虚拟现实与增强现实技术
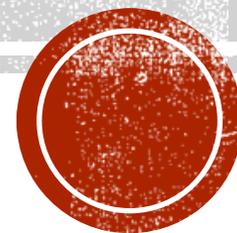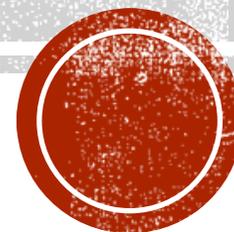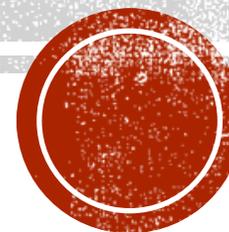
刘石坚 博士/副教授

C2-306
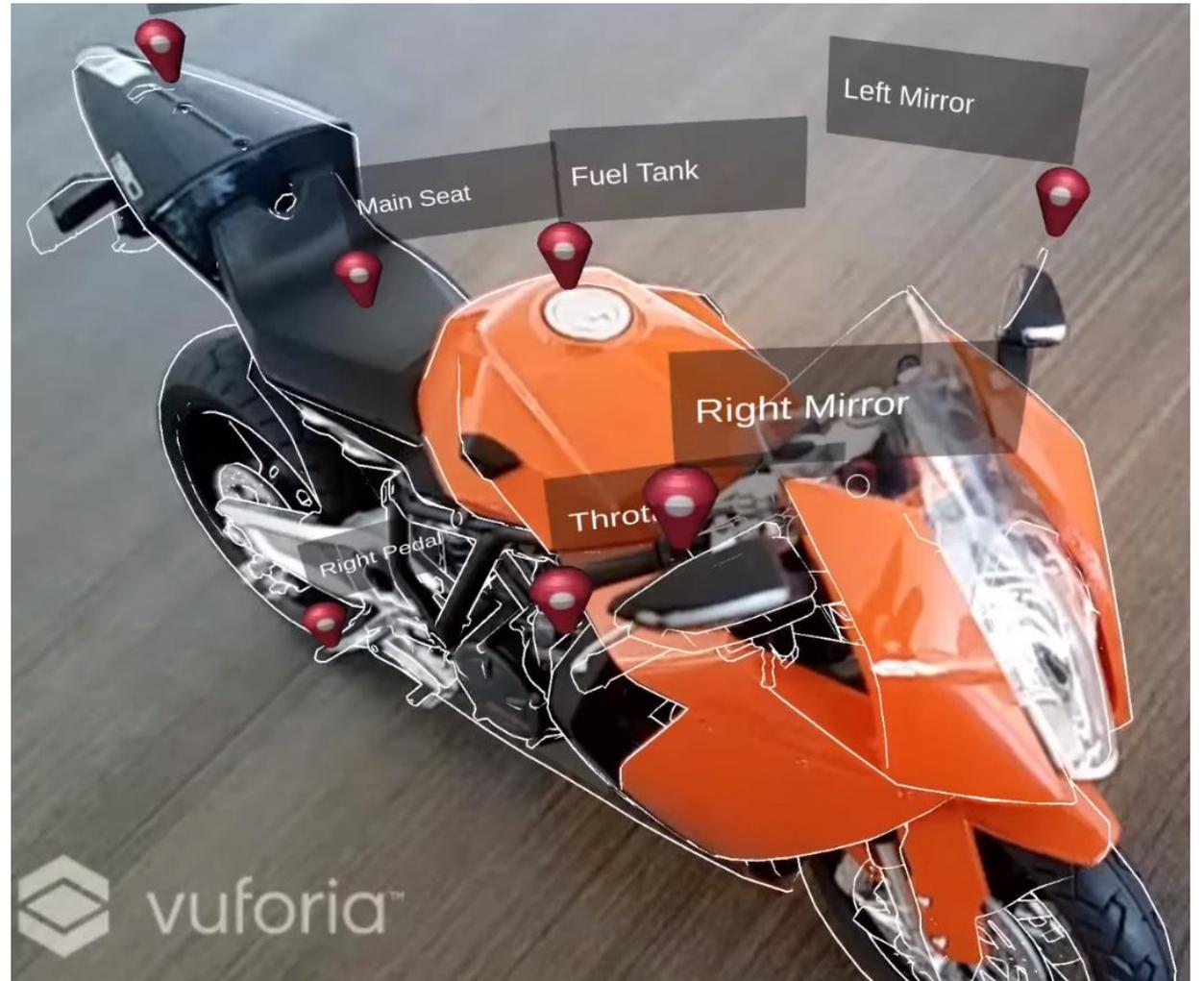
liusj2003@126.com

第8讲 AR引擎-VUFORIA

一、初始VUFORIA

VUFORIA 引擎

- 目前应用最广的AR开发平台之一
- 支持的硬件平台：

智能手机、平板电脑、AR眼镜……

- 支持的软件平台：

Android、iOS、UWP、Unity……

- 支持的开发语言：

C#（Unity）、C++（iOS and UWP）、Java（Android）.

VUFORIA DEVELOPR PORTAL:
[HTTPS://DEVELOPER.VUFORIA.COM/](https://developer.vuforia.com/)

vuforia® engine™
developer portal

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Jun 20, 2019

Vuforia Engine 8.3 is Available!

Summer is here, the sun is out, and so is Vuforia Engine's newest release! The team has been eagerly awaiting this announcement, as it's one of our *smartest* advancements with AR.

- Advanced Model Targets 360 - Recognition Powered by AI
- Brand New Model Target Generator Interface
- Improvements to Platform Specific Illumination Classes
- Upgrade to ARCore 1.7

In our last major release, we announced Advanced Model Targets that allowed for multiple views. Using AI, we enabled developers to choose several guide views that would appear when the user approached a physical model.

