Augmented Shopping Experience for Sustainable Consumption using the Internet of Things

Mr. Kurakula Madhukar, T. Sharan Kumar, K. Paul Hemanth, P. Suvarshitha, Y. Vamshi Kishore,

Dr. Madhavi Tatineni (HOD), Mr.k. Madhukar (Guide),

Department of Electrical, Electronics and Communication Engineering,

GITAM (Deemed to Be University) University, Rudraram, Hyderabad, 502329, India.

Abstract

Regardless of a possible rise in consumer expectations, research has also shown that the majority of consumers today still place value, product, and convenience in their purchasing decisions. They want to be sure that they found the right product at the right price and that it hasn't. We want to create a better store experience for hypermarket buyers with augmented reality. The design solution to find products, know their availability and the payment experience with a perfect combination of digital technology. Conventional stores have stacked aisles on either side of products with little or no information about the products. This makes shopping a slower and more confusing task. In such cases, customers must be satisfied with all the products available on the shelf. Does not give the customer the opportunity to choose between new and unknown products. The use of augmented reality in this context will improve Customer Experience Augmented Reality can be implemented anywhere with minor environmental improvements. If a supermarket identifier must be used for the location, these identifiers can be any picture. The customer can use their own device Smartphone to take advantage of this experience by simply installing an application on your phone. This app guides the customer through the store with extended notes next to each aisle. When the customer selects a line, the product location is displayed on the phone screen. When the product is pointed towards the camera, the customer can get all the information about the product.

Keywords: Raspberry pi processor, Temperature sensor, BP, Spo2 sensor, Glucometer.

1. Introduction

1.1 What is Augmented Reality(AR)?

Augmented Reality (AR) is an interactive real-world experience in which objects located in the real world are augmented with computer-generated perceptual information, sometimes through multiple sensory methods including visual, auditory, haptic, somatosensory, and olfactory. AR can be defined as a system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects. Augmented reality differs from virtual reality (VR) in the sense that in AR part of the surrounding environment is actually 'real' and just adding layers of virtual objects to the real environment.

1.2 Algorithms Used in AR

A key measure for AR systems is the integration of various pieces into the real world. The software must derive real coordinates independently of the camera and the camera images. This process is known as image registration and it uses various methods of image processing mainly related to video tracking. Many computer vision methods of augmented reality are inherited from visual odometry. An augogram is a computer generated image that is used to create AR. Augography is the science and software practice of making augograms for AR. In augmented reality, the distinction is made between two distinct modes of tracking, known as marker and markerless. Markers are visual cues which trigger the display of the virtual information. A piece of paper with some distinct geometries can be used. o enable rapid development of augmented reality applications, some software development kits(SDKs) have emerged.

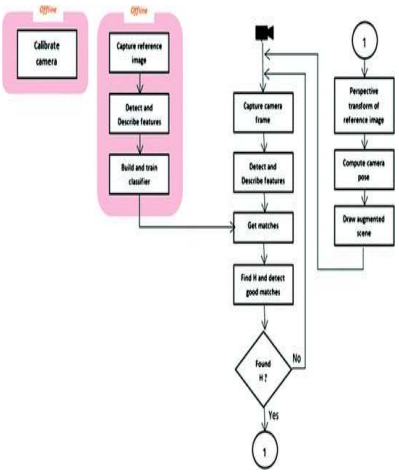

Fig: Flowchart depicting the process of augmented reality

1.3 Applications of Augmented Reality

Augmented Reality has been studied for many uses, from games and entertainment to medicine, education, and business. The exemplary application areas described below include archeology, architecture, commerce, and education. Some of the provided examples given include augmented reality. It is also used to aid surgery by providing virtual overlays as a guide for doctors. Professionals, on AR content for astronomy and welding.

