

"CDICAE - Collaboration to Design an Innovative Curriculum for Animation Education - 2017-1-TR01-KA203-046117 " project carried out by Republic of Turkey Ministry of EU Affairs, Education and Youth Programs Center Presidency and Erciyes University Faculty of Fine Arts, Visual Communication Design Department within the scope of the Collaboration for Innovation and Exchange of Good Practices within the framework of Strategic Partnerships for ERASMUS+ Program KA2 Higher Education Programs.

Augmented Reality Applications Course Instructor's Guide

(O3. Augmented Reality Applications Course)

"Erasmus+ Programı kapsamında Avrupa Komisyonu tarafından desteklenmektedir. Ancak burada yer alan görüşlerden Avrupa Komisyonu ve Türkiye Ulusal Ajansı sorumlu tutulamaz."

"Funded by the Erasmus+ Program of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein."

Augmented Reality Applications Lesson Teacher Guide

Note: Week 1 will be taught according to the same schedule as the Virtual Art Course.

2. and 3. WEEK

NAME OF THE EVENT: Unity Development Environment for Augmented Reality

OBJECTIVE: Introducing the Unity Development environment and setup for augmented reality (AR).

LEARNING OUTPUT: Participants;

- Have information about Unity Game Engine,
- Get information about Unity Game Engine installation,
- Learn about the installation of Vuforia Engine for Unity,

MATERIAL: "Unity Kurulumu.PPT", "Vuforia Kurulumu.PPT"

DURATION: 150 mins. (10-minute breaks in every 50 minutes.)

PROCEDURE:

- **1. 1.** It starts with the following explanation about the application of Unity to students; *This course will focus on developing AR application with Unity and Vuforia software. Unity software is a popular development environment for developing desktop, mobile and console games. You can develop 2D and 3D games. Although Unity is not a tool for direct AR applications, it can be turned into a tool where you can develop AR application with some plugins.*
- 2. "Unity kurulumu.PPT" presentation is opened and the steps related to the installation of Unity software are introduced to the students: In this course, the steps for the installation of software and plug-ins such as Unity, Vuforia SDK (software development kit), Android SDK (for Android devices), Xcode (for iOS devices) and Java Development package will be introduced.

First, download and run the Unity download assistant software from the given web address. "<u>https://unity3d.com/get-unity/download/archive</u>". Choose the Android or iOS compilation support according to which mobile device type you plan to perform the application test from Unity components.

Unity 2019.2.17f1 Download Assistant	Choose Components Choose which Unity components you want to downlo	bad and install.
This assistant will guide you through downloading and Installing Unity. Please make sure you stay connected to the Internet during the installation process, as Unity components will need to be downloaded. Click Next to continue.	Unity 2019 2.17/1 Morsoft Visual Studio Community 2019 Android Build Support VOS Build Support Inrux Build Support More Build Support Universal Windows Platform Build Support Windows Build Support Windows Build Support Windows Build Support Universal Sundows Platform Build Support Windows Build Support Universal Sundows Platform Build Support Windows Build Support Universal Sundows Platform Build Support	Description Position your mouse over a component to see its description.
	Unity 2019.2.17f1 Download Assistant	Install space required: 9.4GB
Next > Cancel		< Back Next > Cance

🚭 Unity 2019.2.17f1 Download Assistant 🦳 🗆 🖂	🚭 Unity 2019.2.17f1 Download Assistant 🦳
Choose Download and Install locations Specify where to download and install files.	License Agreement Please review and accept the license terms before downloading and installing Microsoft Visual Studio.
Specify location of files downloaded during installation 	Visual Studio 2019 Community License Terms
Unity install folder C: Program Files/Unity Browse	
Total space required: 12.8 GB Space available: 42.2 GB	☑ I accept the terms of the License Agreement
Unity 2019.2.17f1 Download Assistant	Unity 2019.2,17f1 Download Assistant
< Back Next > Cancel	< Back Next > Cancel

Select the download folder and select I accept the terms of the Visual Studio License agreement and click next.

