AUGMENTED REALITY BASED SHOPPING EXPERIENCE

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Abstract

This project is related to the upcoming or rather latest technology called Augmented Reality. Augmented reality is a powerful way to bring the physical and digital worlds together. AR places digital objects and useful information into the real world around us, which creates a huge opportunity to make our phones more

intuitive, more helpful and a whole lot more fun. We'll be developing an AR based Restaurant Menu called ARtifact

that uses existing web technologies to create an AR experience that is accessible to everyone everywhere. This

application allows the customers to view all the dishes on a restaurant's menu through smart devices, increasing

customer engagement. Customers can see the food, to scale, on their own table. They can combine different side dishes with main courses, keeping the customer wholly in control of their selections. Because of this, restaurants can minimize customer frustration and buyer remorse. And the way we plan to Integrate Augmented Reality is by using javascript libraries (AR.js,Three.js and A-Frame.io).

Index Terms- *Augmented Reality, customer engagement, smart integration , web application*

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1. INTRODUCTION

Understanding the design of the system helps in the better implementation of the system. This chapter includes the system architecture, in the system architecture the relationship and the process flow among the components is given. The data flow diagram gives the detailed process flow between the various modules of the system, a module is a separate unit of software or hardware. Typical characteristics of modular components include portability, which allows them to be used in a variety of systems, and interoperability, which allows them to function with the components of other systems. The software and hardware requirements includes all data, functional and behavioral requirements of the software under production or development it also includes the hardware specifications required by the project. The software and hard-ware requirements of the system help in analyzing the basic architecture of the system.

The architecture diagram for the project Augmented Reality based Restaurant Menu (ARtifact), gives the basic process flow between the android and the web portal and some of the modules. The data flow diagram includes the process between the modules like login page, check out page, object render page etc.

2. SYSTEM ARCHITECTURE

The architecture of a system is a model to describe or analyze a system. The system architecture basically consists various structures present in them and the relationship between them. The design and architecture of the system can be represented and modeled using an architecture diagram and the data flow diagram. The

architecture diagram will consist of basic components and modules. The data flow diagram describes about every module and the process flow, the pictorial representation of these helps in analyzing the design of the system.
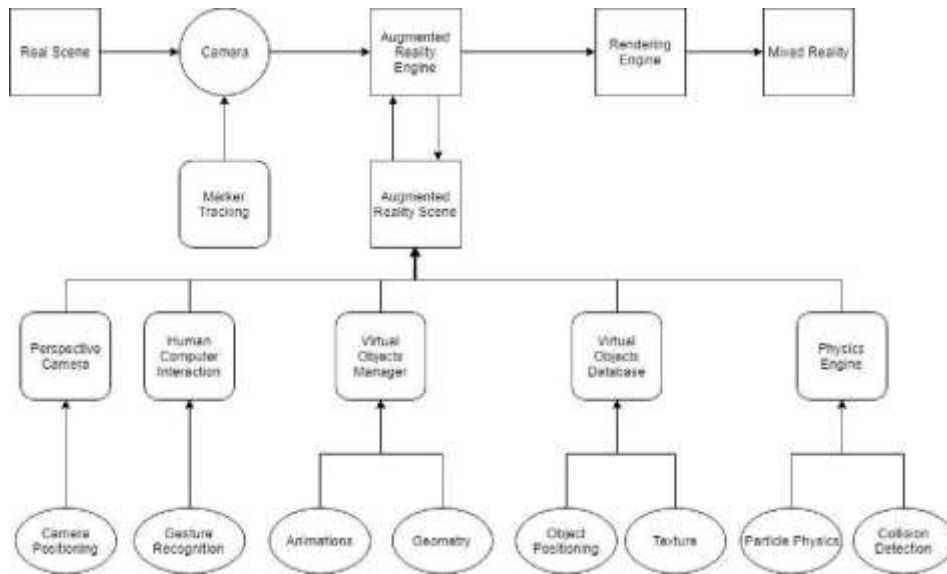
The architecture diagram includes the main components of the AR application like Camera, AR Engine, Virtual Object Manager. The diagram shows that the camera captures the live feed and digital objects are super imposed on to the real scene using an augmented reality engine.

The AR engine is responsible for rendering and maintaining the virtual scene called AR scene. In an AR scene perspective camera, physics engine, virtual objects database play an important role in making the experience seem realistic and natural by providing animations, textures, lighting, shadows.