Fig: **Various applications of AR**

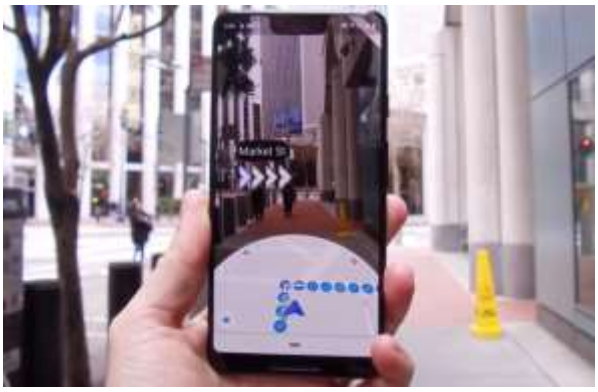

Fig: 2Visual Navigation Using AR

2. Advantages of the proposed System

- Customers feel easy to find the product with reasonable price.
- Enhances the shopping experience, and consumers can know more information about the product they're going to buy.
- More contact-free interactive system with the consumers and less burden on the market staff which is hampered by unnecessary inconveniences caused by the customer.
- The payment can be done hands-free without any cash involved

3. Implementation:

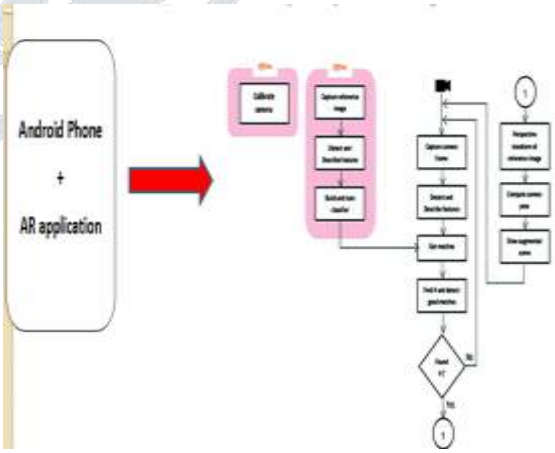

Fig:Block diagram for proposed systems

- This system consists of AR application running on Android, which uses a camera interface to interact with real life objects.
- The app is developed using Unity platform.
- User interface is enhanced by the application.

4. Software Tools Used:

The software tools used for this mobile application are:

a) Unity 3D
b) Vuforia Engine
c) Android Studio

a. Unity 3D:

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Inc.'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. The engine can be used to create three-dimensional, two-dimensional, virtual reality, and augmented reality games, as well as simulations and other experiences. Several major versions of Unity have been released since its launch. The latest stable version, 2020.2.2, was released in January 2021.

Unity gives users the ability to create games and experiences in both 2D and 3D, and the engine offers a primary scripting API in C#, for both the Unity editor in the form of plugins, and games themselves, as well as drag and drop functionality. Prior to C# being the primary programming language used for the engine, it previously supported Boo, which was removed with the release of Unity 5, and a version of JavaScript called UnityScript, which was deprecated in August 2017, after the release of Unity 2017.1, in favor of C#.

It is a cross-platform engine. The Unity editor is supported on Windows, macOS, and the Linux platform, while the engine itself currently supports building games for more than 25 different platforms, including mobile, desktop, consoles, and virtual reality. Platforms include iOS, Android, Tizen, Windows, Universal Windows Platform, Mac, Linux, WebGL, PlayStation 4, PlayStation Vita, Xbox One, 3DS, Oculus Rift Etc.

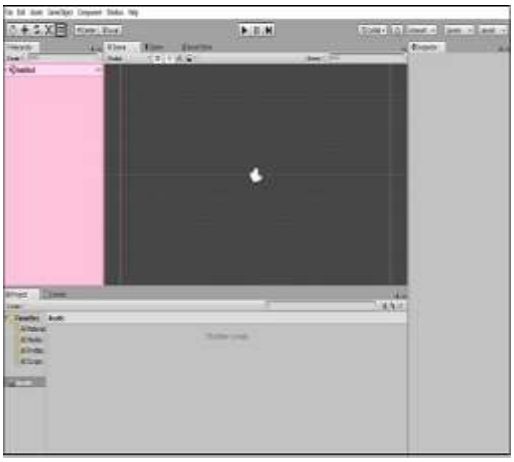

Fig: UI of unity pro 3D

b.Vuforia Engine:

Vuforia is an augmented reality software development kit (SDK) 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. This image registration capability enables developers to position and orient virtual objects, such as 3D models and other media, in relation to real world objects when they are viewed through the camera of a mobile device. The virtual object then tracks the position and orientation of the image in real-time so that the viewer's perspective on the object corresponds with the perspective on the target. It thus appears that the virtual object is a part of the real-world scene.

