iCan: Psychological Look in Future using Augmented Reality Technology

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Abstract

Looking to the future is always something people are interested in from the old days. What people can do using their current ability is ambiguous but this can be achieved psychologically. In this study, a systematic Augmented Reality (AR) system named iCan has been proposed to reveal the ability of what we can do and which way we should choose when facing any junction of choices. iCan has been developed in four steps including basic AR development implementation, building 3D-Models, making the best interaction UX(User-Experience) and test-debug-publish. In the first step, booklet pages have been chosen for AR development instruction, next, 3D models have made and have been presented. Next, interaction methods are under development. The system has been tested by some individuals and the results show the robustness of the presented system which there is a hope to change the future of people in near future.

1. Introduction

Are people able to know what is the best decision for their future? Many psychologists suspect that we do not make choices that maximize our happiness. The vast popular literature on self-improvement is based on the belief that we aren't getting everything we could out of life, and is replete with recipes to increase happiness. Recent findings from behavioural-decision research provide evidence that people are not always able to choose what yields the greatest happiness or best experience. People fail to choose optimally, either because they fail to predict accurately which option in the available choice set will generate the best experience or because they fail to base their choice on their prediction, or both (Hsee and Hastie, 2006). Now, iCan tried to reveal their decision's result after a short process.

Augmented Reality (AR) is an investable technology that could be able to augment virtual 3D-objects to real environments. The user sees the real environment by way of video cameras attached to the helmet; image processing techniques are used to produce natural occlusion of the virtual entities by real entities (through the cameras), or vice versa. Although effecting natural occlusion remains a major challenge, achieving positional stability of the virtual entities with respect to the real environment is even more difficult, because spatial inaccuracy, noise, and temporal lag of the head tracking all result in imperfect registration and relative movement of the virtual imagery with respect to the objects in the real environment (LOOMIS and BLASCOVICH, 1999). In recent years, mobile phones are integrated and improved in XR technology and lead people to have various virtual experiments easy and cheap.

One of the most shining features of this technology is a limitless screen. All spaces around the world are your screen and with AR technology, there is an unlimited screen to show 3D-objects. Moreover, there are several kinds of AR devices as lightweight glasses which could present all AR technology abilities easily. Generally, there are 4 types of AR devices until today, there are Heads up displays (a)(HUD) (Kim and Hyundai, 2017), Holographics displays(b) (Pedersen, et al., 2017), Smart Glasses(c) (Syberfeldt, et al., 2017), and Handheld(d) (Goh, et al., 2017) (Figure 1).

| (a) | (b) | (c) | (d) |

Figure 1: Samples of Augmented Reality in different applications

Another benefit of AR technology is that it doesn't require dedicated hardware and can utilize phones, tablets, and computers. Day by day mobile phones become more and more powerful, the day will come very soon when all AR supported devices will coexist together. There are some AR leader devices like the Microsoft HoloLens series, Magic Leap One, Epson Moverio, Google Glass series, Vuzix Blade AR and more that will change the world. The question is how much this technology could impact the human mind and make a better result in psychological science. There is a diagram that has made as a concept in the beginning (Figure 2). As we can see, it is 4 essential steps to reach the goal and get a version to publish for any kind of platform. Step one is about AR implementation, next step is all about all 3D-Models that it need to be, next one is one of the most important parts of the project that is interaction methods and finally, it needs to be under testing and debugging as any kind of technical project to get ready for the most of available devices all around the world.
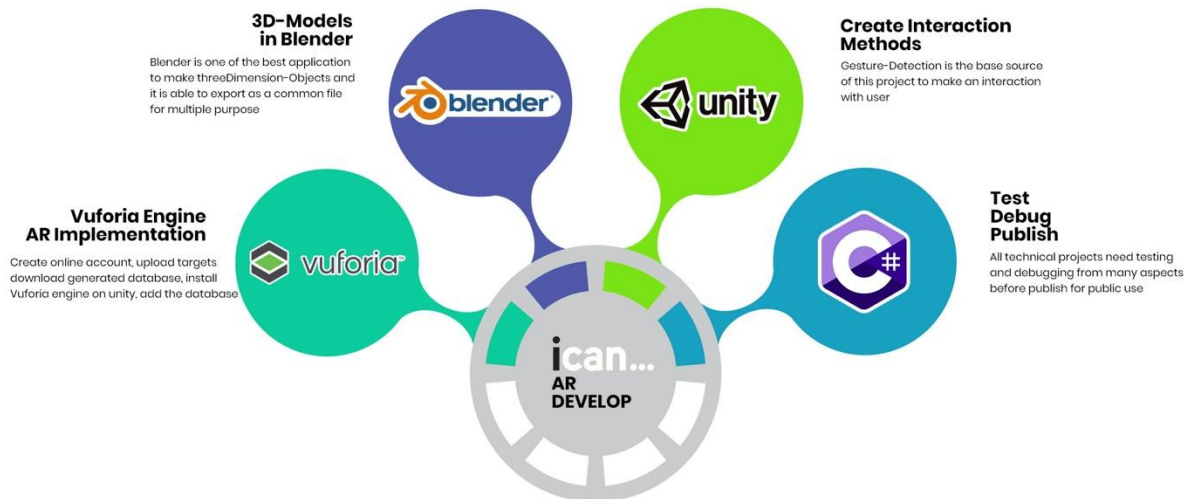
Figure 2 iCan's Activity Diagram

