

## The Reality Of Interactive World

Burhanuddin Harianawala<sup>1</sup>, Saifuddin Harianawala<sup>2</sup>, Junaid Khalfay<sup>3</sup>

<sup>1</sup>(Master of Computer Application, Navinchandra Mehta Institute of Technology and Development, Dadar(W)/Mumbai University, India)

<sup>2</sup>(Master of Computer Application, Navinchandra Mehta Institute of Technology and Development, Dadar(W)/Mumbai University, India)

<sup>3</sup>(Master of Computer Application, Navinchandra Mehta Institute of Technology and Development, Dadar(W)/Mumbai University, India)

---

**Abstract:** Augmented reality (AR) has good potential in making the learning process more active, effective and meaningful. AR enables users to interact with virtual and real-time applications and brings the natural experiences to the user. The application of AR have lot of recognition in a number of fields of learning like Medicine, Chemistry, Mathematics, Physics, Geography, Biology, Astronomy and History. AR technologies have a positive potential and advantages that can be adapted in education and there are certain limitations of AR which could be addressed in future research.

---

### I. Introduction

AR is a technology that superimposes a computer generated image on a user's view of the real world, thus providing a composite view. The term was coined back in 1990 by Professor Tom Caudell. AR brings an interactive experience of a real world environment where the objects that reside in real-world are "augmented" by computer generated perceptuals.

AR is used in some of the applications used below

#### **IKEA APP**

The Ikea Place App is an application that allows you to scan your room and design the space by placing IKEA objects. The app was built using Apple's ARKit Technology.

#### **HUD [Head-Up Display]**

It is an example of AR when it comes to military applications. HUD is a transparent display which is positioned directly in the fighter pilot's view.

#### **POKEMON GO**

It is an application that shows Pokémon's that are augmented objects into a real environment. Augmented Reality also supports the seamless interaction between the real and virtual environment and allows a tangible interface metaphor to be used for object manipulation (Singhalet al, 2012)

According to the oxford dictionary the word "Augmented" and "Reality" have two different meanings. Augmented means "increased in number" and reality means "The state of being actual or real". When both words Augmented Reality are combined together they create an innovative technology and a world of Augmented Reality where the augmented objects appear in the real environment and it appears in such a way that we feel as if it is an interactive environment. AR provides an efficient way to represent models that need visualization.

### II. Literature Review:

#### **QR Code**

A readable array of black and white squares mostly consisting of some information of any specific product or URLs which is read by smartphone camera is what QR Code is about. Typically a QR code contains the information about the item it is related to. QR means Quick Response which implies to instant access to the hidden information present in the code.

#### **How to create a QR code?**

Creating a QR code is easy. First it is required to find a website which generates QR Codes. Then choose the type of QR code and enter the appropriate data and then download in any image format required.

#### **How to scan a QR code?**

Now-a-days many smartphones have scanner application built in. One has to put the desired QR code in the box to get scan. After getting scanned, appropriate action/s will be performed.



**Image 1:** Mobile application scanning a QR code

[<https://www.iphonelife.com/content/how-to-scan-qr-codes-iphone-best-free-qr-code-reader-apps>]

## **Markers**

Markers are simplified QR Codes. We define specific Objects, Texts, Scenes (called as Models) for specific markers, so when the camera recognizes the Marker, the application shows specified Model on top of the marker.

### **1. Pattern Markers**

The best feature of ar.js is the possibility of using custom made markers. Most of the AR.js demos use the Hiro/Kanji marker. People can personalize the marker, for example, they may want to use their logo. The custom made marker should be square in shape and of 16x16 Pixels in resolution. They cannot have any colors except for black or light grey. They should contain one letter, a symbol or a number. One can use the following link to generate their own custom marker.