After the real scene is processed by the AR engine the Virtual scene is mapped on to the real world by using a marker there by rendering a mixed reality on the screen.
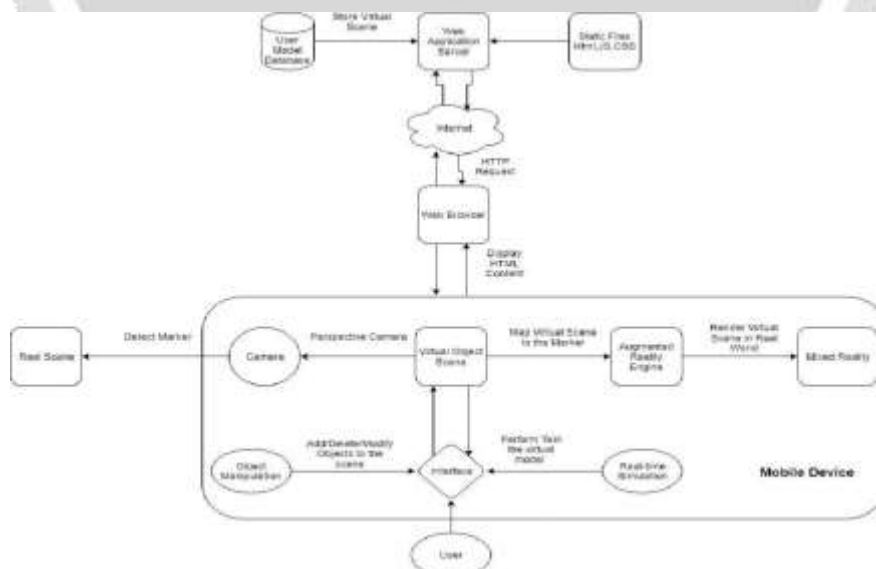
In the data flow diagram the various modules and the process flow between these modules is comprehensibly described. The data flow diagram shows the step by step process of the web application. First there will be a login page to validate user's credentials via a web browser, once the user enters the login information they will be taken to the restaurant's home page. The browser makes use of the device's camera to track the marker in the

real world, Once marker position is established digital objects can be mapped into the real world. The users can view the restaurant's menu by visualizing the dish on their screen. Customer can then place an order and proceeds to the payment page.

2.   LOGIN MODULE
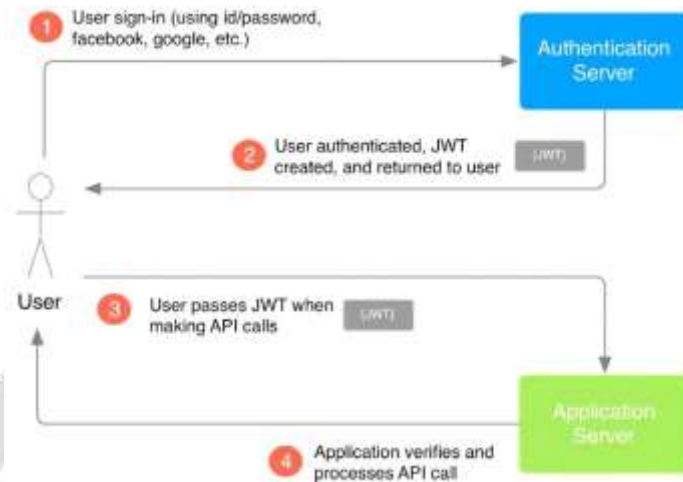
Description The log in is the most important part of the application as it provides a layer of security to the app. The user will enter the email and password and based on the suffix of the email, the app will first authenticate the user and then redirect to the home page.JSON Web Tokens are used for representing claims securely between two parties. It is an open, industry standard for stateless authentication.