2. Previous Work

Augmented Reality is a technology that could able to add virtual objects into a real scene through a camera. Image processing is the core of this technology and the result will be shown on the screen of mobile phones or specific devices. It has classified into two major categories, location-based AR and vision-based AR. In the location-based category, we need to use an extra component like GPS to determine our target location anywhere on the planet and the vision-based only needs frames from a camera to process. (Kolivand, et al., 2018). To have an experience of AR Technology, an available camera on a smartphone is required. The camera records frames of a real scene and the program put virtual objects on real objects in every frame (Yuan, et al., 2005). The AR Technology is using in the tourism industry(Genç, 2018), hospitality industry(Nayyar, et al., 2018), construction safety(Li, et al., 2018), education(Alakärppä, et al., 2017) (Sural, 2018) urban industry(Piroozfar, et al., 2021), advertising (Chowdhary, et al., 2017), games(Von Itzstein, et al.,2019) and it grows day by day. Nowadays The AR Technology can process details of 3D-objects and even the object's shadow. Kolivand, et al., (2018) made a technology to build realistic shadows for any virtual object in custom and flexible time and date. All of these works have been done to make more details and keep it closer to reality. Details are matter and it could affect human sight and leads psychologists and psychoanalysts to make a better connection to their patients. In this paper, we try to test and describe this effect on this subject.

Juan, et al., (2005) used augmented reality to treat phobias. The system is useful for treating several psychological problems, including phobias such as fear of flying, agoraphobia, claustrophobia, and phobia of insects and small animals. AR and VR share some advantages over traditional treatments, as Table 1 shows. However, AR gives a greater feeling of presence (the sensation of being there) and reality judgment (judging an experience as real) than VR because the environment and the elements the patient uses to interact with the application are real. Results from the treatment showed an important change in the avoidance of spiders/cockroaches. Before the treatment, none of the patients was able to

approach real spiders/cockroaches. After the treatment, all of them were able to kill several real, live spiders/cockroaches. The positive results of this prototype suggest AR's potential in psychology. The study's main shortcoming is the small sample size. We need to apply this treatment to larger samples in a group design that includes a control group. AR applications can also be useful as a therapeutic tool for several other psychological disorders. And also Bouchard, et al., (2006) used VR to treat arachnophobia and another example is Botella, et al., (2010) treated cockroach phobia with augmented reality.

"I believe that visualization is one of the most powerful means of achieving personal goals."
Harvey Mackay

3. **Method**

iCan tries to develop a healthy mindset and change the way we think, our mindset can change our life. iCan will help us to create a vision for the future and take the first steps towards this. Learn from role models, learn from experience and develop a habit are basic steps of this technique which helps us to change our life. We attach augmented reality to get a better result and more creativity.

The system is developed in Unity platform and programed in C# language, Visual Studio as a development environment, Vuforia engine 9.7 incorporate Augmented-Reality (AR) options and uses Blender 2.91 for 3D-Models.
The virtual elements are the objects that can help users (or patient) to see targets in front of them instead of imagination (or 2D pictures) to answer some questions better than the past. The 3D-Objects transmit the feeling of each page to users and even users can have interactions and play with elements.

Firstly, it needs to introduce image targets (pages) to the Vuforia cloud system and make a database for the project and it imports to the Unity platform. Every single page gets a detection rate (1 to 5 stars). Although one star doesn't mean unavailability to detect, 5 stars mean faster detection of the target page or a picture. Next, the database generates and downloadable to be included in Vuforia SDK on Unity platform. After that, it needs 3D-Objects based on the aim and the subject of each page. All objects are created in Blender as .fbx files which could be usable in Unity and AR technology. There is a summarized UML diagram of the technical side of the project which is shown a summary roadmap of functionality and life-cycle of the application (Figure 3).

