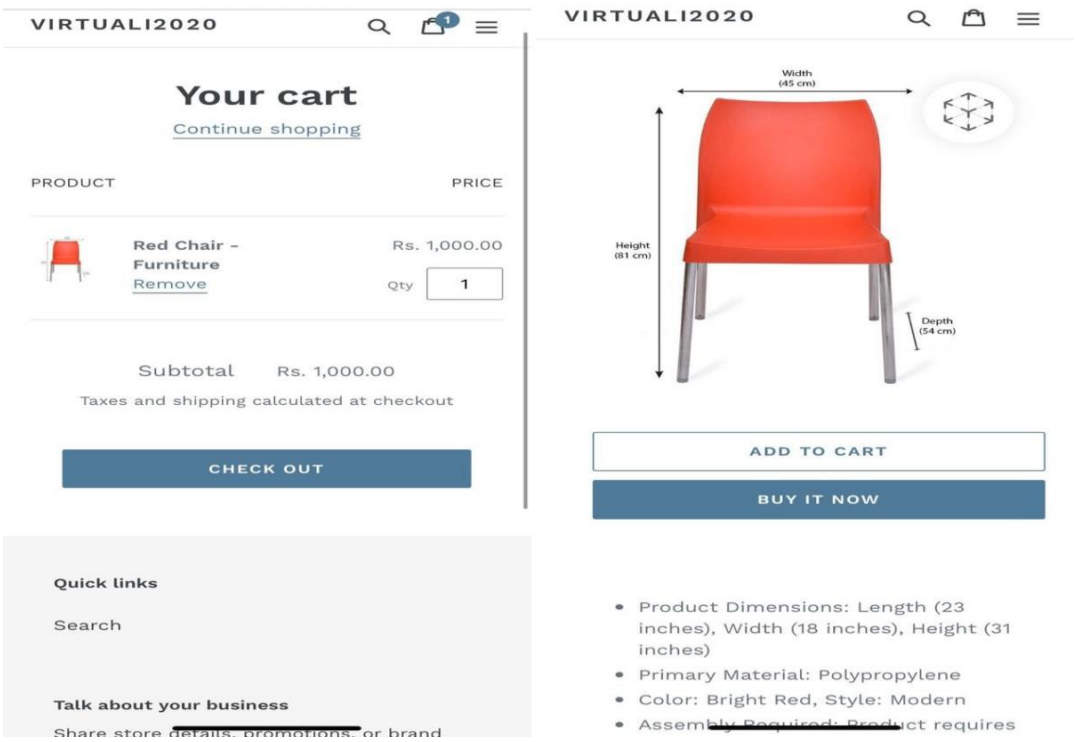

Figure.3. User Interface of Cart

6.2. AR view and Object View:

Augmented view is the view wherein 3D models and images are superimposed on the user's display of the normal world, thus enhancing the experience further

Object view is the 3 Dimensional view of any product to be augmented.

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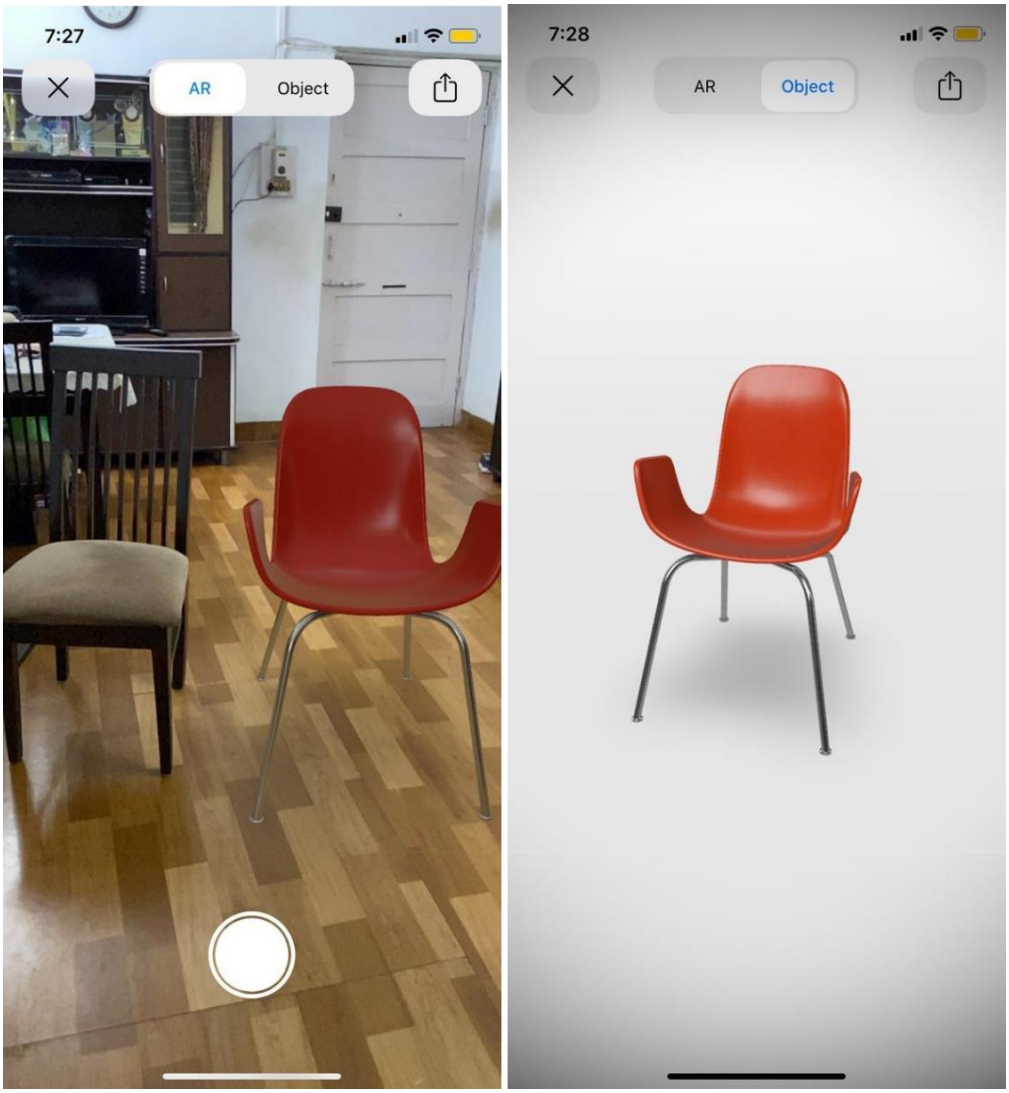