4. AUGMENTED REALITY SCENE
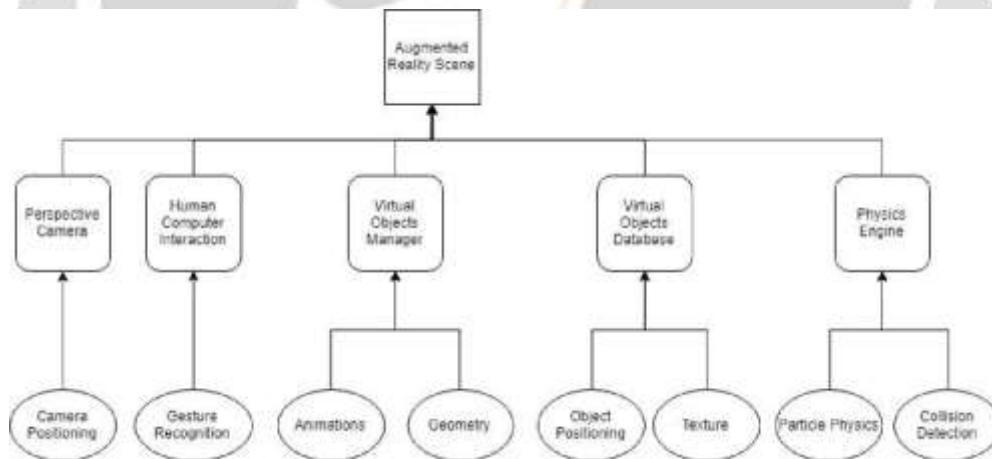
Description Scenes allow you to set up what and where is to be rendered by the rendering engine. This is where you place objects, lights and cameras.

•   Perspective Camera

•   Human Computer Interaction

•   Virtual Object Manager

•   Virtual Object Database

•   Physics Engine

All this information is stored in the database and which is used to render the scene.

5. Orders and Payment Module Description

This is the module where all the user can place an order and proceed to the payment gateway: All this information is stored in the database and helps in providing a quick and easy way to place orders.
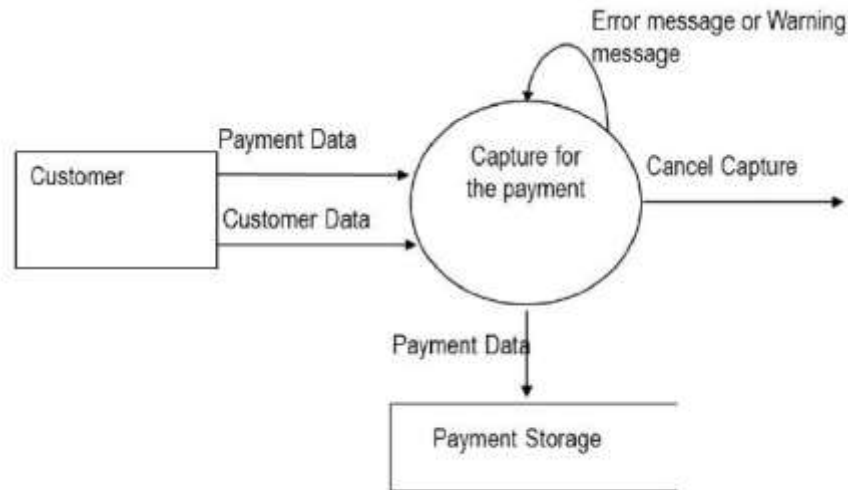
6. IMPLEMENTATION DETAILS

6.1 SIMULATION PARAMETERS

Web Testing in simple terms is checking your web application for potential bugs before its made live or before code is moved into the production environment.

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.

6.2 UNIT TESTING

During this testing the number of the arguments is compared to input parameters, matching of parameter and arguments etc. All five modules are checked separately, each test case is given to each unit and it is checked. The result is checked to see if the actual outcome is same as the expected outcome. A unit test is also called a module test because it tests the individual units of code that comprise the application. Each test validates a single module that was built to perform a certain task with the expectation that it will behave in a specific way. During this testing

the number of the arguments is compared to input parameters, matching of parameter and arguments etc. All five modules are checked separately, each test case is given to each unit and it is checked. The result is checked to see if the actual outcome is same as the expected outcome. A unit test is also called a module test because it tests the individual units of code that comprise the application. Each test validates a single module that was built to perform a certain task with the expectation that it will behave in a specific way.

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Integration testing is a process where all the separate modules are combined together and its working is checked. There are two approaches to this : bottom-up and top-down integration. At first the branch, semester and grade selection modules are integrated and checked. Top-down approach is being used in this software testing.

6.4 USER ACCEPTANCE TESTING

User acceptance of a system is the factor for the success of any system. The system under consideration is tested for the user acceptance by constantly keeping in touch with the prospective system user at the time of developing wherever required.