In Unity, one of the best methods to build animations is using C# language, it will be smoother and faster. Objects, animations, interactions and reactions can be under the control of Script files (.cs files). To make objects more realistic and natural on real environments, it needs Light-Control and Shadow. Shadows are one the most important part of objects that can make them acceptable and sensible, and light is set on automatics detection for a better result in AR projects.
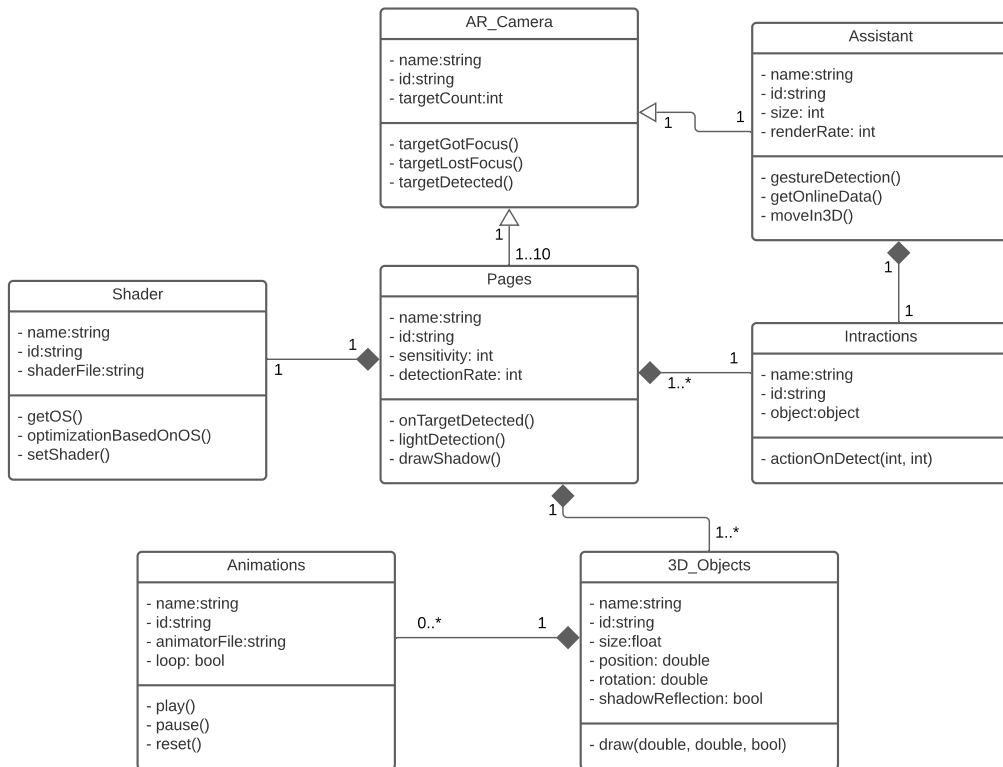
AR_Camera
- name:string
- id:string
- targetCount:int

- targetGotFocus()
- targetLostFocus()
- targetDetected()

Assistant
- name:string
- id:string
- size: int
- renderRate: int

- gestureDetection()
- getOnlineData()
- moveIn3D()

Shader
- name:string
- id:string
- shaderFile:string

- getOS()
- optimizationBasedOnOS()
- setShader()

Pages
- name:string
- id:string
- sensitivity: int
- detectionRate: int

- onTargetDetected()
- lightDetection()
- drawShadow()

Intractions
- name:string
- id:string
- object:object

- actionOnDetect(int, int)

Animations
- name:string
- id:string
- animatorFile:string
- loop: bool

- play()
- pause()
- reset()

3D_Objects
- name:string
- id:string
- size:float
- position: double
- rotation: double
- shadowReflection: bool

- draw(double, double, bool)

Figure 3 iCan's Basic UML diagram

Interaction with the user is important as well, this project uses Virtual-Buttons technology by Vuforia to give control to users and make the best UX (user experience). Moreover, there is a virtual assistant in the project which can guide user step-by-step during the process.

Unity is able to export for a multi-operation system like Windows, Mac, Linux, iOS, Android, AR Devices, ... with the same source, the only change to make is several setting for specific OS. We believe the next generation of devices is wearing stuff and development will be on them as well. This project has exported for Android and iOS till now

"*Looking to the future, the next big step will be for the very concept of the 'device' to fade away*" — Sundar Pichai