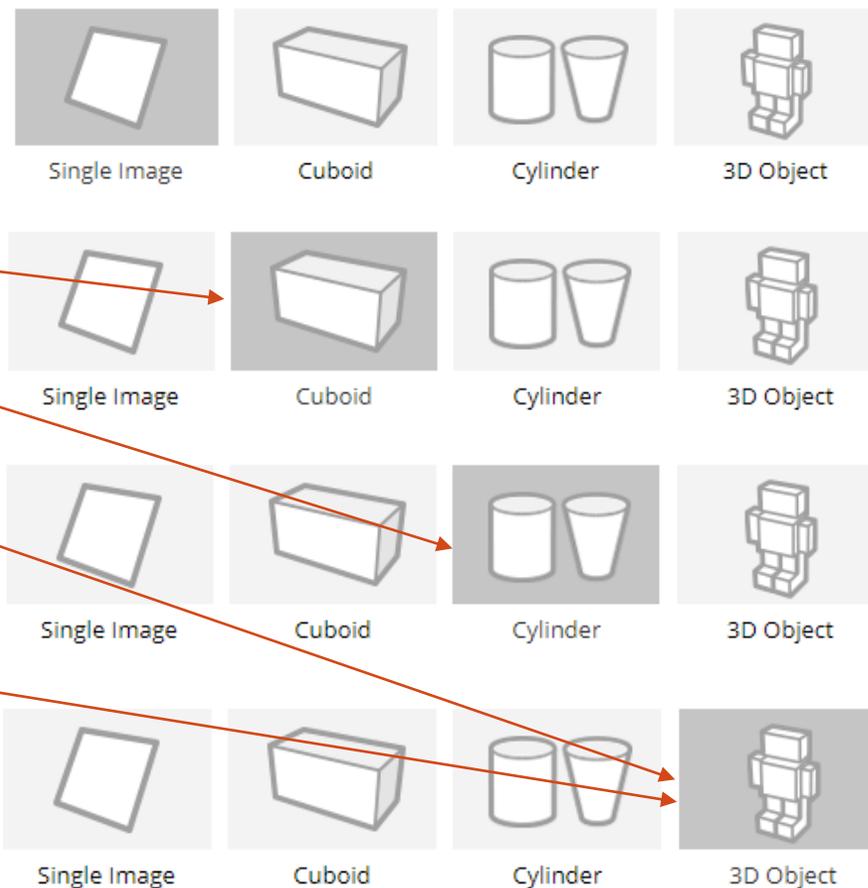Now – no guide views needed. Advanced Model Targets 360 can recognize a physical
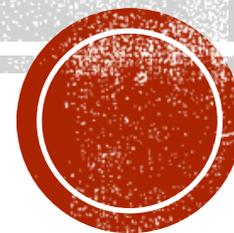
VUFORIA 支持的目标类型

- 基于图片**纹理特征**的AR
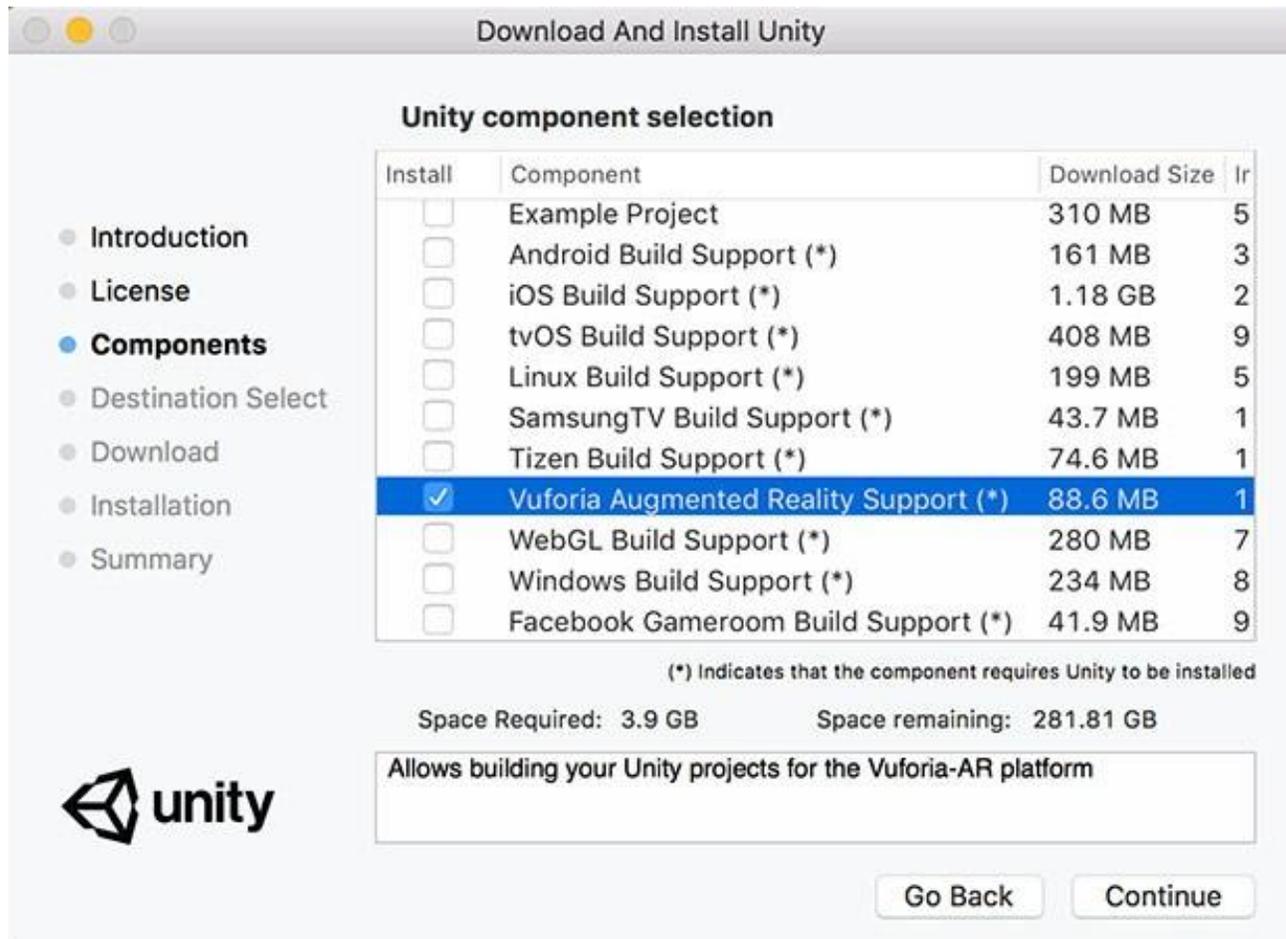 - 单个平面图片
  - 多个平面图片
  - 圆柱/圆锥表面图片
  - 任意3D对象

