**AUGMENTED REALITY IN E-COMMERCE**

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**ABSTRACT**

The subject of this paper is an analysis of the concepts and application of the augmented reality in e-commerce. The literature in the field suggests a huge potential for improving e- commerce using augmented reality services. The goal of the paper is to provide a new insight into this field through an example of development of an augmented reality service for furniture manufacturing company. The project includes creation of a virtual catalog of products which consists of 3D models of products and their positioning in real space. User interaction with the developed system is performed through mobile devices.

**1. INTRODUCTION**

Augmented reality (AR) is a technology with an incredibly fast development nowadays. Combines computer-generated objects with real environment, allowing human interaction real-time. This new smart technology was introduced and developed in the 1990s, The AR technology focused on using different displays, interfaces, and algorithms. There are AR devices that connect to AR mobile apps. AR research has aimed at technical evaluation of devices, user perception and acceptance, task performance, developing app design guidelines, or AR cognition. AR apps have been present in marketing and retail only in the last decade. This is a novelty, making e-commerce “smart”. Studies on AR apps between 2006 and 2016 mostly investigated convenience, perceived usefulness, perceived ease of use, customer satisfaction, shopping value, personal emotions, system quality, and innovativeness.

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Human-machine hybrid-augmented intelligence is a future research direction considering

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Retailers and customers benefit from AR as a smart technology that improves customer

engagement and purchasing decisions. It also generates better customer and business value [4],

[5], [6], [7].

An AR system is different from a traditional on-line shopping system because it includes

interactivity and immersion [8]. User experience is a key factor in the success of an AR system,

and it includes evaluating users’ perceptions, thoughts, and feelings about the products and

services [8].

Augmented reality is similar to virtual reality (VR), but instead of replacing the physical world,

“AR enhances the physical reality by integrating virtual objects into the physical world. The

virtual objects become an equal part of the natural environment” [9].

VR in e-commerce has been used to provide consumers a new type of shopping experience by

interacting with virtual products [9]. VR was a way of user interaction, but new methods were

needed to support customer experience and provide more realistic product perspective in size

and interaction [9]. Thus, AR integrates computer-generated objects in real-world scenes,

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Back to the applications themselves: one of the original augmented reality-based online applications for e-commerce are virtual fitting programs. With the help of a camera, users are able to see how products look that they’re interested in purchasing when superimposed over their own bodies. However, this technology carries with in the risk of making some clothing articles appear unnatural due to the way that sizes are sometimes displayed. When it comes to smaller items, however, this technology works very well. Online opticians provide a good example of how augmented reality can be successfully applied:

When browsing through online glasses stores, one often has the option to try different frames on ‘in 3D’. The service is loaded via a flash application and the user’s only needs to allow the site access to their webcam. Glasses and sunglasses are then placed directly in front of a digital depiction of the viewer’s face.

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**2. PROBLEM DOMAIN**

The main problem is to design a framework that uses augmented reality, mobile technology to enhance a customer satisfaction when dealing with e-commerce. Traditional e-commerce systems have reached a limitation that needs to be overcome, because they do not provide enough direct information for online shoppers, especially when they are shopping for products like furniture, clothing, shoes, jewelry, and other decorative products.

**3. SOLUTION DOMAIN**

“only solution related data will be inserted”

“add more content”

Like traditional e-commerce systems, our AR e-commerce system uses the Internet as the Primary user interaction platform. However, with our AR e-commerce system, a video Camera is needed to capture the consumer’s physical environment and then integrate it with Virtual objects in real time. The system was developed as an Active X plug-in for an e-commerce. Users can use app for search the product related information, just as they would with a traditional e-commerce apps. However, online Shoppers can also use the plug-in to bring virtual products into their physical environment and then interact with the products to determine if the products are suitable. The client-server plug-in was made using the MFC and OpenGL libraries.

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**3.1 REQUIREMENT ANALYSIS**

It is necessary to:

* Adapt the already developed furniture models to the need of the services.
* Enter basic information for each model: availability of available colors and dimensions.

Enable the display of the Products in the space, product change and ordering procedure.

**3.2 STRUCTURE**

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**3.3 ARCHITECTURE**

Augmented Reality application is a module of the mobile AR client in the middleware layer designed to mainly work with the Metaio native SDK to process some AR tasks, e.g. building geometries, visualizing contents, etc. Moreover, the AR application is also joint with the web service framework for capably requesting services and receiving responses, which are dynamic contents or final outcomes from the web service provider. The following units explain each module in the application, which is intended to support the proposed features. Web Service Framework: The web service framework executed with web services. APIs such as SOAP or REST is composed of client and server-side service code. The web service framework concurrently works with the AR application as a middleware layer for creating web service connections, sending requests and receiving responses between the mobile client and web service provider. In the web service framework, there is an XML Parser and XML serialization module to process XML data representing the final outcome of the web service provider. The result will then be transferred to the AR application. At the moment we are utilizing XML Http Request for the server-side response, but we plan to consider JSON as an alternate to XML for transferring data from the server.