4. Results and Discussion

Figure 4 shows pictures of some pages of the iCan MagicBook based on psychological studies to involve a user with the subject more than past. The app includes features like rendering based on distance and wind simulator (A) (F), the user is able to feel freshness and nature as a sign of a new healthy and productive way, script animations with Mesh 3D Text (B) will transmit the message of the idea of the booklet, native and colourful 3D-Objects (C) could bring out a general road map, attached animations with animator and play in order (D) (E) could be a sign of order and arrangement and information about steps in a life, Virtual Button for direct interaction and even complex Visual Effects (H) will involve the user to be more than a viewer and let the users change options and result. Moreover, every

single page has an extra layer for shadow which has an optimizing performance based on the device hardware that could help to create realistic objects (J). And finally, every page has a specific setting and it's completely customizable singularly (I).
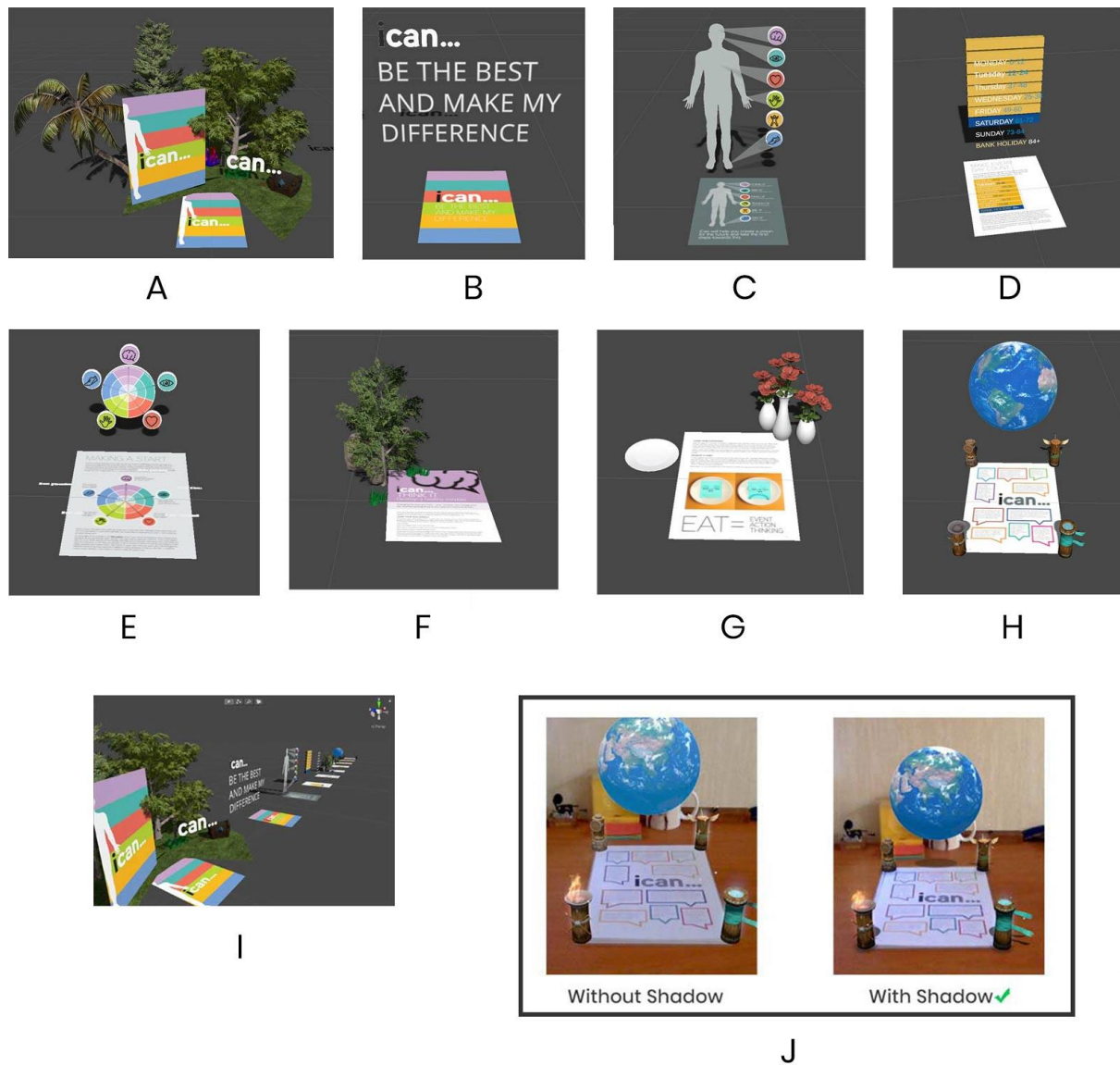

A   B   C   D

E   F   G   H

I

J

Figure 4 Final result

5. Conclusion

As an overall, Augmented Reality technology could help us in any kind of science, in this project we try to use AR in psychology and we believe in wide AR's potential in future. This Magic Book app can make a better connection between the psychologist and people (or patient). Concerning details, animation and realistic 3D-Objects reveal the best user experience and attention. This project uses Unity platform with Vuforia Engine, Blender for 3D-Objects and export for Android and iOS operating system and helps people to make the best decision for their future as we expect.

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