- Input screen design.

- Output screen design.

- Online message to guide the user.

- Format of the reports and other outputs

6.5 FUNCTIONAL TESTING

Functional testing ensures that the application is working as per the requirements. Most of the test conducted for this is driven by the user interface and call flow

6.6 PERFORMANCE TESTING

This testing process is undertaken to check the performance and behavior of the application under certain conditions such as low battery, bad network coverage, low available memory, simultaneous access to applications server by several users and other conditions. Performance of an application can be affected from two sides applications ,server side and clients side. Performance testing is carried out to check both.

6.7 MEMORY LEAKAGE TESTING

Memory leakage happens when a computer program or application is unable to manage the memory it is allocated resulting in poor performance of the application and the overall slowdown of the system. As mobile devices have significant constraints of available memory, memory leakage testing is crucial for the proper functioning of an application

6.8 INTERRUPT TESTING

An application while functioning may face several interruptions like incoming calls or network coverage outage and recovery. The different types of interruptions are:

- Incoming and Outgoing SMS and MMS

- Incoming and Outgoing calls

- Incoming Notifications

- Battery Removal

- Cable Insertion and Removal for data transfer

- Network outage and recovery

- Media Player on/off

An application should be able to handle these interruptions by going into a sus-pended state and resuming afterwards.

6.9 Usability testing

Usability testing is carried out to verify if the application is achieving its goals and getting a favorable response from users. This is important as the usability of an application is its key to commercial success (it is nothing but user friendliness).Another important part of usability testing is to make sure that the user experience is uniform across all devices. This section of testing hopes to address the key challenges of the variety of mobile devices and the diversity in mobile platforms/OS, which is also called device fragmentation. One key portion of this type of usability testing is to be sure that there are no major errors in the functionality, placement, or sizing of the user interface on different devices.

6.10 INSTALLATION TESTING

Certain mobile applications come pre-installed on the device whereas others have to be installed from the store. Installation testing verifies that the installation process goes smoothly without the user having to face any difficulty.

This testing process covers installation, updating and uninstalling of an application

6.11 SECURITY TESTING

Security Testing: To check for vulnerabilities to hacking, authentication and authorization policies, data security, session management and other security standards.

6.12 RESULTS

Testing Parameters	Expected Output	Actual Output	Result	
	Authenticate user by			
Authentication	validating credentials	User is Authenticated	Pass	
	from API			
	Fetch cuisines from	Cuisines fetched and		
Cuisines			Pass	
	The API	displayed		
	Track marker position			
Marker Tracking		Marker detected	Pass	
	in the camera feed			

	Fetch 3D model and	Model rendered on the				
AR Scene			Pass			
	render	marker				
Orders	Place an order	Order placed	Pass			
Payment	Process Payment	Payment successful	Pass			
Test-Cases						

Name of Test	Web Browsers	Test Result					
	Chrome, Firefox,						
Unit testing		Pass					
	Safari						
Integration testing	Chrome, Firefox	Pass					
User Acceptance testing	Chrome, Firefox	Pass					
Functional testing	Chrome, Firefox	Pass					
Usability testing	Chrome, Firefox	Pass					
Memory Leakage testing	Chrome, Firefox	Pass					
Performance testing	Chrome, Firefox	Pass					
Interrupt testing	Chrome, Firefox	Pass					
Installation tests	Chrome, Firefox	Pass					
Security Testing	Chrome, Firefox	Pass					
Test-Results							

7. CONCLUSION

Humans are visual creatures, therefore a web application, incorporating augmented reality in restaurant menu, is a very effective tool which can be used for improving the overall efficiency in a restaurant and increase customer engagement. The proposed web application portability and ease in use increases its credibility compared to the traditional system.

8. FUTURE ENHANCEMENT

AR can be used as an effective marketing tool for restaurant owners, AR food menus can also be designed with a range of other features to enhance customer experience. Within the food industry, the opportunities created by the augmented reality technology are nearly endless.

There are many different ways restaurants can benefit from the AR adoption and improve their outdated marketing techniques to attract customers, entertain them, and encourage them to share their AR restaurant user experience with their friends.

The food industry is supersaturated with various brands striving to obtain as a large market share as possible. That's why restaurants should turn to exploring new technologies to remain competitive within the chosen path.

9. REFERENCES

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