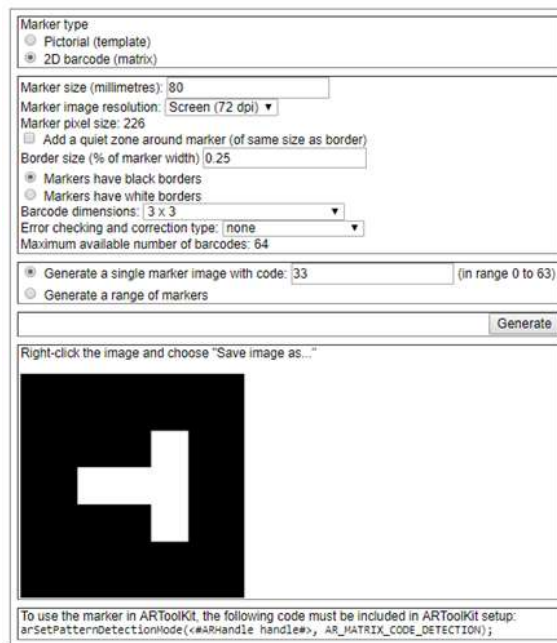
**Image 2:** Generating marker using the below website

[<https://jeromeetienne.github.io/AR.js/three.js/examples/marker-training/examples/generator.html>]

The result is a .patt file as output which one has to specify as the source of the marker. The custom made marker should have high contrast else the camera will have difficulties on recognizing the marker.

### **2. Barcode Markers**

One can also use barcode as markers. These markers represent a number as a symbol, created with calculus on a matrix. One can use the following link to generate Barcode marker.



**Image 3:** Generating Barcode marker using the below website  
 [http://au.gmented.com/app/marker/marker.php]

**Related Research:**

Many applications based on Augmented Reality are now popular in market in the field for education. Augmented reality can serve a number of purposes. It helps the students easily acquire, process, and remember the information if AR is used for educational process.

It is also not limited to a single age group or level of education, and can be used equally well in all levels of schooling; from pre-school education up to college, or even at work.

- Some professors in the US have had taught Anatomy in classroom using an AR application. It makes studying both interactive and interesting for students.



**Image 4:** Learning Anatomy using AR Applications

[https://easternpeak.com/blog/augmented-reality-in-education-the-hottest-edtech-trend-2018-and-how-to-apply-it-to-your-business]

- A language learning application known as modly has integrated AR based Virtual teacher to help users interact and set a real life scenario. This boosts up distance learning for many.



Image 5: Interface of Modly Application

[<https://easternpeak.com/blog/augmented-reality-in-education-the-hottest-edtech-trend-2018-and-how-to-apply-it-to-your-business>]

- The Community College of Beaver County, Pennsylvania uses augmented reality to provide lecture notes in the form of video & audio. This makes students more engaged.

Also seeing such improvements in Augmented Reality, companies like Apple and Google are pushing and providing AR technologies forward. Many developer tools like ARCore and ARKit are available for building most enhanced AR based Educational Applications.

ARCore



ARKit

Image 6: ARCore by Google v/s ARKit by Apple

[<https://medium.com/@knapenkjell/arcore-vs-arkit-ee0780c33b69>]

### Application Areas:

The goal of real application lies in identifying the potential use of AR in different fields of education. The AR technologies implementation began to emerge in 2007. One research represented different fields in which AR has been used in a range of areas. The research highlighted the purpose and the features of the AR technology that had been used. The search of the literature was conducted using EditLib which is the digital library for Education and Information Technology.

Meta-analysis of research on the use of AR in different fields of education

Author/s	Field	Purpose of AR	AR Features used
Chang et al. (2011)	Surgical Training	To provide training and to plan and guide surgical procedures	AR image guided therapy
Yeom (2011)	Anatomy	To teach and test anatomy knowledge	Interactive 3D anatomy pictures
Cerqueira&Kirner (2012)	Mathematics	To teach geometry	Head mount display and personal interaction panel
Mathison& Gabriel (2012)	Biology	To teach food chain	AR experience
Coffin et al. (2008)	Physics	To teach physics concepts like speed, velocity, acceleration, etc.	AR Video and tracked physical props (ex. toy car)
Martin et al. (2011)	History	To gather information and enhance the experience of visitors to museums and archaeological sites	Mobile AR Educational games

Lewis Smith Jr.	Games (Treasure Hunt)	Encourage people to get active while discovering AR/QR Codes	AR Markers or QR Codes
-----------------	-----------------------	--	------------------------

### III. Research Design

#### About precisAR

PrecisAR is a web-app created using ar.js and html for precision learning of any topic. It uses webcam of cellphone to detect the AR Markers and produce respective content on top of the marker.