- 基于**几何形状**特征的AR
  - 任意3D对象

二、在UNITY中使用VUFORIA

VUFORIA 引擎预备-UNITY版本 <2019.2

VUFORIA 引 擎 预 备 -UNITY版 本 ≥2019.2

- Package Manager窗 口

VUFORIA核心对象

Single Image   Cuboid   Cylinder   3D Object

- 添加核心对象

方法一：主菜单→GameObject菜单→...... 方法二：层次窗口→右键弹出窗口→......
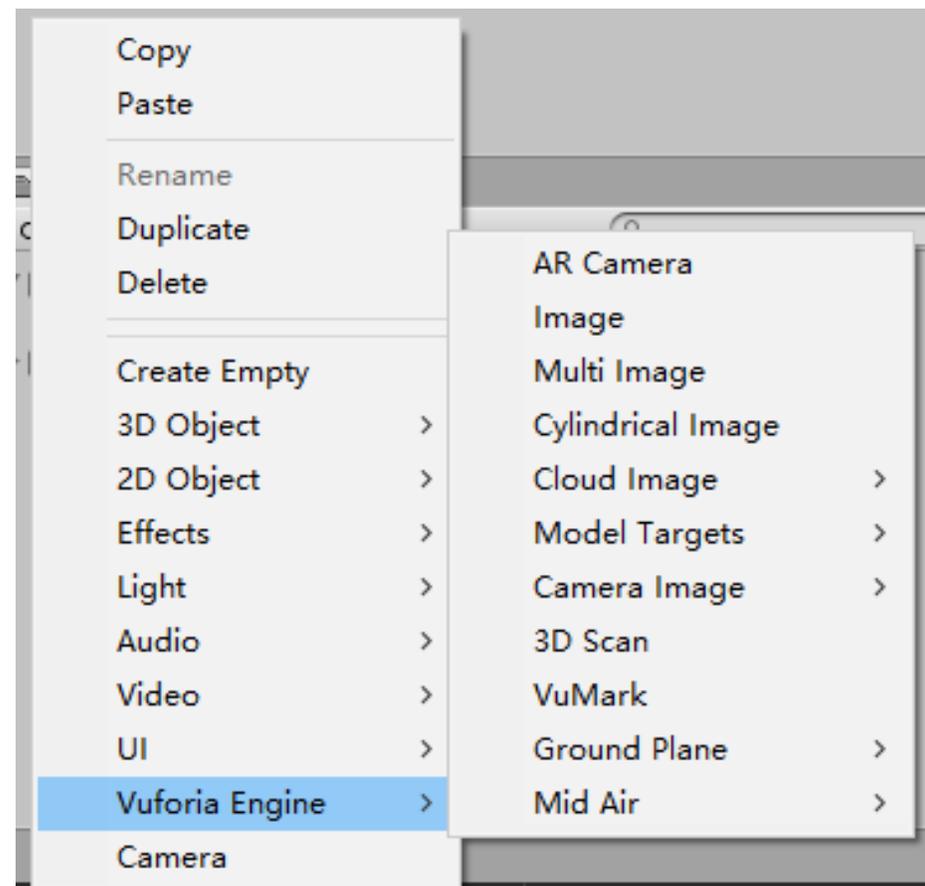
ARCAMERA

- AR相机对象简介
  - 获取相机图像显示在屏幕上
  - 使用摄像头：后置（手机、平板）

- 如何使用AR相机对象
  - 删除已有的Main Camera
  - 添加AR Camera

Vuforia Engine→AR Camera
组件缺失？

ARCAMERA 的 组 件

☑ Camera   ☐ Static ▾
Tag Untagged   ▾   Layer Default   ▾

▼ ⋏ **Transform**
Position   X 2.646169   Y -1.248523   Z -1.772181
Rotation   X 0   Y 0   Z 0
Scale   X 1   Y 1   Z 1