Downloading Unity 2019.2.17f1		Installing Unity executables	
Show details		Show details	
588568kB (61%) of 964223kB @ 1746.4kB/s (3 minute	s remaining)		
	Cancel		
nity 2019,2,17f1 Download Assistant < Back N	ext > Cancel	lsoft Install System v2.50.0-Unicode	< Back Next > Canc
	Ø	Unity 2019.2.17f1 Download Ass	istant — 🗆
		с	ompleting the Unity Setup
			ir computer must be restarted in order to complete th
		You	compater most be restarted in order to complete an
Visual Studio Installer		Yo. ins	tallation of Unity. Do you want to reboot now?
Visual Studio Installer		Yo ins	tallation of Unity. Do you want to reboot now? Reboot now
Visual Studio Installer Lütfen bekleyin Dosyalarınız getiriliyor. Indiriliyor:44,16 MB / 71.23 MB	1.96 MB/sn	Yo ins	tallation of Unity. Do you want to reboot now? Reboot now
Visual Studio Installer Lütfen bekleyin Dosyalarınız getiriliyor. Indiriliyor:44,16 MB / 71,23 MB Yükleniyor	1,96 M8/sn	Yo ins 	tallation of Unity. Do you want to reboot now? Reboot now I want to manually reboot later
Visual Studio Installer Lütfen bekleyin Dosyalarınız getiriliyor. Indiriliyor:44.16 MB / 71.23 MB Yükleniyor	1,96 MB/sn	Yo ins O	tallation of Unity. Do you want to reboot now? Reboot now I want to manually reboot later

Visual 3. Unity installation steps.

Install the software by following the installation steps. When you run Unity for the first time, Unity Hub will issue a license warning if it is not already installed on your computer. Install option is selected and Hub is downloaded from the Unity web page and installed.

Install Unity H	łub	\times
\triangleleft	To use Unity, you must have an active license. download the Unity Hub and activate your licer	Please 1se.
	Install Qu	it Unity
Visua	I 4. Unity Hub license warr	ning.

← → C ☆ 🏻 🗎 unity3d.com/get-unity/download	Uni	y Hub Kurulumu	- 🗆 X
Ounity Products Solutions Made	Lisar with Unity Learning Su Lüt	ıs Sozleşmesi en Unity Hub programını kurmadan önce sözleşmeyi okuyu	nuz.
	Söz	eşmenin geri kalanını okumak için 'page down' tuşuna basa	bilirsiniz.
Download U	nity "	nity Terms of Service ast updated: May 24, 2018	î
Welcome! You're here because you want to do creating 2D and 3D multiplatform games and	wnload Unity, the world's m interactive experiences.	nity Technologies ApS ("Unity", "our" or "we") prov d related software (the "Software"), developmen <u>nity Teams</u> ("Developer Services")), and various i <u>nity Answers</u> and <u>Unity Connect</u> ("Communities") mencion with our website accessible at <u>unit</u>	ides game-development t-related services (like Unity communities (like), provided through or in vad com or unity com
Choose your Unity + download	nity that's right for you. Söz ign ownload Unity Hub	eşme koşullarını kabul ediyorsanız, 'Kabul Ediyorum'a basın sözleşme koşullarını kabul ediyorsanız, 'Kabul Ediyorum'a basın	iz. Unity Hub programmi kurmak
Learn more about the new Unity Hub here.	Unity H	ub 2,2,2	Cabul Ediyorum Vazgeç
Unity Hub Kurulumu	- 🗆 🗙 🖪 Unit	/ Hub Kurulumu	– 🗆 X
Hedef dizini seçimi Unity Hub programnı kurmak istediğiniz dizini şeçiniz. Unity Hub aşağıdaki dizinde kurulacak. Fariki bir dizinde kurmak iç	çin Gözat düğmesine basıp	Unity Hub Kurulum tamamlanıyor.	ı sihirbazı
başka bir dizin seçin. Kurulumu başlatmak için Kur düğmesine bas	in.	Lütfen 'Bitir'e basarak kurulumu	ı sonlandırın.
Hedef Dizin		Unity Hub programmı çalıştı	
C: \Program Files\Unity Hub	Gözat		
Unity Hub 2.2.2	Kur Vazgeç	< Geri	Bitir Vazgeç

3. 3. After the installation is completed, ask the students to open a Unity account. After opening an account, ask them member to log in to their accounts using their e-mail addresses and passwords from "Sign in "menu.

Kinny Hab 222	÷ 0	Cherry Head Stops in	 ✓ unity
Central License Management	My Account	Sign into your Unity ID	Unity has made updates Prease review the following.
Decision Decision To be able to be address which table years are not experimently activity of the provided	Helg Report a beg Sign In	Provide the study of the second secon	Privacy Policy Market M

Visual 6. Unity software first run login screens.