#### Activity Diagram

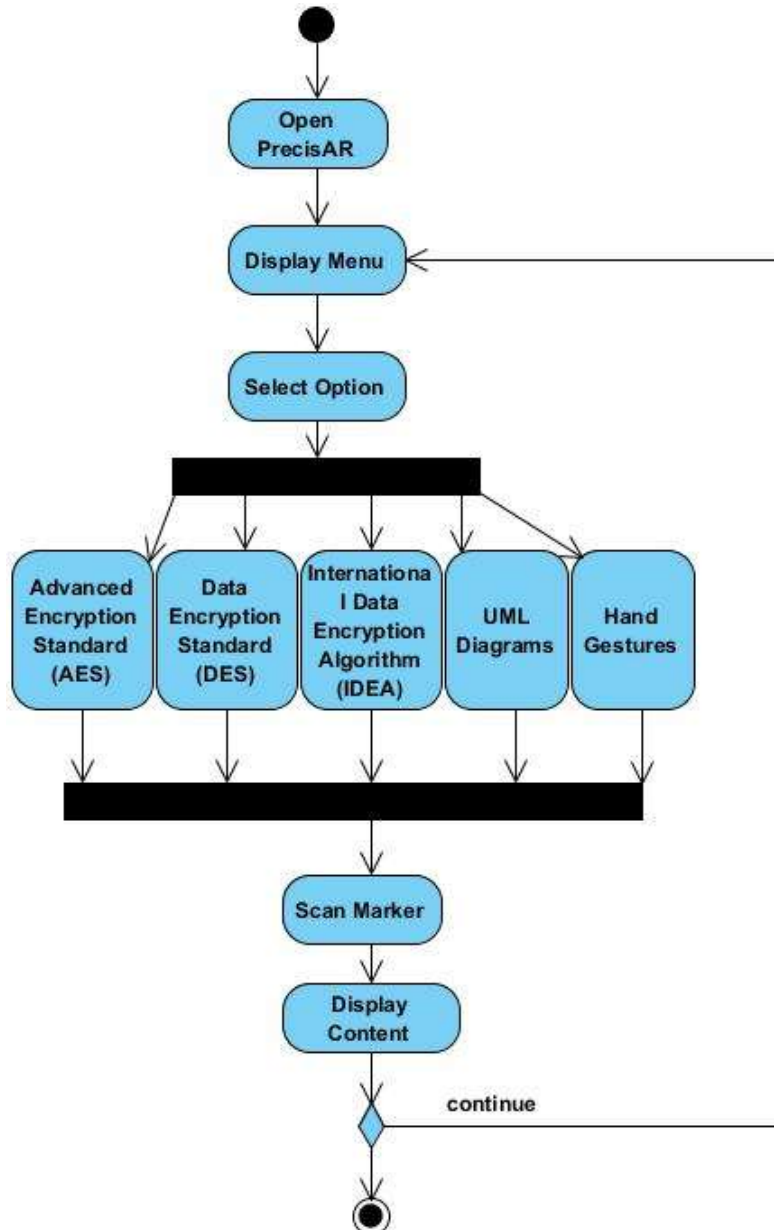


Figure 1: Activity diagram of precisAR

As shown in figure 1, on opening precisAR a menu will be displayed consisting of some options to choose. Then on selection of any one option a marker is required to be scanned to see the output. And then the display menu will be displayed again to use other options provided.

#### AR using Markers

Concept of AR comes up with two types of modes of tracking known as marker and marker less. Marker in AR is known as fiducial marker. Fiducial marker is an object that can be placed in a scene to provide



a fixed point of reference of position or scale. Markers provide interface between physical world and Augmented Reality concepts [1].