▼ 🎥 ☑ **Camera**
Clear Flags   Skybox   ▾
Background   ▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉ 🖊
Culling Mask   Everything   ▾
Projection   Perspective   ▾
Field of View   ●──────────────────── 60
Physical Camera   ☐
Clipping Planes   Near 0.3
                   Far 1000
Viewport Rect   X 0   Y 0
                   W 1   H 1
Depth   0
Rendering Path   Use Graphics Settings   ▾
Target Texture   None (Render Texture)   ⊙
Occlusion Culling ☑
Allow HDR   ☑
Allow MSAA   ☑
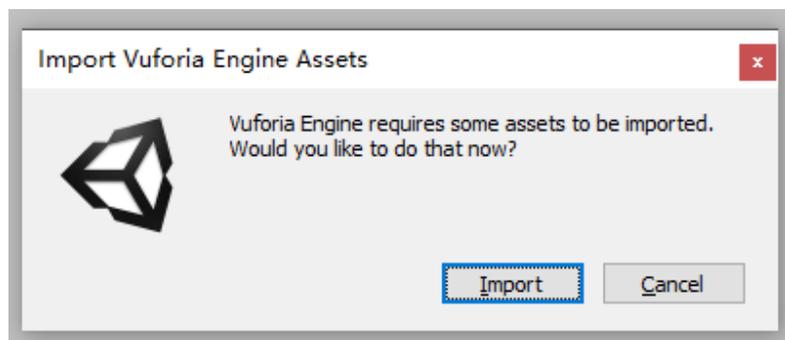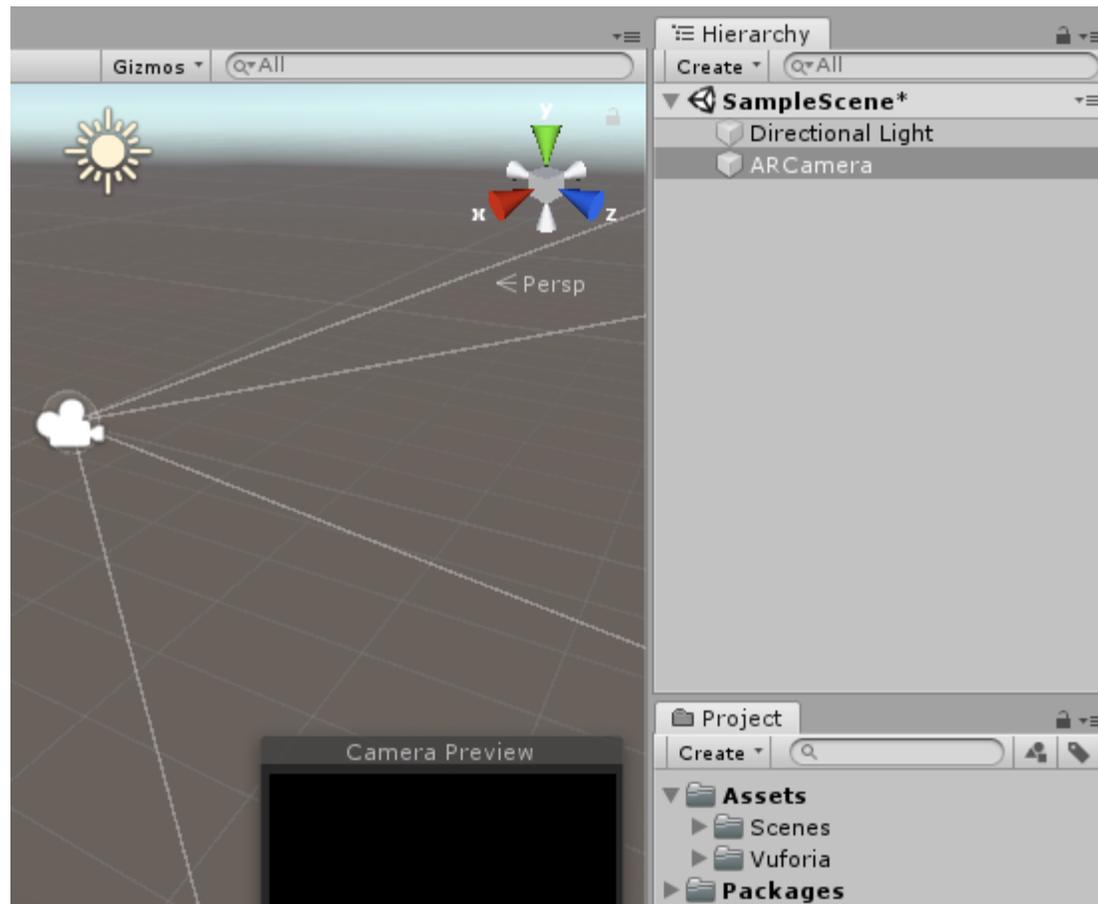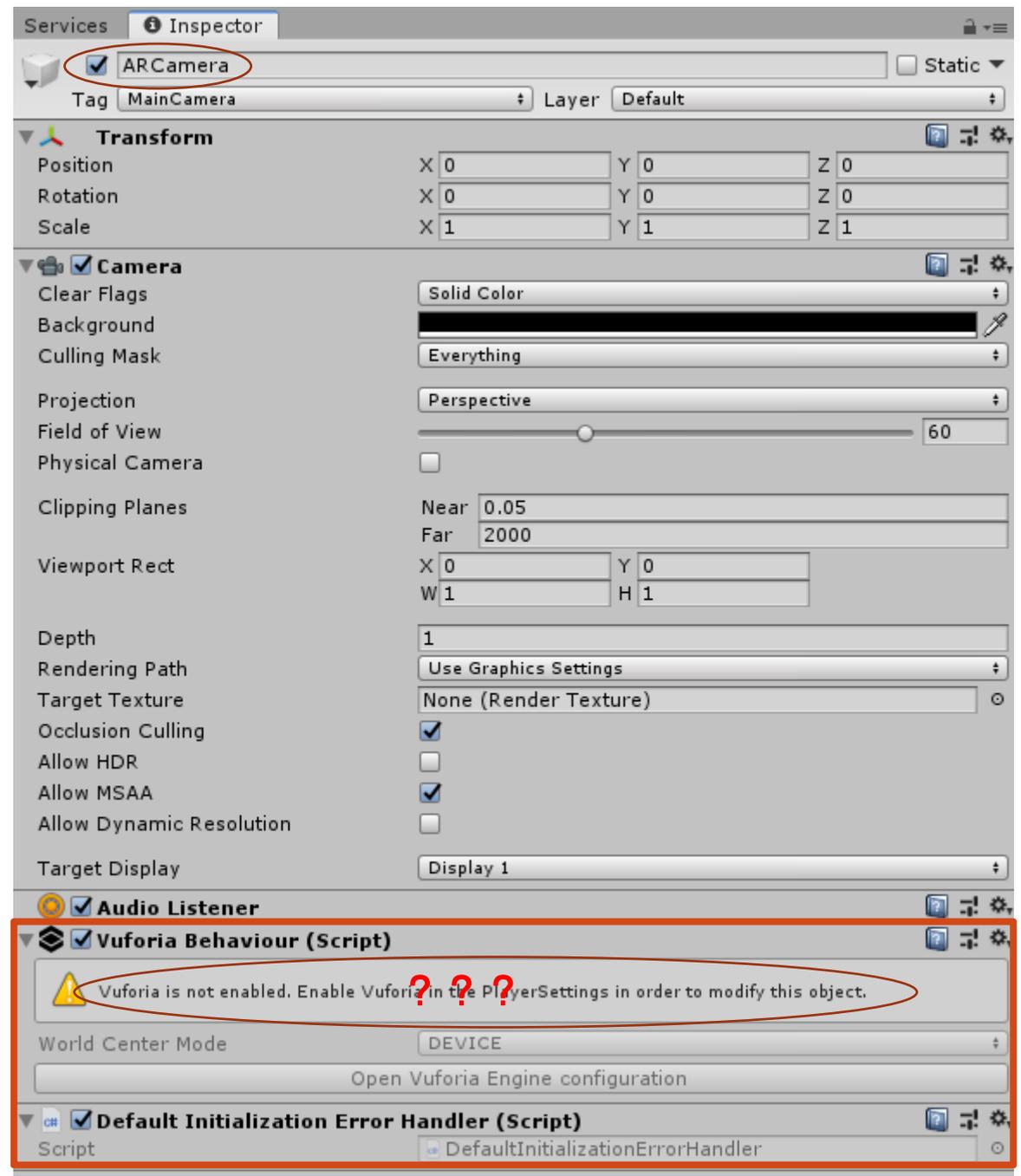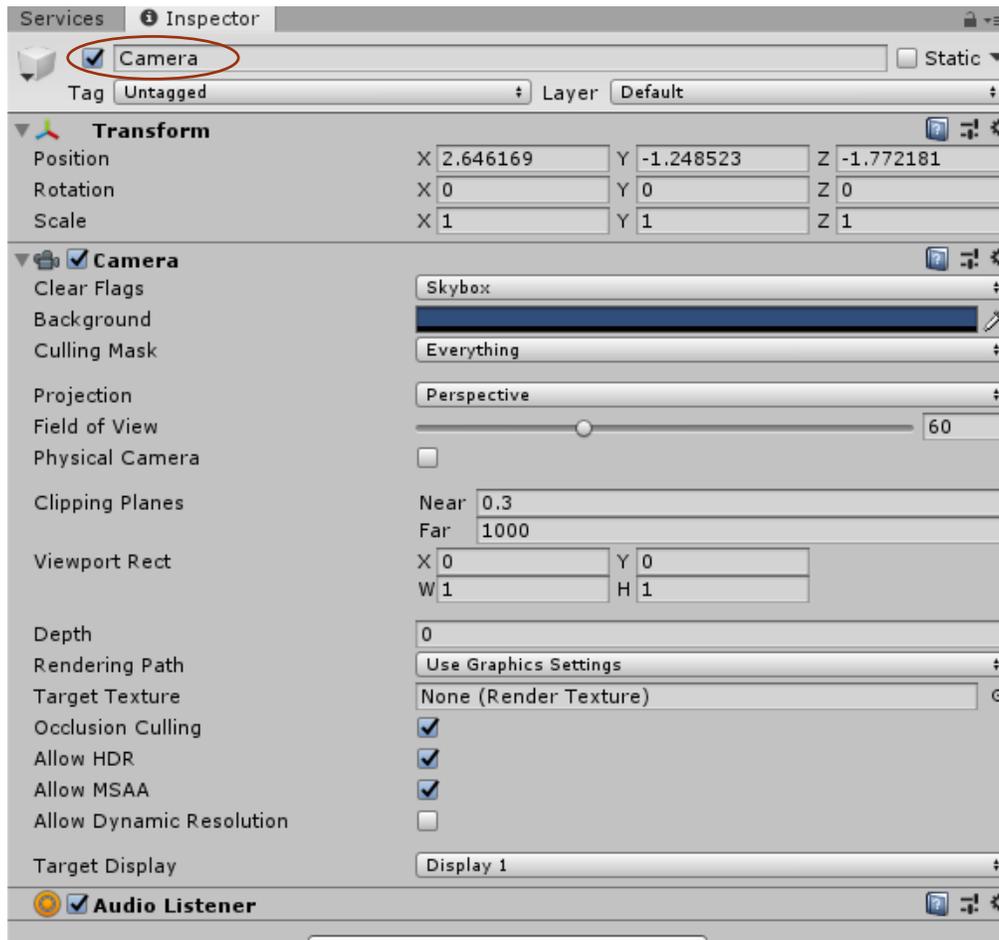Allow Dynamic Resolution ☐
Target Display   Display 1   ▾
🔆 ☑ **Audio Listener**