“flow diagram”

**3.3 RESEARCH DESIGN**

The research is experimental, and it is based on the development of Smart Ecommerce Framework (SEF). Based on this framework, we developed a smart e-commerce application that uses augmented reality technologies and cognitive functions on an e-commerce infrastructure.

“compare with similar product or idea (ikea) ,comparative chart”

* 1. **THE FRAMEWORK**

In our approach, the Smart E-commerce framework have two main layers:

**Application** **Model**: contains five models for smart e-commerce application development as follows: User Profile Model (UPM); 3D Products Model (3D PM); EnvironmentModelUser Interface Model (UIM); Application Infrastructure Model (AIM).

**Augmented Reality Process**: represents the AR functions implemented in Application Models.

**4. SYSTEM DOMAIN**

**“srs content”**

* 1. **SYSTEM FEATURES**

1. **ADMIN** – Role includes CRUD (Create/Read/Update/Delete) Items, categories, and other tasks available from the Dashboard (Web Admin panel).
2. **CLIENT** – Use by customers for shopping (Mobile App).
3. **AUGMENTED** **REALITY** – On selecting AR View of a product from client, an INTENT is send to the AR Module for displaying a 3D View of the available item.

**4.2 ADMIN – WEB APP**

* The Administrator is the super user of this application and also the owner of company. Only they have access to the dashboard and to all other functionalities available from it.
* They can manage Items.
* They can view information about all the registered users.
* They can view Item reviews posted by various user. They can view all the Orders placed by users.
* They can send notifications to desired users on details like Offers, Shipping details, etc.
  1. **TECHNOLOGIES USED**
* **Frontend**: XML, HTML, CSS, Bootstrap frontend library and JavaScript.
* **Backend** : Java, PHP
* **Database** : MySQL,
* **Tools Used**: Android Studio, Sublime Editor, Apache Server, WAMP (PHP MyAdmin), Augmented Reality App (Client), Unity 3D Engine and Vuforia Engine.

**4.4 System requirements**

* **Operating system** : Windows 10 /Linux 17.04+ / Macos
* **RAM / Processor** : 2 GB / 1.3 GHz intel core i3 (5th gen) Processor
* **Web Browser**: Google Chrome, Firefox, Safari
* **Other** : Wi-Fi, Android App (Client) – Smartphone
* **Operating System** : Android OS 6+
* **RAM**: 1 GB RAM
* **Tools Used**: Wi-Fi Connectivity Augmented Reality App (Client) – Smartphone
* **Camera**:5MP Quality Camera
* **Sensors**: Accelerometers and Gyroscope

1. **APPLICATION DOMAIN**

Augmented Reality is a very new technology, used mostly in gaming as of now, and is yet to make a significant impact in the trillion dollar E-Commerce market. AS the shopping moves online for everything like electronics, apparel, medicines, cosmetics and home furniture, the demand for a great Shopping experience also rises, and that’s where AR make becomes a game changer With AR, users can get a 360 degree view of the product, and helping in making a better judgement. AreasAreas where AR can make an impact goes long including Gaming, E-Commerce, Medical, Training, Education, Entertainment, etc.

**FUTURE SCOPE**

* AR Assets (3D Images) can be fetched from cloud storage instead of local database.
* More items can be added to provide better shopping experience using AR Tech database.
* More features can be added to Android app such as Search, Filter, Bookmarking the product.
* Features like private chat can be implemented where users can chat with product owners for bargaining or to get more info on items.

**6. EXPECTED OUTCOME** (70 Words Approx.)

This paper provides insight on the future of AR apps in marketing and retailing.

Cognitive computing technologies embedded in a mobile augmented reality app can help

improve customer decision-making and give feedback to the selling organization.

The proposed framework has three objectives. First of all, through the 3D Products Model (3D

PM), Augmented Reality Process (ARP), and Cognitive Functions (CF), we want the app to

offer the best customer support, so they get to know the product and “use” it in real time before

they buy it. We consider that the level of satisfying the customer expectations will be high.

Secondly, through the Environment Model and Cognitive Functions, we want to improve

support for integrating the product adequately and ecologically in the environment the product

will be used in. Thirdly, through the User Profile Model (UPM), the app offers powerful

decision-making support for customers.

Limitations. For the time being, integrating mobile technologies with AR and Cognitive

Computing into one app is very complex. Also the objects recognition is limited. Environment

scanning is quite limited as well.

Future research. Implementing a dialog model with the application through voice and speak

recognition included in Cognitive Functions. Implementation of IoT interaction functions for

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automated purchasing and delivery of products. Extending the application to access and “test”

products directly from stores - considering the technology used by Amazon Go [18].

The goal of this paper was to develop a virtual catalog of products based on technologies of augmented reality. So far, an initial version of the virtual catalog for android devices has been developed with several models of padded furniture. In the near future, the user interface will be upgraded. AR as technology will surely be more and more available and used in different fields and its application will facilitate and complement in achieving business advantages and is the type of technology that will improve the user satisfaction with products and services.