Figure.4. AR View and Object View

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5.3. Admin Panel to add products:

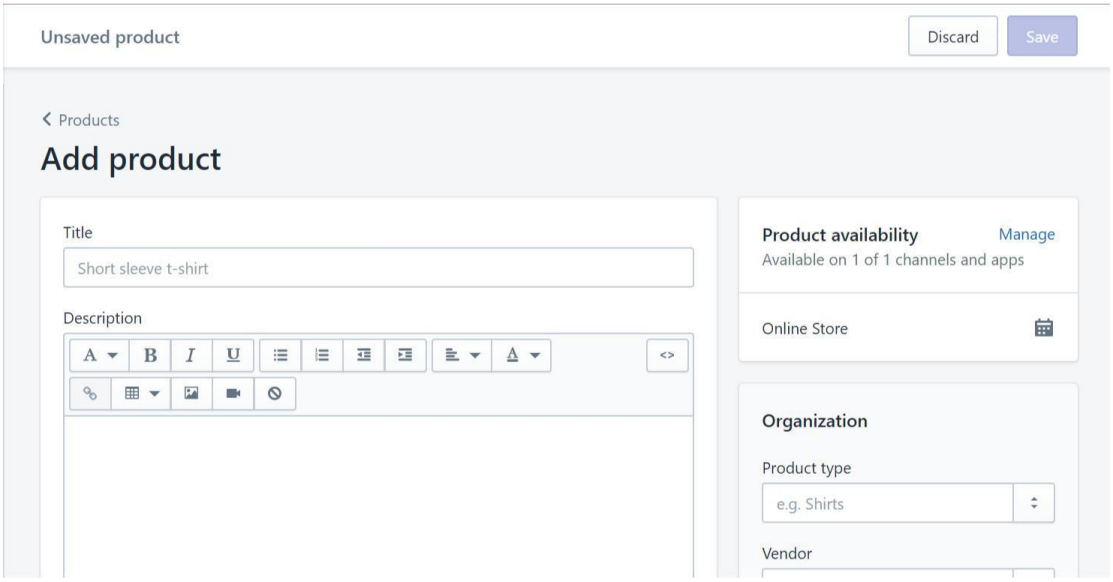

Figure.5. To add a product

5.4. Admin Panel Module to add a 3D Model:

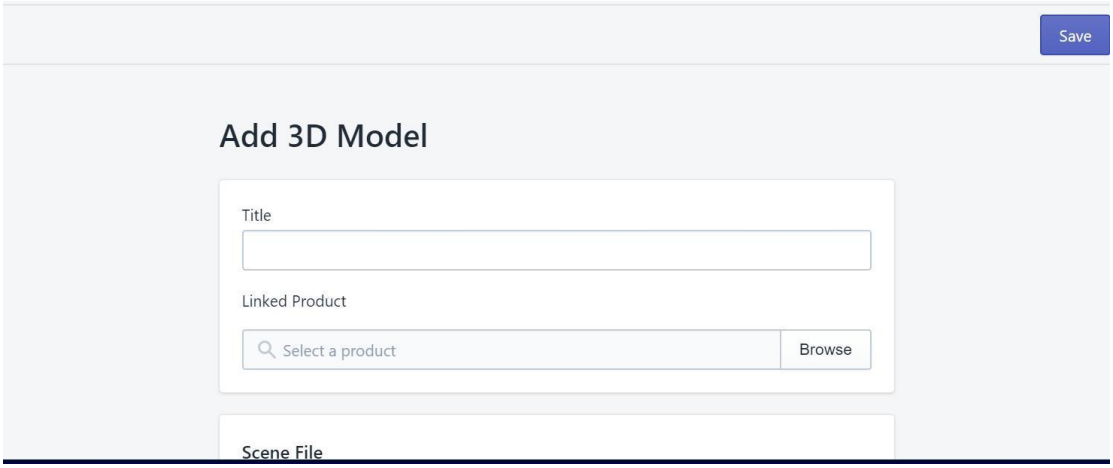

Figure.6. To add the 3D Model of the product

7. Conclusion and future scope

There are right now 171 Million AR/VR clients internationally. The worldwide AR market is relied upon to develop to $209 Billion and our application targets taking advantage of this market in the Indian locale.

We expect to open AR and VR's exceptional potential with this Application by gamifying and making an intelligent shopping experience for a consumer. This application will change client engagement as well as the overall experience of living the product they intend to buy.

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