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?**

<table>
<thead>
<tr>
<th>Unity</th>
<th>OpenGL, DirectX, XNA</th>
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</thead>
<tbody>
<tr>
<td>High Level</td>
<td>Low level</td>
</tr>
<tr>
<td>Little programming</td>
<td>Lots of Programming</td>
</tr>
<tr>
<td>Components already available</td>
<td>Start from scratch</td>
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<tr>
<td>Highly visual</td>
<td>Result isn’t immediately visible</td>
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**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 ...

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
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]
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 drag 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

- Script Reference

- Unity Tutorial Videos

- Resources
  - [http://unity3d.com/support/resources/](http://unity3d.com/support/resources/)
Setting up the Kinect on a PC

- http://groups.google.com/group/openni-dev/browse_thread/thread/e698f58c1b3b95f3/9f19fe1bea7490d?lnk=gst&q=installation#9f19fe1bea7490d

- 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
     0K01k2JelBYCIjPWkVrMoRKn5cdY4=

Interfacing NITE with Unity

- OpenNI sample project
  - https://github.com/OpenNI/UnityWrapper

- C# wrapper around a DLL

- Key Components
  - UnityInterface.dll
  - OpenNI.xml

- Example