☑ ARCamera   ☐ Static ▾
Tag MainCamera   ▾   Layer Default   ▾

▼ ⋏ **Transform**
Position   X 0   Y 0   Z 0
Rotation   X 0   Y 0   Z 0
Scale   X 1   Y 1   Z 1

▼ 🎥 ☑ **Camera**
Clear Flags   Solid Color   ▾
Background   ▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉▉ 🖊
Culling Mask   Everything   ▾
Projection   Perspective   ▾
Field of View   ●──────────────────── 60
Physical Camera   ☐
Clipping Planes   Near 0.05
                   Far 2000
Viewport Rect   X 0   Y 0
                   W 1   H 1
Depth   1
Rendering Path   Use Graphics Settings   ▾
Target Texture   None (Render Texture)   ⊙
Occlusion Culling ☑
Allow HDR   ☐
Allow MSAA   ☑
Allow Dynamic Resolution ☐
Target Display   Display 1   ▾
🔆 ☑ **Audio Listener**
▼ ◈ ☑ **Vuforia Behaviour (Script)**
⚠ Vuforia is not enabled. Enable Vuforia in the PlayerSettings in order to modify this object.   **? ? ?**
World Center Mode   DEVICE   ▾
         Open Vuforia Engine configuration
▼ #️⃣ ☑ **Default Initialization Error Handler (Script)**
Script   DefaultInitializationErrorHandler   ⊙