After logging into your account, you need to activate the license. To do this, click on the "Activate License" button, as you can see in the next step. Select personal use as shown in the license options. Thus, you can make your trials without paying the license fee.

(Treferences			4	License Agreement
🗘 General	License	ACTIVATE NEW LICENSE MANUA	AL ACTIVATION	Please select one of the options below:
License Management				Unity Personal
				O The company or organization I represent earned less than \$100,000 in gross revenue in the previous fiscal year.
				I don't use Unity in a professional capacity.
				O Unity Plus or Pro
		No License		
		To be able to start working with Unity activate a new license,		
		or menuary domaine.		Buy Professional Edition - Help - FAQ DONE
		Viewal 7 Unity soft	wara li	agence activation sereens



Visual 8. Unity software completed license screen.

4. 4. After the license process is completed, ask the students to create a new project from the Project selection / creation screen by clicking the back arrow in the upper left corner of the screen.

🔇 unity			🗘 rč	Create a new project with Unity 2019.2.17	f1		- 0
Eearn Installs	Projects	۸۵ Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant Constant 	NEW	Templates	O O JD With Extras	Settings Project Name * First AR Unity Project Location * C:\Users\Levent	
						CANCEL	CREATE

5. 5. "Vuforia kurulumu.PPT " presentation is opened and the steps related to the installation of Vuforia software are introduced to the students: Vuforia is an Augmented Reality development tool with highly advanced features (SDK-software development kit). It provides the opportunity to develop AR applications for mobile devices thanks to its ability to recognize and track images and 3D objects in real time. Thanks to its tracking capabilities, it can show the content created in the digital world (for example, an animation, video, photo or 3D model) with real-world objects and display these two types of images as real-time images in superimposed layers.

To download and install the software, you need to login to the Vuforia website (developer.vuforia.com) with your username and password. If you do not have a membership, you can create a membership with your e-mail address for free.

	developer vuforia.com/downloads/sdk		
	Vuforilo engine developer portal Home Pricing Downloads Library Develop Support		
	SDK Samples Tools		
Login	Vuforia Engine 8.6	Software License	
Login with your Vuforia developer account to download software, get license keys and participate in the Vuforia community.	Use Vuforia Engine to build Augmented Reality Android, IOS, and UWP applications for mobile devices and Afglasses. Apps can be bulk with Unity. Android Studio, Xooda, and Kivasi Sudio, Vuforia Engine can Jaio be	In order to continue downloading, you need to agree to the terms below.	
	accessed through the Unity Package Manager by adding Vuforia's package repository with the script below.	Use of this Vuforia™ Software Development Kit or	
Email Address	Add Vuforia Engine to a Unity Project or upgrade to the latest version add+vuforis package 8-6-7.unitypackage (2.30 KB)	extension (the "software") is subject in all respects to all of the terms and conditions of the Vuforia Developer Agreement, which may be found at	
Not Registered? Create account now	Control Contro	https://developer.vuforia.com/legal/vuforia-developer- agreement. If you do not agree to all the terms and	
Password Forgot password?	Download for Android vuforia-sdk-android-8-6-7.zip (26.16 M8)	must not retain or in any manner use any of the Software.	
	IOS Download for IOS vuforia-sdk-ios-8-6-7.zip (53.67 MB)	Decline L Annae	
	Download for UWP vuforia-sdk-uwp-8-6-7.zip (15.38 MB)	- Geome Tragree	

Visual 10. Downloading and installing the Vuforia package.

6. 6. After logging in, you should download the updated Vuforia Engine for Unity from the "Download" menu. Select "Add Vuforia Engine to a Unity Project or upgrade to the latest version" from this screen, and then accept the software license terms.

7. 7. When the download is completed, click the "Assets / Import Package / Custom Package..." menu option to include the Vuforia package in the Unity scene..



Visual 11. Adding Vuforia engine to Unity software.



Visual 12. Adding Vuforia package to Unity software.

When the installation of the Vuforia package is complete, the Vuforia folders will appear on the project screen as shown in Visual 13.



4. WEEK

NAME OF THE EVENT: Unity Stage and Vuforia Operations for Augmented Reality OBJECTIVE: Creating the Unity Stage for augmented reality (AR) and introducing Vuforia operations.

