Bringing the Virtual World to the Real World; Use of Augmented Reality (AR) to Enhance the Learning Experience.

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Abstract

Augmented Reality (AR) has been around for close to thirty years. However it is only in the last decade that it has really become accessible to those outside of major technological industries. The work originally undertaken by research based companies like Autonomy, based at Cambridge University in the UK, have gone a long way to enable the casual user to be able to adapt and engage with AR technology - despite the complexities involved in the programming necessary to make it actually work.

The work presented here looks at exactly how AR can be implemented in the pursuit of enhancing the learning experience. It considers the usability of commercially available packages and presents some of the advantages of using such an approach to AR alongside the respective limitations. It goes on to look at the greater complexities of using 'studio' based AR Software with the necessity of specific channel subscription in order to facilitate its use.

Introduction

Undergraduate Students at Edge Hill University have been taught using Augmented Reality as a means of enhancing their learning experience for a number of years. Initial work on this concept, started around four years ago on the Secondary Undergraduate BSc(Hons) Design and Technology with QTS course. At the time, work was undertaken primarily using a freely available software package and studio from a company called Aurasma™. The company, originally the brain child of a group of academics in 1996, grew into something much bigger and in 2011 it was bought by the leading computing firm Hewlitt Packard (HP). Since then, a few other companies have come along emulating this style of AR but Aurasma is often seen as being a leader in this field.

In recent years, there has been a shift change into less complex, more commercially available packages that have limited (or no) customisation. These tend to be packages that have, in the authors experience, more reliability.

First Reported Success using AR in the teaching of Undergraduate Students at Edge Hill University (Bell 2013).

How it works in Practice

Using a 'studio' based piece of AR software is relatively simple, however it requires a user to generate an account, hosted online by the software supplier. End users are then required to use the same software and subscribe to the same 'channel' within the account for the originator of the AR imagery. This is essential so that the right AR content is displayed when an end user tries at access it. Problems occur when end users sign up to more than one channel, from different AR accounts – and one (or more) use the same trigger image. To combat this, the precise image (or exact GPS location) is used, so making it necessary to get the right angle and orientation of the device used to read the trigger. Despite the nuances of this method, it is relatively simple to use; (i) Down load Software, (ii) Determine Trigger, (iii) Record or Obtain Video or Audio Item to link to trigger, (iv) Link Video or Audio Item to link to trigger, (v) Upload Video or Audio Item to your own "channel", (vi) Share with end users. This is the method used with undergraduate students, as they can be easily directed to the content and they essentially form a closed group of end users.

Example of Work Undertaken

One application of this technology has been in the safe instruction for the use of an HPC Laser Cutting Machine. If students scan the actual machine with a software enabled reading device, an AR version of the tutor will appear and talk through the safety features of the machine. The image left shows this in action. However, it is important to recognise that if the machine is moved, changed or altered, then the original image used a trigger may no longer work as.

Recent Innovations

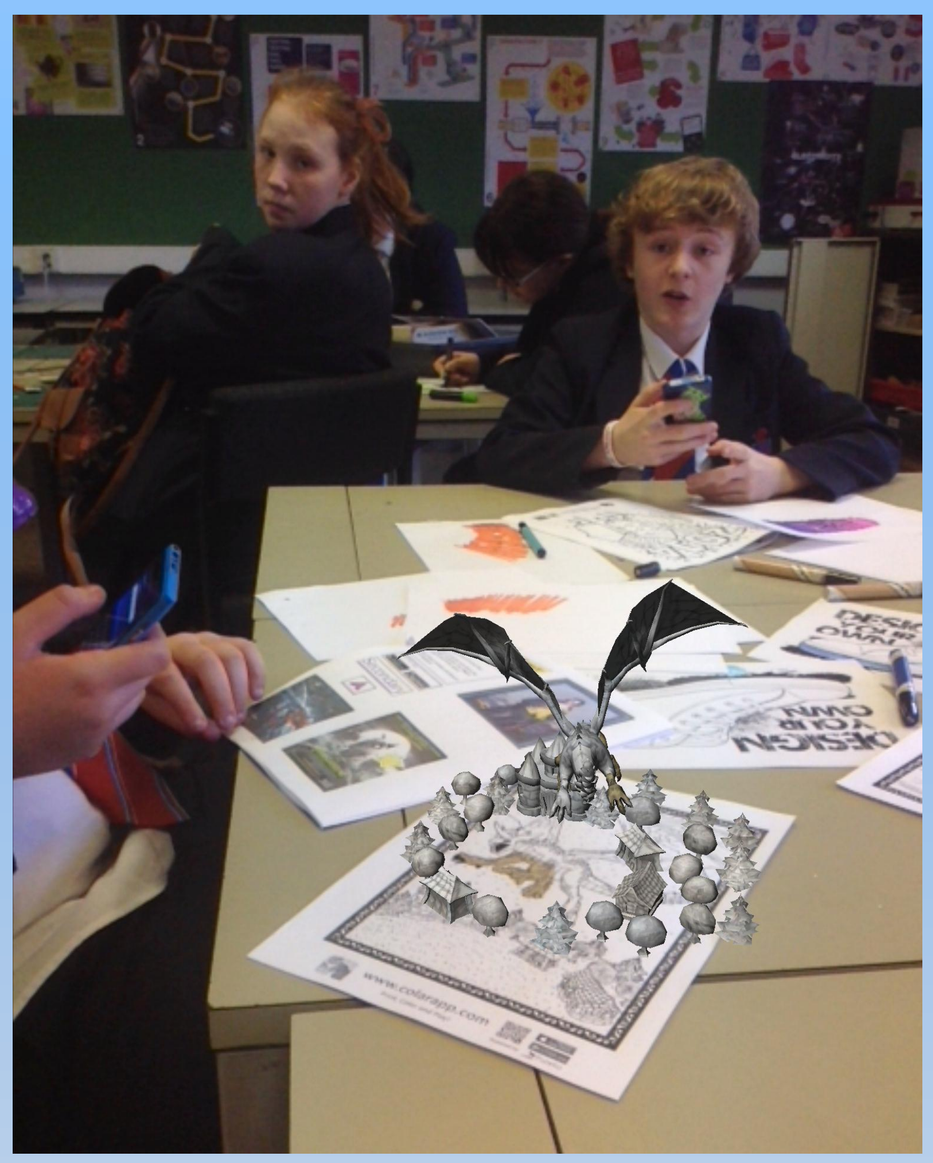
More recently, there has been a move to generate similar packages that have less flexibility, but with a similar amount of impact within the non-industrialised end user of AR technologies. Again, these require an end user to download a specific piece of software and a trigger is used to engage the AR aspect of the piece. However, these are often predefined in the software and not able to be customised, thus limiting their usefulness in academic terms – although with careful consideration and suitable application, they can still be utilised.

One example of this is student teachers using predefined examples that school pupils hand render on paper, they scan the work and their rendering is used to render the AR image. So some form of customisation is possible, however, it is considerably restricted.

The image right shows pupils on a recent STEM day at Edge Hill University being taught hand rendering skills using AR templates as a graphical medium on which to undertake their work.

The example used here (right) is from a company called Quiver (formerly known as colAR mix).

End users print hard copy black and white images that can be rendered and manipulated and scanned to produce a bespoke AR outcome. So although not as versatile as a bespoke AR channel, it can be used to great effect



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Bell, D. and Jones, R. (2013) Exploring Augmented Reality. D&T Practice: The Design and Technology Publication for the Profession (1). pp. 15-17. ISSN 1745-5448