LICENSE

- 如何添加许可证
  1. 在线申请开发密钥：
     https://developer.vuforia.com/vui/develop/licenses

  2. 粘贴开发密钥：
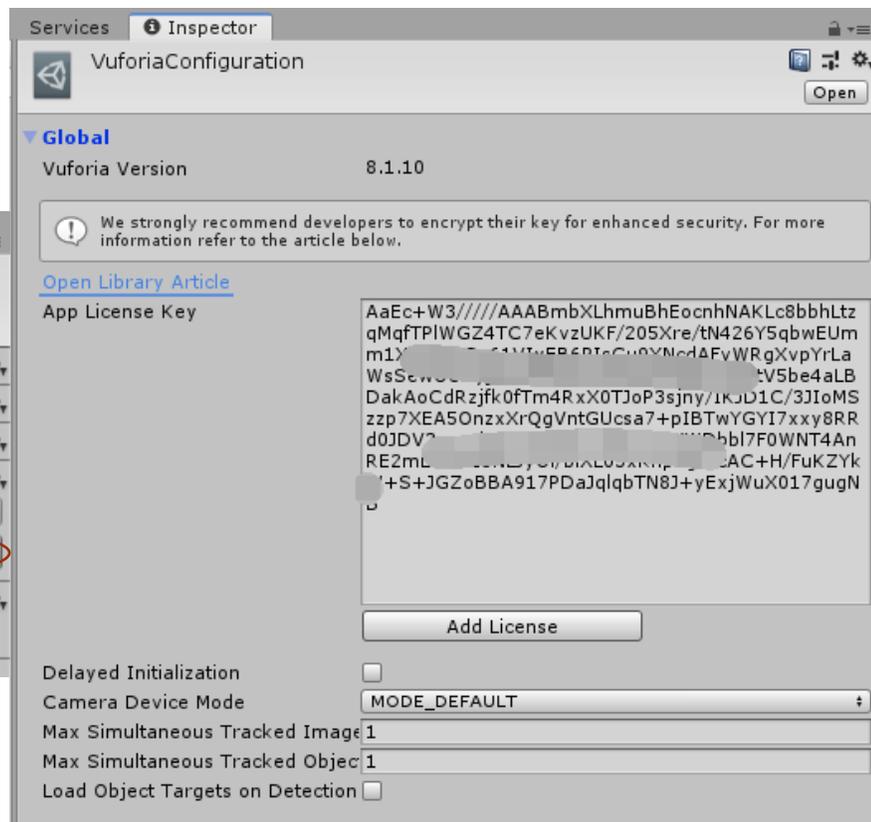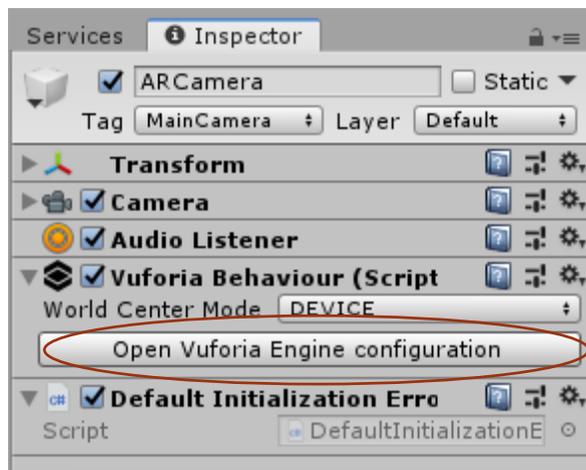   ARCamera→Vuforia Behaviour→Open Vuforia Engine configuration→Inspector窗口→Global
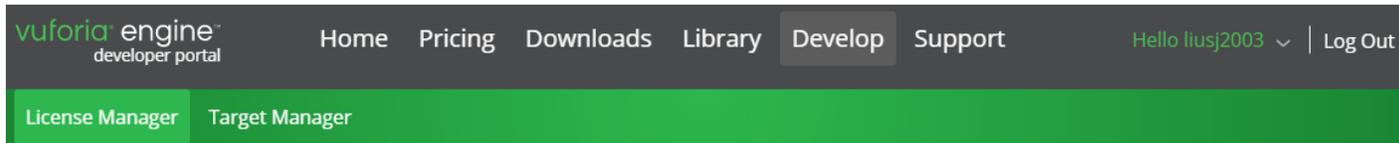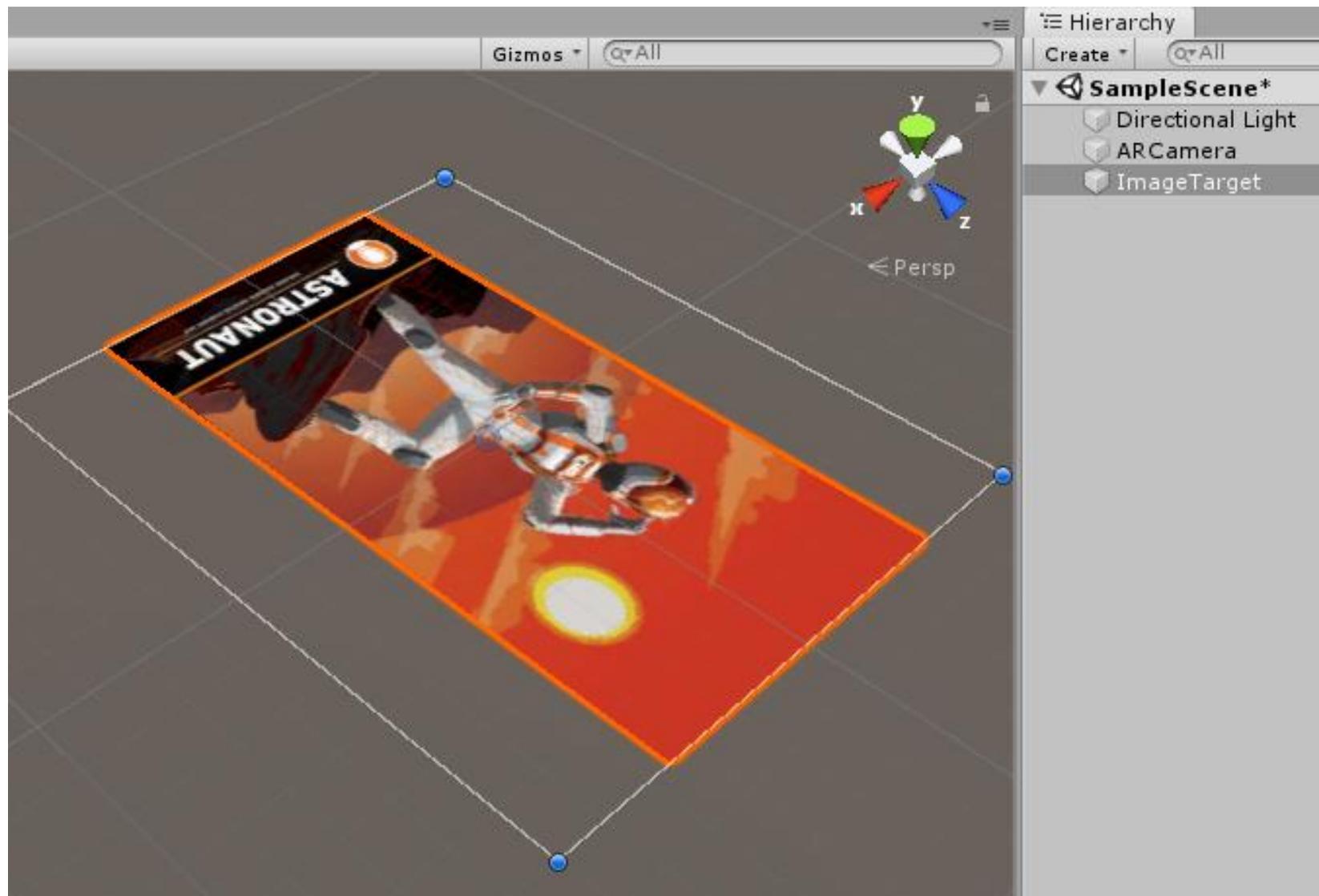
IMAGE 对 象

