

Introduction to Unity

CAP 6121 – 3D User Interfaces for Games and Virtual Reality

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What is Unity3D

- **Game Development Tool**
 - Download at www.unity3d.com
- **Useful Features**
 - Imports 3D models easily*
 - Terrain Modeling Tool
 - Integrated Physics Engine (NVidia PhysX)
 - Audio
 - Networking
 - Highly scriptable (C#, Boo and Javascript)
 - Very easy to prototype games
- **Free and Pro versions**
 - Pro version has more features, e.g. ability to play videos

Why use Unity?

Unity

- High Level
- Little programming
- Components already available
- Highly visual

OpenGL, DirectX, XNA

- Low level
- Lots of Programming
- Start from scratch
- Result isn't immediately visible

Concepts in today's Lecture

- Using the Editor
- Prefabs
- Scripting
- Setting up a simple game world
 - First Person View
 - Import 3D models
 - Particles (fire effects, dust, snow)
 - Collision Detection
 - Triggers
- Interfacing the Kinect with Unity3D

Editor

- Scene View
 - Positioning/manipulation of objects in the environment
- Inspector
 - Alter properties of game objects
- Project
 - Shows everything in current project
- Hierarchy
 - Contains objects in currently loaded scene

Parenting and Prefabs

- Parenting
 - Construct complicated objects by arranging components in hierarchical manner
- Prefabs
 - Suppose you need a monster in your game
 - Load a model for a monster
 - Position point lights to light the model properly
 - Attach some particle effects to make it menacing
 - What if you want 10 such monsters?
 - Solution: Create a monster template (prefab) and clone it

Components of a Unity Project

- Scenes
 - Initial Menu, Game Levels, High Scores, ...
- Game Objects
 - Geometry, Particles, Camera(s), ...
- Scripts
 - Behavior for Player, Enemies, Collisions, ...
- Other Resources
 - Sounds, fonts, images, prefabs ...

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Physics

- Rigidbody Component
 - Forces, velocity, ...
- Collider Component
 - Box
 - Sphere
 - Capsule
 - Mesh
- Trigger
 - Ignored by the physics engine
 - Can be used to trigger game events, cut scenes, etc

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Scripting

- Change behavior of Game objects
 - Only form of programming required in unity
 - Most important aspect of a game
 - Can be written in C#, JavaScript, or Boo

- Important functions

• Start	Called when a script is instantiated
• Update	Called once every frame
• FixedUpdate	Physics update
• OnGUI	Used to display GUI (score, health,...)
• OnCollisionEnter	Collision Detection
• OnTriggerEnter	Collision with a Trigger

- For all script functions, see MonoBehavior in unity script reference
[\[http://unity3d.com/support/documentation/ScriptReference/MonoBehaviour.html\]](http://unity3d.com/support/documentation/ScriptReference/MonoBehaviour.html)

Scripting : Important Classes

- Mathematics
 - Vector3, Quaternion, Mathf, Ray, ...
- Audio Related
 - AudioClip, audio, ...
- Physics Related
 - Rigidbody, Collider, Physics, ...
- GUI Related
 - Texture2D, GUI, ...
- Others
 - GameObject, Input, Application, ...

Scripting : Fine Print

- A script can be applied to multiple game objects
 - Each game object gets own copy
 - Public variables visible in Inspector
 - modifiable at runtime
 - Can drap and drop
- Be careful with parenting and tags
 - Components referenced in script may be within children
- Make use of Debug.Log for debugging
- Be Cautious: Build incrementally

Important Links for Unity

- Models
 - Google Sketchup warehouse
- Manual
 - <http://unity3d.com/support/documentation/Manual/index.html>
- Script Reference
 - <http://unity3d.com/support/documentation/ScriptReference/index.html>
- Unity Tutorial Videos
 - <http://unity3d.com/support/documentation/video/>
- Resources
 - <http://unity3d.com/support/resources/>
 - http://www.unifycommunity.com/wiki/index.php?title=Main_Page

Setting up the Kinect on a PC

- http://groups.google.com/group/openni-dev/browse_thread/thread/e698f58c1b3b95f3/9f19fea1bea7490d?lnk=gst&q=installation#9f19fea1bea7490d
- Summary:
 1. Download and unzip Kinect drivers file "avin2-SensorKinect-b7cd39d.zip" from <https://github.com/avin2/SensorKinect>
 2. Connect the Kinect to your PC, and install driver executable will be found under "avin2-SensorKinect-b7cd39d\Platform\Win32\Driver"
 3. Download "OpenNI 1.0 Alpha build 23 binaries for Win32" from <http://www.openni.org> and install
 4. Execute "SensorKinect-Win32-5.0.0.exe" from 'Bin' folder in package you unzipped in 1.
 5. Download "PrimeSense NITE version 1.3 Beta" from <http://www.openni.org> and install it
 6. For NITE, use the following key code
0K0Ik2JeIBYClPWVnMoRKn5cdY4=

Interfacing NITE with Unity

- OpenNI sample project
 - <https://github.com/OpenNI/UnityWrapper>
- C# wrapper around a DLL
- Key Components
 - UnityInterface.dll
 - OpenNI.xml
- Example