Introduction to Developing AR Applications with Hololens

- Course: CMSC398U
- Credits: 1
- Seats: 18
- Lecture Time: Friday, 1:00 - 1:50 PM
- Location: CSI1122
- Semester: Fall 2018
- Course Facilitators:
    - John Ball: jlball@terpmail.umd.edu
    - Matt Graber: mgraber1@terpmail.umd.edu
- Faculty Advisor:
    - Matthias Zwicker: zwicker@cs.umd.edu
- Syllabus Last Updated: 5/8/2018
- Office Hours: TBA

Course Description:
A hands on, project driven introduction to developing Augmented Reality applications for devices like the Microsoft Hololens using the Microsoft Mixed Reality Toolkit and the Unity 3D engine. Topics will include AR design thinking, the Unity scripting API, deploying applications to Hololens, and the technology behind AR devices. Students will explore the capabilities of AR devices through bi-weekly projects designed to give them usable, valuable skills as quickly as possible. Basic programming and Unity experience, while not strictly required, are strongly recommended.

Topics Covered:
- Augmented Reality basics
    - What is AR? AR vs. VR vs. Conventional computer interaction
    - AR design thinking
- Using Unity to develop AR applications
    - Mixed Reality Toolkit
    - Unity scripting API basics
    - 3D asset design
- Hololens basics / intro
    - Hololens tech: how does it work?
    - Hololens setup / development portal

Additional Notes:

- Windows 10 required for Hololens build support, so Mac users will need to setup a virtual machine (which can be done for free through TerpWare, and will be covered in class)

Grading:

Participation	10%
Projects	15% each
Final Project:	30%

Projects:

- Project 1: Creating a world
  - Introduction to Hololens build pipeline, Unity basics, spatial sound
- Project 2 Creating a game
  - Intro to user input with Hololens, Unity raycasting
- Project 3: Creating a simulation
  - More Hololens user input techniques, Hololens spatial mapping, Unity physics engine
- Project 4: Learning to use Hololens voice recognition
  - Hololens voice commands, intro to Blender / animation in Unity
- Project 5: Networking / Multi device interaction "Final Project"
  - Team project combining all previously learned skills and the Hololens networking capability to create an app of student design.

Week	**Topics Covered**	**Assignments due**
August 27	Syllabus, what is AR?	
September 3	Intro to Unity, Hololens, MRTK[1]	Download Unity, download visual studio, setup virtual machine if necessary
September 10	Project 1 introduced	
September 17	Unity topics: raycasting / prefabs	
September 24	Project 2 introduced; Intro to	Project 1 due

[1] Mixed Reality Toolkit

	Hololens input: gaze, airtap, remote	
October 1	Unity topics	
October 8	Project 3 introduced; Unity topics: physics	Project 2 due
October 15	Unity topics	
October 22	Project 4 introduced, voice commands	Project 3 due Download Blender
October 29	Asset creation	
November 5	Project 5 (Final Project) introduced; Intro to multi-device interaction	Project 4 due
November 12	Special Topics in Unity	
November 19	Project Work day / Special Topics in Unity	
November 26	Project Work day / Special Topics in Unity	
December 3	Final Project presentations	Final Project due