- **Image对象简介**
  - 自定义图片目标
  - 具有丰富的纹理细节
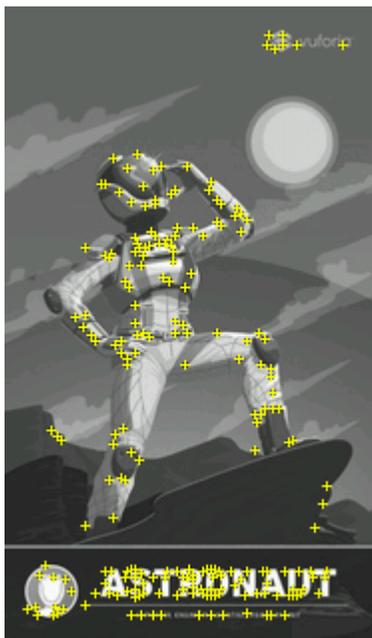
IMAGE 对象的组件

- 如何添加Image对象
  - 在线添加数据库
    https://developer.vuforia.com/vui/devel
    op/databases
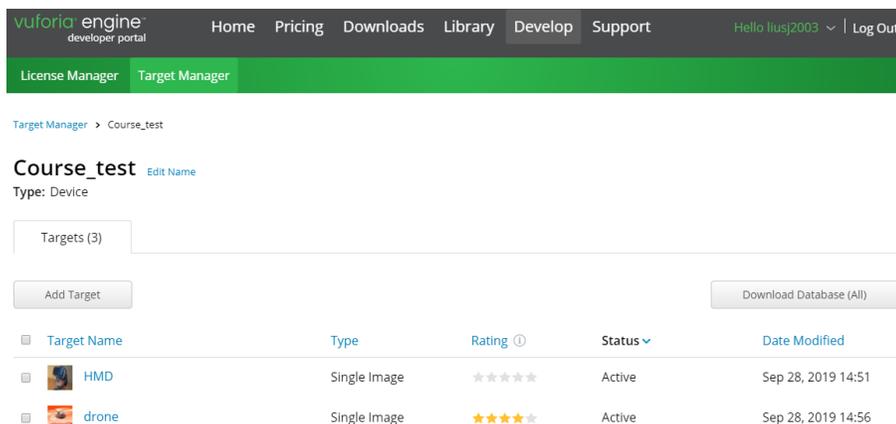 - 下载并导入数据库文件
  - 创建ImageTarget对象
  - 选择目标对象：
    ImageTarget→ImageTargetBehaviour组
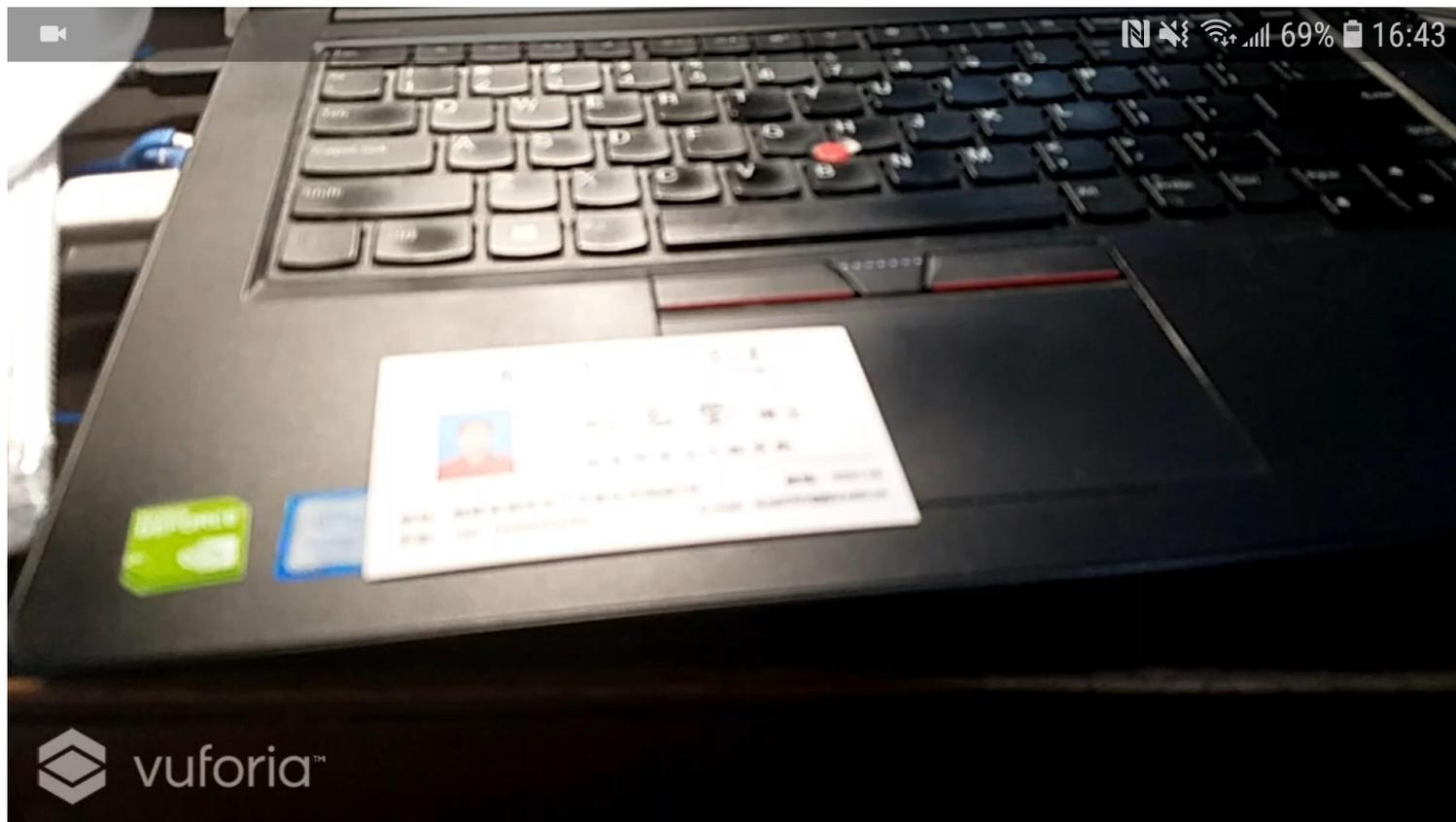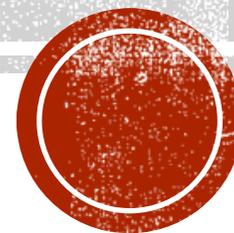   件→ImageTarget下拉框
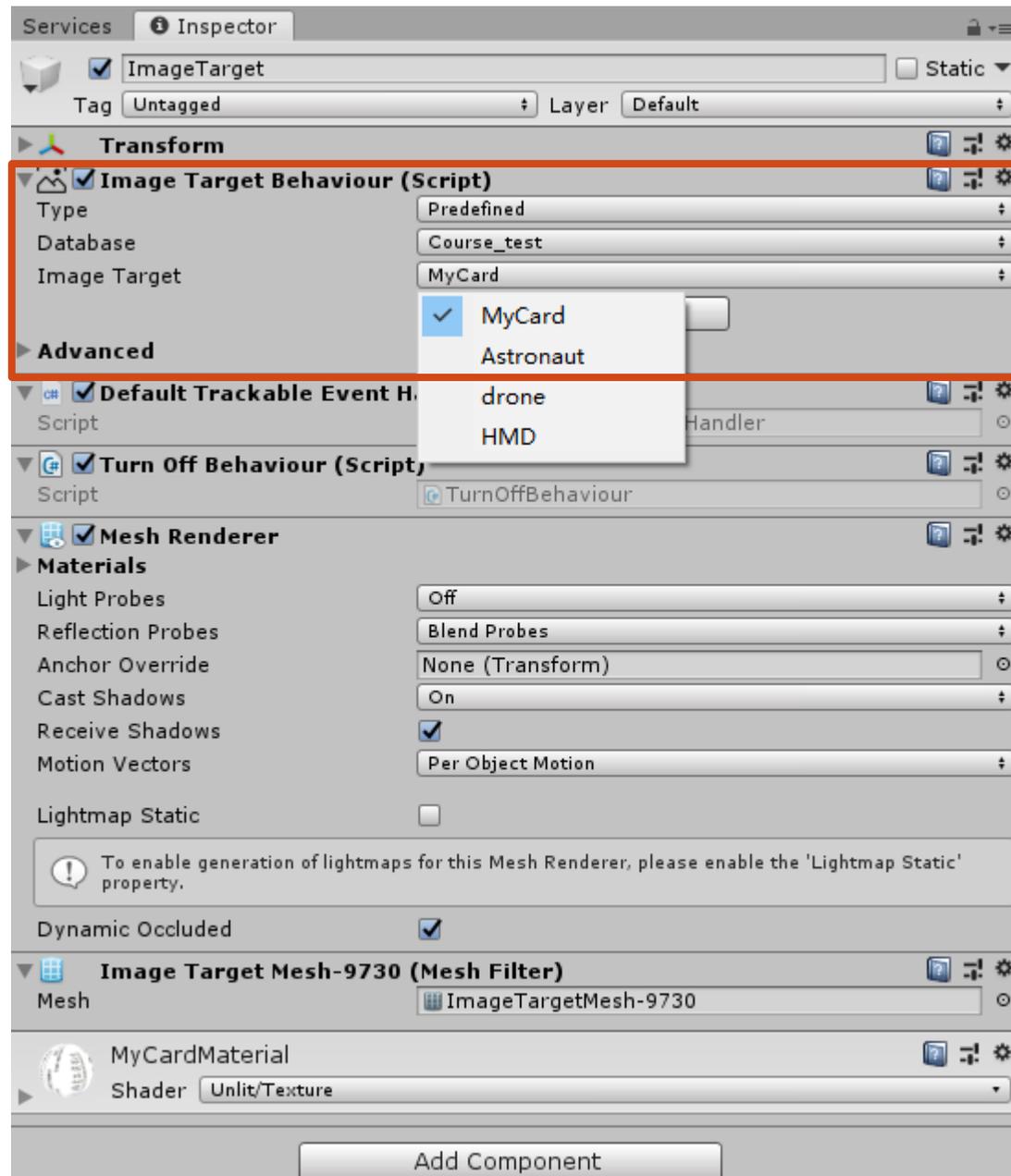
具体操作步骤