**AR using Hand Gestures**

Hand gestures are to interact with devices and to have more potential than traditional methods, such as keyboards, controllers and computer mice. Hand gesture recognition in an AR display can provide same interaction possibilities as a smartphone touchscreen [2][3].

**Implementation**

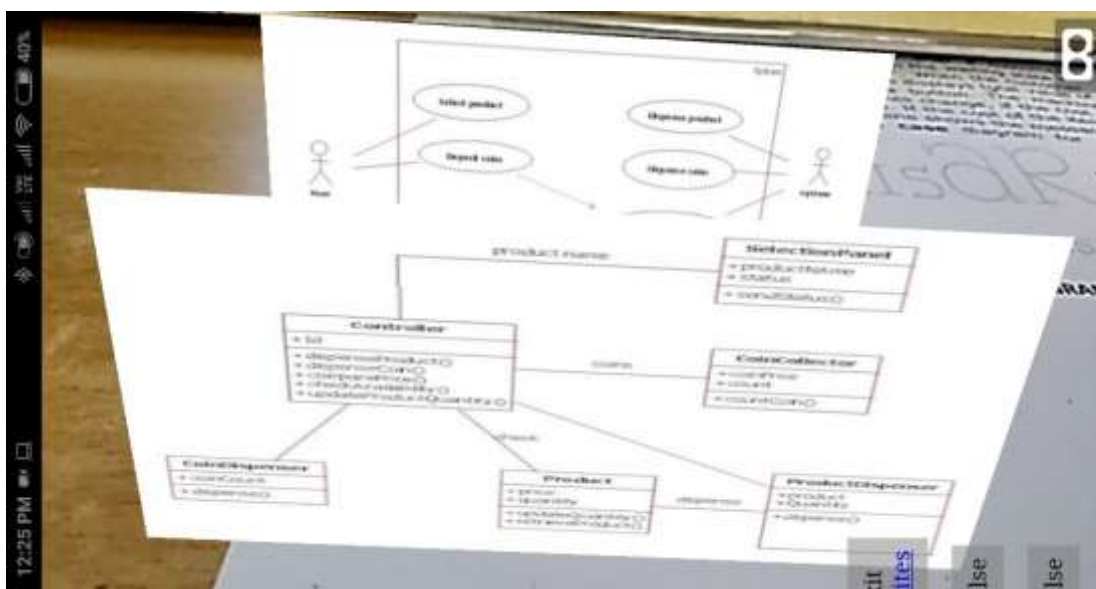
About Ar.js file

Ar.js is an efficient AR solution of web. It runs 100% on web browser without installation of any external application. Runs on all platforms android, ios and windows. AR.js is open source and consists of few lines of html code. A camera moves according to marker position defined in coding. The html coding includes a marker-camera which has a preset attribute where one can specify the name of marker being used that is either Hiroor Kanji [4].

**Output screenshots**



**Image 7:** Output on scanning marker which consist of IDEA Algorithm



**Image 8:** Output on scanning marker which consist of UML Diagrams

#### **IV. Future Enhancement**

AR technology has much more to offer to the industry than just the entertainment. It will be very helpful for Healthcare Industry as well as travel Industry. Travel industry believes that AR is the future of tourism.

Augmented Reality are useful in many sector like in sectors of medicine (direct training of students), military (precise location of enemy positions), fine art (mixed media and interactive artworks), industry (assistance in prototyping) and teaching (visualizing learning material in interactive apps) [5].

#### **V. Conclusion**

AR technology has the potential to be further developed in all the industries. This is because the advantages and beneficial uses of AR features are able to engage industries in learning processes and help improve their development skills.

#### **References**

- [1]. <https://www.kudan.eu/tag/augmented-reality/>
- [2]. <http://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1263215&dsid=889>
- [3]. FULLTEXT02.pdf
- [4]. <https://aframe.io/blog/arjs/>
- [5]. <http://www.tekshapers.com/blog/Future-of-Augmented-Reality>