- **LEARNING OUTPUT:** Participants;
- Have sufficient information on the preparation of the Unity AR scene,
- Have sufficient knowledge about creating a license key with Vuforia,
- Have enough information about converting Vuforia target images into datasets,

MATERIAL: Unity software, Vuforia plugin, internet connected computer (win/mac). DURATION: 150 mins. (10-minute breaks in every 50 minutes.) PROCEDURE:

1. Make the following explanation to students about preparing Unity scene for AR application: As the Vuforia engine will use its own components, there is no need for the "Main Camera" and "Directional Light" objects that come as default on the Unity scene. You can delete these objects under the "Hierarchy" panel and press the "Delete" key on the keyboard.



Visual 1. Adding Vuforia components to the stage.

Then add the "AR Camera" and "Image (Target)" components from the "GameObject / Vuforia Engine" menu to the hierarchy list. Create a target plane to the scene by doubleclicking the ImageTarget object. To see this plane on stage, you must make sure that the 2D option is turned off.



panel, find the "Vuforia Behavior" section in the "Inspector" panel. Click the "Open Vuforia Engine Configuration" button from here. Paste it to the "Add License Key" section of the "Global" title from the window that opens.

*=	U Inspector	🗧 🖸 Inspector 🔒 🛪
	Transform Image: Constraint of the second seco	VuforiaConfiguration
< Persp	Clear Flags Solid Color + Background Culling Mask Everything +	Vuforia Version 8.6.7 We strongly recommend developers to encrypt their key for enhanced sacurity. For more information refer to the article below. Open Library Article
	Projection Perspective • FOV Axis Vertical • Field of View 60 Physical Camera 0 Clipping Planes Near 0.05 Far 2000	App License Key App License Key AYTyKKL/////AAABmWPPLEjA8kz yoiXvWy/EoRxD/AISTz/Itea7kSQ MOaFX/9C778B129g5xt+HMBHn Ru3dftIAjC9wxq0Xc1by1Q5N8R Ps2IDn146/pp28jv2-7L43NppD gH8av4oVckrUh4IGJsLZnrHw23 z116W0/21bu16/G7247EF08/R
Camera Preview	Viewport Rect X 0 Y 0 W 1 H 1 1 Depth 1 H 1 Target Texture None (Render Texture) 0 Oraclesiae Cullans Cullans 1	CmXHUw1x174A6xijn3wGMgZGZ CmXHUw1x174A6xijn3wGMgZGZ P6eSUmX0cIhMoPr7jBa5WJ3KzB BideIJYmeqXHdPmcWrHCfSFHt WCJWYw678vKAv2oqo6CyFmu/G D2SBeSY111sqyR8VmawQHD7Q aZ4zjXfocrU9ywmzTBtTcqWi5G6 CGkkbJ0i7CTpQei74Ryq8XWKLf3 hXMfGWj0
ii += 4 ♥ ★ Ø10	HDR Off + MSAA Use Graphics Settings + Allow Dynamic Resolu Target Display Display 1 +	
	✓ Audio Listener ✓ ✓ Audio Listener ✓ ✓	Add License Delayed Initialization Camera Device Mode MODE_DEFAULT + Max Simultaneous Tr{1
	Script DefaultInitializa O	Max Simultaneous Tra1

Visual 4. Adding Vuforia license key to the Unity scene.

- 3. Students are asked to record their scenes. Unity saves files by default in the Assests folder..
- 4. They are asked to find images that will be used as markers for the next lesson. The following statement is made about the pointer images: A real world image is required to trigger the AR application. You can find this image on the internet and print it on paper, or even a photo taken from outside.

The first thing to note is that you will need this image (photo or that piece of space) later to test the application. For example, if you took a photo of a carpet in your home, your device camera will need to see either the carpet or the photo printed on paper during the test phase. Another issue related to the pointer visuals is that the recognition and follow-up works of the images with irregular, unsymmetrical textures were done much more successfully by Vuforia.