1. 添加ARCamera
2. 配置许可证
3. 激活目标数据库
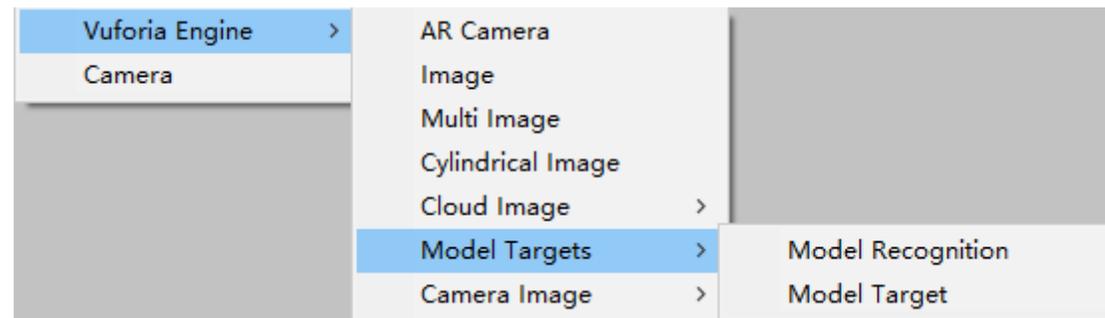4. 添加"辅助对象"到场景中
5. 编译并发布工程

体 验 AR

三、课后

思考&预习

- 除Vuforia以外，你是否了解其他的AR引擎？

- AR引擎的工作原理是什么样的？
  - AR引擎如何识别图片对象？
  - 当相机角度改变以后，AR引擎如何正确判断图片对象的方位？

- 除了图片纹理特征，还有什么特征可以用来识别AR对象？

- 如果图片因弯曲而不再处于一个平面上，是否还能进行AR识别和追踪？Vuforia是怎么做的？

- Vuforia中的Model Target是什么？他与Model Recognition有什么区别？

谢　谢

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