

# Educational: 3D Design for Mobile Augmented Reality

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**Abstract.** Using Unity and the Vuforia platform in the course "3D design for Mobile Augmented reality" at The Norwegian School of IT. In the course students learned to make efficient, optimized and visually coherent content for Augmented Reality apps for mobile devices.

**Keywords:** Educational, Augmented Reality, Unity, Vuforia, 3D, IoS, Android, Mobile.

## Overview

Making 3D content for mobile augmented reality consists of many challenges including both hardware limitations and design aspects when it comes to consistent content. The 3D graphics students of NITH (The Norwegian School of Information Technology) have designed augmented reality apps that addressed these challenges in their course "3D Design for Mobile Augmented Reality." This demonstration will show hands-on student work based in augmented reality on iPad and Android tablets as well as the technical workflow used when deploying the app on a tablet.

## Background

With the increased use of smart phones and tablets, development of Augmented Reality apps in entertainment and in marketing for iPhone and Android has increased. As an example the Norwegian company Placebo Effects and Australian Labrat has created numerous AR apps for marketing. The latest product was a color game for children, created for the milk producer Tine in Norway<sup>1</sup>.

In the beginning, creating augmented reality applications required a massive setup of hardware and custom work. A pioneer project among others was the research of AHO (The Oslo School of Architecture and Design) regarding the visualization of the Margaretha Church in Maridalen, Oslo in 2005<sup>2</sup>. The project was a recreation of an old church in 3D. The ruins of the church were covered by

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<sup>1</sup> [http://www.pfx.no/web\\_ar\\_tinekuer.html](http://www.pfx.no/web_ar_tinekuer.html)

<sup>2</sup> A lecture of Professor Søren Sørensen at AHO covering different early AR projects: <http://www.ife.no/en/ife/departments/software-engineering/files/ar/ar-in-architectural-and-urban-planning.pdf>

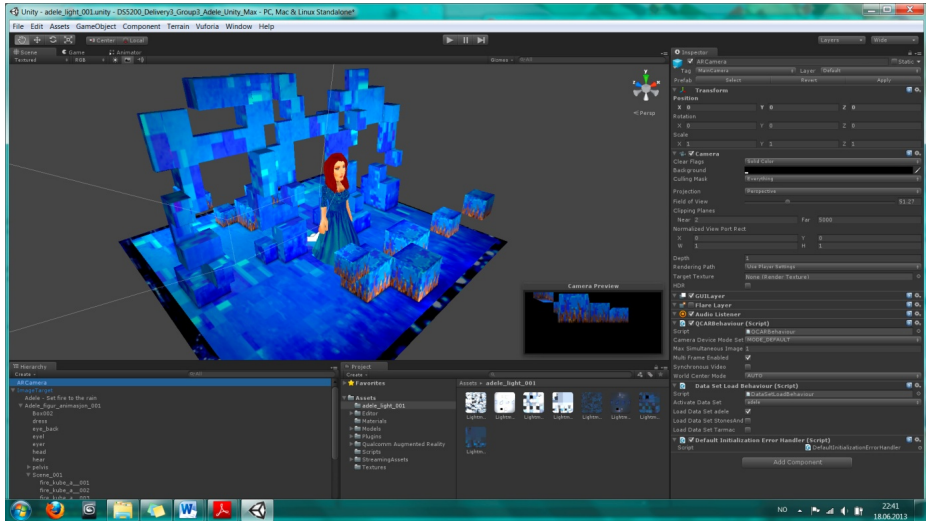


**Fig. 1.** AR markers placed on the ruin of the Margareta Church in Maridalen, Oslo, Norway

markers in order to project the 3D model in the right place. The project would be viewed from a custom made portable screen that the audience could carry around the area.

## Unity

Today with the use of the game engine Unity and the Vuforia platform, creating augmented reality content has become much easier. However, there are still challenges to consider. The hardware limitations on mobile devices allows content creators to carefully design 3D content with a limited use of geometry, textures and visual effects. One of the many advantages of Unity is that it is a game engine that has the possibility to deploy to many different platforms as iOS and Android. This, combined with the Vuforia AR platform, makes it possible to assign a virtual camera in the 3D scene that is linked to an image tracker. This combination can then be deployed to a smart phone or tablet. Finally, it is possible to utilize the camera on the device in order to mix the 3D scene with the camera image.



**Fig. 2.** Screenshot from Unity with a scene for the song "Set Fire to the Rain" by Adele, made by Helene Roberts NITH 2012

## The Course

The course "3D Design for Mobile Augmented Reality" focuses on the technical and aesthetic process of developing an augmented reality app for Android and iOS.

In the course the students worked on an assignment which was an AR app for a band or an artist. The students started by making a tracking marker as a CD cover and later designing a 3D scene with an animated figure as a cartoony version of the artist/band placed on the cover. Both the marker and the 3D scene with the figure reflected the band/artists visual style.

Creating AR markers or an image tracker that both is stable and visually coherent with the 3D content is a task in which the students must also take the visual design into account. They must create enough tracking points in the marker to create stable experience for the user while interactive with the app. The 3D design of the scene and the animated figure should both be optimized for mobile and reflect the visual style and concept of the artist/band. A 3D scene optimized for AR follows normal rules for creating games which means low-poly modeling of geometry and limited use of textures. Animating a figure would also mean a limited use of polygons and animation bones.

## The Demonstration

The demonstration will be showing examples from several student works from the augmented reality course with different markers. The complete workflow will also be demonstrated, starting with a 3D scene in Unity and deploying to multiple mobile devices (an Asus tablet for Android and an iPad for iOS).



**Fig. 3.** Augmented Reality scene on iPad for the song "Set Fire to the Rain" by Adele, made by Helene Roberts NITH 2012