5. WEEK

ACTIVITY NAME: Creating Image Data Sets with Vuforia
OBJECTIVE: Understanding the information about adding Vuforia image datasets for
augmented reality (AR).
LEARNING OUTPUT: Participants;
• Have sufficient information on the preparation of the Unity AR scene,
• Have sufficient knowledge about creating a license key with Vuforia,
• Have enough information about converting Vuforia target images into datasets,
MATERIAL: Unity software, Vuforia plugin, internet-connected computer (win / mac),
Pointer image file (max 2,5 mb, .JPG/.PNG)
DURATION: 150 mins. (10-minute breaks in every 50 minutes.)

PROCEDURE:

1. The students are given the following explanation regarding the subject of

converting the images to be used as a pointer image into Vuforia data sets: *Image files must be in .JPG or .PNG format. It should also be less than 2.5 MB in size. Therefore, if the photos taken with smartphones are in HEIC format, convert them to one of these formats before transferring them to the computer.*



Visual 1. Bill Bryson's Short History of Just About Everything book cover.

The first thing to consider when choosing an image is that you will need this image (photo or that piece of space) later to test the application. For example, if you took a photo of a carpet in your home, your device camera will need to see either the carpet or the photo printed on paper during the test phase. Another issue about pointer images is that color contrast is sufficient and the recognition and follow-up works of visuals with irregular, unsymmetrical textures are done much more successfully by Vuforia.



Visual 2. AR application: 3D Model associated with Pointer image. Source: <u>https://arpost.co/wp-content/uploads/2018/06/unnamed.png</u>

2. Give the students the following explanation about creating a database and ask them to create a database with their own visuals: The image files you choose should be converted into databases that Vuforia can follow. To do this, first open the Vuforia website and click the "Add Database" button in the "Target Manager" menu.

	Create Database
vuforio engine ∵ Hello leventoroh ∨ Log Out	Database Name * ilk_uygulama_image_target
Home Pricing Downloads Library Develop Support	Туре:
License Manager Target Manager	Device
	Cloud
Target Manager Add Database	VuMark
Use the Target Manager to create and manage databases and targets.	Cancel Create
Search	

Visual 3. Creating a database.

3. Make the following explanations about the database name / type and image upload to the students: *Give the database a unique (not listed) name, and select the "Device" for the database type.*

Select "Single Image" for the pointer type from the "Add Target" window that opens after pressing the create button, and upload the image file on your computer from the Browse button.

To find the width (with) value of the image, right click on your JPG / PNG file and select the "properties" menu option. You can see the Width value by switching to the Details tab from the window that opens. You must give a unique name to the name part. After pressing the add button, the database will be created.

Özellik	Değer	^	Туре:				
Derecelendirme Etiketler Açıklamalar	$\bigstar \Leftrightarrow \Leftrightarrow \Leftrightarrow \Leftrightarrow$			\Box	07		
Kaynak			 Single Image	Cuboid	Cylinder	3D Object	
Yazarlar Cekildiği tərib	16 01 2020 04:33		File:				owi
Program adı	13.3		IMG 6757.ipg			Browse	
Edinildiği tarih Telif Hakkı			.jpg or .png (max file	2mb)			
Resim			Width:				
Görüntü Kimliği			2024				
Boyutlar	3024 x 4032		5024				
Genişlik	3024 piksel		Enter the width of yo	ur target in scene u	nits. The size of the ta	arget should be on the	
Yukseklik Vatau Ožačačalčk	4032 piksel		unit scale. The target	's height will be calc	ulated when you uple	oad your image.	
Tatay Çozununuk Dikov Cözünürlük	72 dpi 72 dpi		-	-			
Bit Derinliği	72 upi 24		Name:				
Sıkıstırma			KitapKapak				
Çözümleme birimi	2		Name and be called			d la companya di sati an	
Renk Temsili			this will be reported i	ie to a database. Wh in the API.	ien a target is détecté	ed in your application,	
Sikistirilmis hit/niksel		~					

Visual 4. Properties window and target image loading window.

The resulting database recognition and tracking quality can be seen from the number of stars in the "Rating" column and the "show features" option on the page that opens when you click on the database name. ilk_uygulama_image_target Edit Name Type: Device

🗆 🕵 KitapKapak	Single Image	****	Active
Target Name	Туре	Rating (i)	Status 🗸
Add Target			Downloa
Targets (1)			

Target Manager > ilk_uygulama_imag... > KitapKapak

KitapKapak

Edit Name Remove



Update Target Hide Features

Visual 5. Database recognition and tracking points.

