CSE 190: Virtual Reality Technologies

LECTURE #11: AR DISPLAYS

Announcements

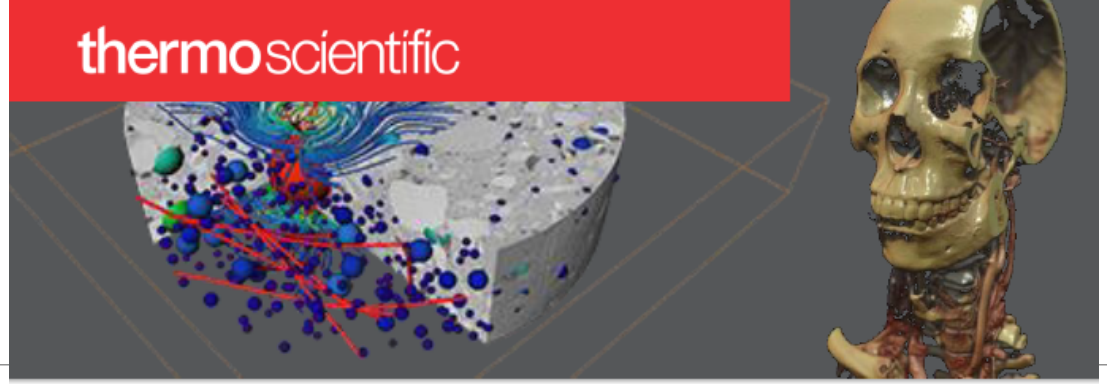
Homework project 3

- Due Friday, May 18th at 2pm
  - To be demonstrated in VR lab B210 in **two groups** like for project 2
  - Upload code to TritonEd by 2pm

Midterm exam

- Thursday, May 24th during lecture 2-3:20pm
- Written exam
- Closed book

thermo scientific



Introduction to Open Inventor Toolkit and Amira-Avizo Software

May 23rd, 2018 | 6PM | CSE Building - Room 1202

Thermo Fisher Scientific will be at the University of California San Diego to introduce their 3D visualization and analysis software products for scientific and engineering applications:

- Thermo Scientific™ Open Inventor™ Toolkit
- Thermo Scientific™ Amira-Avizo Software

Location:
University of California San Diego
CSE Building - Room 1202

Open Inventor Academic Program:
Qualified academic and non-commercial organizations can apply for the Open Inventor Academic Program. Through this program, individuals in your organization can be granted the Open Inventor Software Toolkit, at no charge, for non-commercial use.

Contact details:
Paula Kreger - pkreger@eng.ucsd.edu
Benjamin Longuechaud – benjamin.longuechaud@thermofisher.com

Applications:

- Medical and dental applications
  - 3D visualization
  - Online remote viewer
  - Image processing library
  - Virtual Reality
- Biomedical
  - Bioengineering
  - Cellular biology
  - Natural sciences
  - Neuroscience
- Materials Science
  - Biomaterials
  - Ceramics, glasses, porous media
  - Porous materials

Find out more at
thermofisher/amira-avizo.com
thermofisher/openinventor.com

ThermoFisher SCIENTIFIC

Job Opportunity

We are embarking on a journey with a **shipbuilder** in Canada. We are very early in the process – building design hasn't even been completed yet. They are very interested in using **visualization** in their process – Design, Engineering, Reviews with various other disciplines on their team including procurement, planning and senior management updates.

We are good on the technology portion – meaning we will figure that out as we move through our discovery process which will help define "what is important; what expectations do you have; what do you want to look at; what type of interaction is expected with the models", etc.

Do you have any **students that have graduated or are about to** and are looking for some **contract consulting work** that would be a **visualization expert** (display, software) that might want to work with me on this project if it comes to fruition.

Jim Angelillo
Vice President, Advanced Visualization Group
AVI-SPL
Boulder, CO
C: 248-808-8100
E: jim.angelillo@avispl.com

Google Glass: Almost AR

Small see-through display in front of one eye

- Not AR, just an overlay image

Sold 4/13 until 1/15 for $1,500

Android 4.4 on ARMv7 CPU

640x360 pixels

5MP camera, 720p video recording

Wi-Fi, Bluetooth

1-2GB RAM

16GB flash memory

Gyroscope, accelerometer, compass, light sensor

Bone conduction speaker

Since 7/17: Enterprise Edition

- 32GB, bigger battery, GPS, barometer, Intel Atom

Microsoft HoloLens

Released 3/16 for $3,000
True AR: superimposes images onto real world
Wireless, self-contained
Stereo displays, 30x17 degrees FOV
2-3 hours battery life
6 DoF tracking with IMU and 120x120 degrees depth camera
2.4MP RGB camera
4 microphone array
Ambient light sensor
Intel CPU with integrated GPU and 1GB RAM
Custom Microsoft Holographic Processing Unit (HPU) with 1GB RAM and 28 custom DSPs for inside-out tracking and mapping
8GB SRAM
64GB flash memory
Cortana for speech recognition
Video:

- https://www.youtube.com/watch?v=SkVpdl-WcD0

HoloLens Clicker

Metavision Meta 2

Released 12/16 for $1,500 ($950 pre-sale)

Requires Windows PC with Nvidia GTX 960+

90-degree field of view

2560x1440 pixels at 60Hz

Inside-out tracking with IMU and camera array

- In practice tracking is not as good as HoloLens

720p RGB camera

9 ft cable for video, data & power

4 surround sound speakers

3 microphones

Weight: 1.1 lbs

ODG R-9

Pre-orders for $2,000

Qualcomm's Snapdragon 835

Dual 1920x1080 pixels at 60Hz

50° FOV

GNSS (GPS/GLONASS)

IMU

Altitude Sensor

Humidity Sensor

Ambient Light Sensor

13MP Autofocus Camera (1080p @ 120fps, 4k @ 60fps)

5MP Cameras for Stereo Capture and Depth Tracking

Ultra Wide-Angle Fisheye Camera for Enhanced Environmental Tracking and Positioning

Two Digital Microphones (Environment & User)

Built-In Stereo Speakers

Magic Leap One

Stereo goggles “Lightwear” with “photonic wafer” lenses using multi-focal lightfield technology

Wired to compute+battery box “Lightpack”

Includes 6 DoF controller “Control”

Release planned for 2018

Magic Leap One
Specs based on published API

Audio: Stereo audio output and voice microphone recording are supported.

Camera: Capture still images and videos from the color camera.

Eye Tracking: Ability to retrieve fixation point position and eye centers. Blinks can also be detected.

Graphics: OpenGL ES and Vulkan rendering paths.

Hand Gestures & Key Point Tracking: Recognize the user's hand poses (gestures) and track the position of identifiable points on hands such as the tip of the index fingers.

Head Tracking: Headpose is tracked in full six degrees of freedom (DOF).

Image Tracking: Track the position and orientation of specified image targets in the user's environment.

Input (Control / MLMA Support): Full 6 DOF (position and orientation) from the Magic Leap Control. Detect button and touchpad presses and the analog trigger. A range of touchpad gestures are also supported, as are haptic vibration and LED ring feedback.

Light Tracking: Provides information (luminance, global color temperature) about the ambient light of the user's environment.

Meshing: Converts the world's depth data into a connected triangle mesh that can be used for occlusion and physics.

Occlusion: An interface for feeding depth data to the Magic Leap platform for hardware occlusion.

Planes: Recognize planar surfaces in the user's environment for placing content. This includes semantic tagging for ceilings, floors, and walls.

Raycast: Fire a ray and get the point of intersection with the world's depth data.