Vuforia provides Application Programming Interfaces (API) in C++, Java, Objective-C++, and the .NET languages through an extension to the Unity game engine. In this way, the SDK supports both native development for iOS, Android, and UWP while it also enables the development of AR applications in Unity that are easily portable to both platforms.

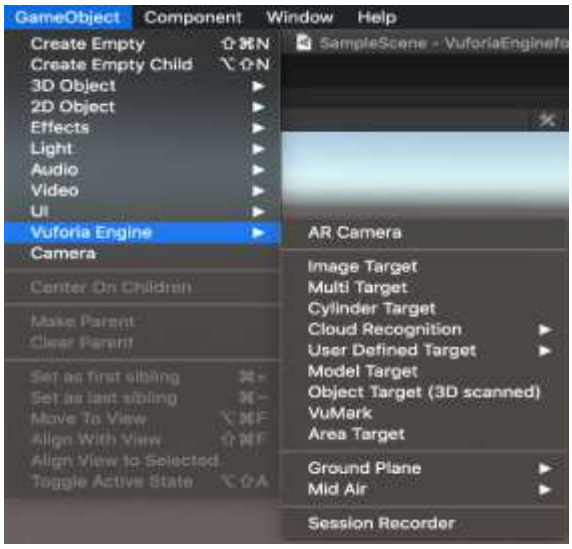

Fig: UI of Vufoira Engine

c. Android studio:

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, which is based on the JetBrains IntelliJ IDEA software and was specially developed for Android development.It will be available for download on Windows, MacOS and Linux-based operating systems or as a subscription-based service in 2020.It is a replacement for the Android Eclipse Development Tools (E-ADT) as the primary IDE for developing native Android apps.Some of its featurea include:

- Gradle-based build support
- Android-specific refactoring and quick fixes
- Lint tools to catch performance, usability, version compatibility and other problems
- ProGuard integration and app-signing capabilities
- Template-based wizards to create common Android designs and components
- Support for building Android Wear apps.
- Built-in support for Google Cloud Platform.
- Android Virtual Device (Emulator) to run and debug apps in the Android studio.

4. CONCLUSION:

An innovative IoT decision support system is introduced and its components and general functions are described. Field test implementations have demonstrated the technological readiness of this approach to help customers on the sales floor. A personal rating that depends on the stated individual preferences. For future project extensions, manual information acquisition and evaluation processes. It needs to be automated to provide a working system in terms of operating costs. A new paradigm of IoT that aims to empower customers to act according to their needs and enable more sustainable consumption.

5. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

REFERENCES

[1] J. Klinglmayr, B. Bergmair, and E. Pournaras, “Sustainable Consumerism via Self-Regulation,” Proc. 2nd Int’l. Wksp. Data-Driven Self-regulating Systems, 2016.

[2] J. Klinglmayr et al., “Sustainable Consumerism via Context-Aware Shopping,” Int’l J. Distributed Systems and Technologies, vol. 8, no. 4, 2017, pp. 54–72.

[3] ASSET Project Homepage, Oct. 2019; https://www.asset-consumerism.eu/

[4] K. P. Subbu et al., “Analysis and Status Quo of SmartPhone-Based Indoor Localization Systems,” IEEE Wireless Commun., vol. 21, no. 4, Aug., 2014, pp. 106–112.

[5]J. Liu et al., “A Hybrid Smartphone Indoor Positioning Solution for Mobile LBS,” Sensors, vol. 12, no. 12, pp. 17 208–17 233, 2012; https://www.mdpi. com/1424-8220/12/12/17208

[6] A. Abadleh et al., “Ilps: Indoor Localization Using Physical Maps and Smartphone Sensors,” Proc. IEEE Int’l. Symp. on a World of Wireless, Mobile and Multimedia Networks 2014, June 2014, pp. 1–6.

[7] Z. Chen et al., “Indoor Localization Using Smartphone Sensors and iBeacons,” 2015 IEEE

10th Conf. Industrial Electronics and Applications, June 2015, pp. 1723–28.

[8] J. Li, M. Guo, and S. Li, "An Indoor Localization System by Fusing Smartphone Inertial Sensors and Bluetooth Low Energy Beacons," 2017 2nd Int'l. Conf. Frontiers of Sensors Technologies (ICFST), April 2017, pp. 317–21.

[9] G. D. Forney, "The Viterbi Algorithm," Proc. IEEE, vol. 61, no. 3, Mar. 1973, pp. 268–78.