4. Make the following explanation to students about follow-up points and follow-up quality and get feedback on the number of follow-up points of their visuals: The yellow dots on the cover of the book show the points that Vuforia will follow. The more the number of these points, the more successful the tracking will be.

6. and 7. WEEK

ACTIVITY NAME: Creating Image Data Sets and Using Digital Content with Vuforia OBJECTIVE: To comprehend information about creating Vuforia image datasets for augmented reality (AR) and adding digital content to AR application.

LEARNING OUTPUT: Participants;

- Have sufficient information on the preparation of the Unity AR scene,
- have sufficient information about using Vuforia pointer database,
- have enough information about converting Vuforia target images into datasets,

MATERIAL: Unity software, Vuforia plugin, internet connected computer (win/mac). DURATION: 150 mins. (10-minute breaks in every 50 minutes.) PROCEDURE:

1. Make the following explanations about downloading the database created in the previous week to the students: You can download the databases you have created to your computer with the "Develop / Target Manager / Download Database" options. At the time of download, answer the question related to the development platform with "Unity Editor" and click the "Download" button. The database will be compiled and the download will take place.

Download Database		
1 of 1 active targets will be downloaded Name: ilk_uygulama_image_target		
Select a development platform:		
 Android Studio, Xcode or Visual Studio Unity Editor 		
Cancel Download		

Visual 1. Download of Vuforia Image Target database for Unity.

2. Give the following explanation to the students about the inclusion of the database on the Unity stage: You can add the completed database to your scene by clicking the "Assets> Import Package> Custom Package" menu options in the Unity interface.



Visual 2. Import menu for Unity prefabs.

After the database is imported, select "Image Target" from the hierarchy menu and select "Type: Database", "Database: name you give", "Image Target: name you give" from the "Image Target Behavior" option group in the "Inspector" panel. So you can see the book cover on the stage. ARCamera will automatically recognize ImageTarget.



3. Make the following statement regarding the subject of adding digital content to the students: You can align (associate) various digital contents with the "Image Target" object on the stage. These contents can be photos, videos, 3D models (still or animation) etc.



Visual 4. Paper.Plus AR application showing video content on newspaper. Source:<u>https://www.paper.plus/en/wp-content/uploads/sites/2/2018/05/Handy_You_Tube_2.jpg</u>



Visual 5. AR application using 3D model as digital content. Source: <u>https://blog.novoda.com/content/images/2018/02/BlogPostPicButBetter.png</u>

4. Please make the following explanations to the students about the 3D model usage within the Unity AR scene: It supports common 3D model file formats such as Unity .FBX, .OBJ. Models produced in design and animation software such as Autodesk 3DsMax, Maya; geometry, texture or animations can easily be transferred to Unity as Asset.

This course will focus on how to incorporate a computer-generated 3D character model into the AR scene. First, make sure that the model file is in one of the formats supported by Unity. This example uses a .OBJ file. Copy the relevant file to the "Asset" folder in your project folder. When you return to Unity, you will see the file appear in the Asset folder. In this example, the file name is "014.OBJ".



Drag and place the model onto the Image Target object (in this example, the book cover) and size it. You can adjust the position, orientation and size settings from the transforms in the "Inspector"

panel.

In the hierarchy panel, the added model must be the child object of the Image Target object. You can easily set up the parent-child relationship by dragging the model onto the Image Target.



Visual 7. 3D character model aligned to the Image Target object.

5. Make the following explanation to students about testing the program, show it by applying: To test the program, the application is run by pressing the Play button. Then, by selecting the AR application to trigger it, the image database created by the image camera is positioned so that the alignment made with the Image Target path is checked.



8. and 9. WEEK

NAME OF THE EVENT: MID-TERM EXAM

SUMMARY OF EVALUATION METHOD: Midterm evaluation of this course is based on a Mobile AR Application and process evaluation: Exams are measured over 100 points. A process evaluation form will be used for evaluation (Appendix). Compiling to the mobile devices is not expected in the midterm exam, the assignments will be delivered in the Google Classroom platform of this course as an Unity scene archive file.

EVALUATION PLAN EXAM SUBJECT Midterm Project 1 AR Mobile Application - 1 %70 General Performance Individual Classroom Performance %20 Exam Presentation Visual Presentation Performance %10

EVALUATION CRITERIA:

- AR Mobile Application
 - Preparation (%25)
 - Developing Design Idea
 - Application Design
 - Preparation of Digital Content
 - Selection of suitable tool / software / tool (Brush etc.) to work
 - \circ Timing (%10)
 - Working properly in lesson plan
 - Quality (%35)
 - Conclusion study and initial idea cohesion
 - Aesthetic quality
 - Originality and Creativity
 - Attention to Details and Touch-ups
 - Interaction quality of the application
 - Exam Presentation (10%)
 - General (In-Class Individual) Performance (20%)
 - Careful use of studios and equipment
 - Working discipline and independent performance
 - The complexity / level of digital technology used
 - Attendance to the course
 - Participation in activities related to the field

DURATION: 1. DAY art work and report submission.

2. DAY 15 min visual presentation + 5 min question answer time.

10, 11, 12, 13, 14 and 15. WEEKS

NAME OF THE EVENT: Development of the Final Project

OBJECTIVE: Understanding information about mobile application development, device testing and compilation with Augmented Reality (AR).

LEARNING OUTPUTS: Participants;

- They analyze mobile AR application development,
- They have in-depth knowledge of current mobile AR applications,
- Gain experience in developing a functional mobile AR application,
- They work together with their own discipline and different disciplines,

MATERIAL: Unity software, Vuforia plugin, internet connected computer (win/mac). DURATION: 150 mins. (10-minute breaks in every 50 minutes.)

- 1. The end of term project covers a long period of 6 weeks. In this process, students are expected to develop a functional mobile AR application by fulfilling the work packages listed below.
 - To analyze trends related to AR technology,
 - To search the literature about AR technology and applications,
 - To examine existing mobile AR applications in terms of their functions, target audiences, interface designs, interaction methods and visual quality of their content,
 - Presentation of the obtained data in the form of peer presentations,
 - Preparing the application design idea in written homework format,
 - Production of digital content in accordance with the idea,
 - AR application development / production / testing
 - Production of versions compiled for mobile devices
 - Delivery of Unity archive and mobile application files,
- 2. Applications to be developed are expected to be prepared in a subject and fiction that will meet a real need such as an art museum, an archeology museum, a hospital, an application integrated with the book, an application for the field of education (medicine, design, art, etc.).
- 3. Students are asked to make self-assessment and peer assessment for their end-of-term studies. Feedback is received from students about the work of themselves and their peers.
- 4. They continue their individual studies for 6 weeks in which students will develop their projects. The trainer monitors each student's work at weekly intervals and guides them as necessary. This guidance is done by giving and encouraging the critics that will carry each student forward individually according to the working speed, style and nature of the study.
- 5. The trainer follows the students' processes through the process follow-up form, receives the projects of the student's project on weekly 16th and 17th week and evaluates student success with the criteria and approach detailed in the preparation method section of the preparation, quality of work, student performance in the process, project presentation, etc.

16. and 17. WEEK

NAME OF THE ACTIVITY: FINAL EXAM

SUMMARY OF EVALUATION METHOD: Midterm evaluation of this course is based on a Mobile AR Application and process evaluation: Exams are measured over 100 points. A process evaluation form will be used for evaluation (Appendix). End of term application projects are expected to be compiled on Android or iOS mobile devices, assignments will be delivered in the Unity stage archive file and .APK on the Google Classroom platform of this course. **EVALUATION PLAN**

EXAM	SUBJECT					
Midterm Project 1	AR Mobile Application - II	%70				
General Performance	Individual Classroom Performance	%20	TOTAL %100			
Exam Presentation	Visual Presentation Performance	%10				

EVALUATION CRITERIA:

AR Mobile Application

- Preparation (%25)
 - Developing Design Idea
 - Application Design
 - Preparation of Digital Content
 - Selection of suitable tools / software / tools to work (Brush etc.)
- \circ Timing (%10)
 - Working in accordance with the lesson plan
- Quality (%35)
 - Conclusion study and initial idea cohesion
 - Aesthetic quality
 - Originality and Creativity
 - Attention to Details and Touch-ups
 - Interaction quality of the application
- Exam Presentation (%10)
- General (In-Class Individual) Performance (20%)
 - Careful use of studios and equipment
 - Working discipline and independent performance
 - The complexity / level of digital technology used
 - Attendance to the course
 - Participation in activities related to the field

DURATION: 1. DAY art work and report submission.

2. DAY 15 min visual presentation + 5 min question answer time.