Augmented Reality: Capturing the Real World

Dr. Roger Skidmore
EDX Technologies, Inc.

July 2018

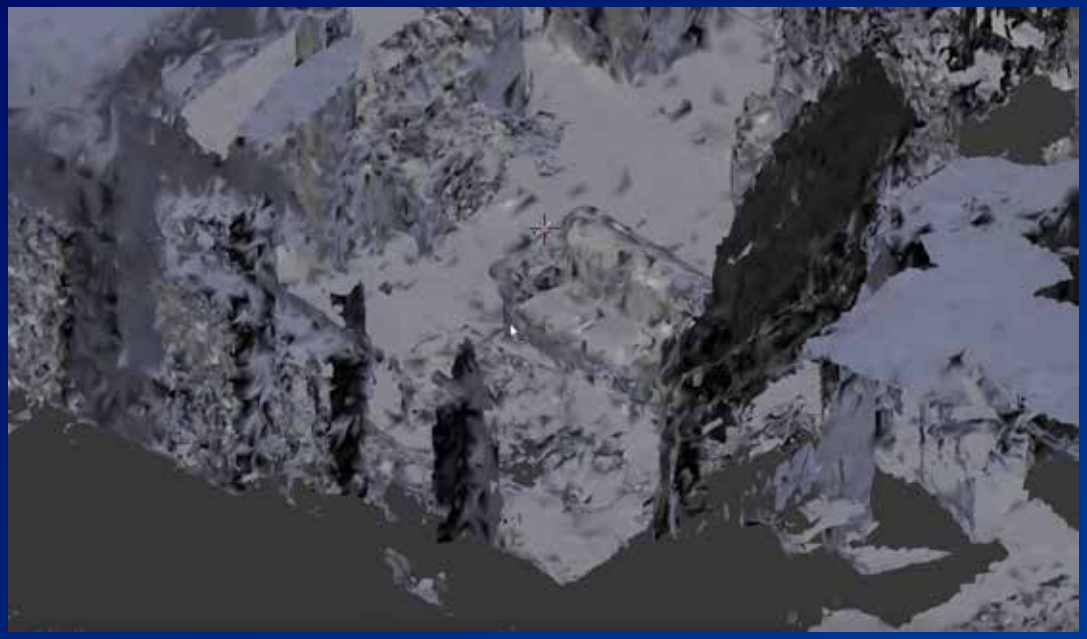
What is AR?

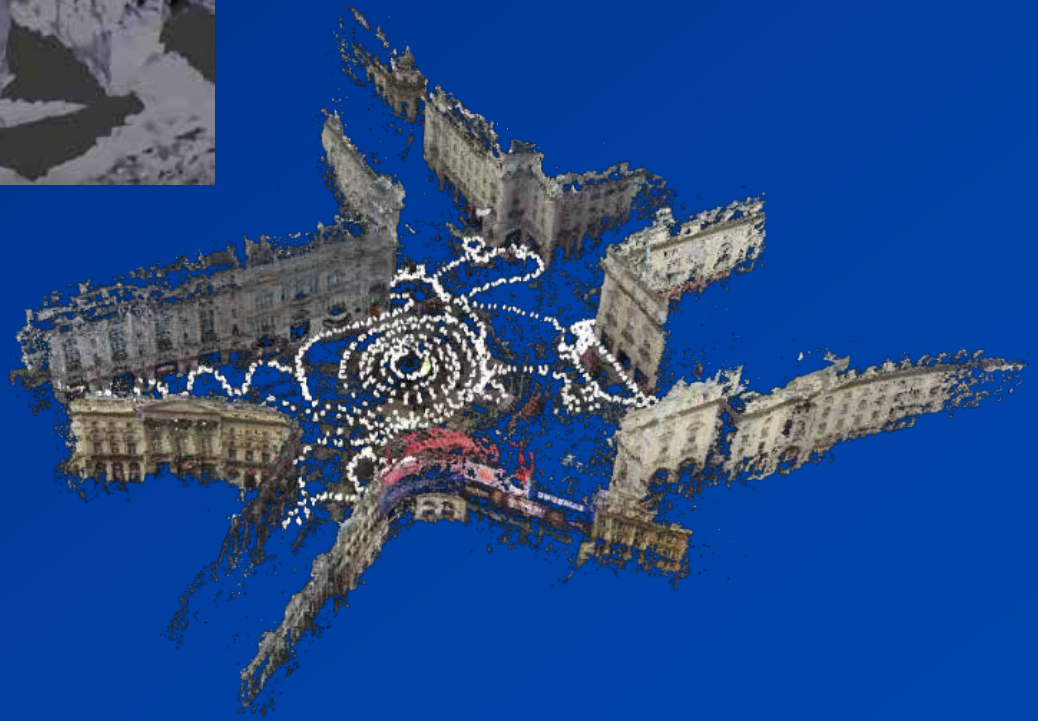
- Augmented Reality (“AR”): real-world environments augmented or embellished by additional computer generated sensory content
  - Adding graphics, audio, haptic, or other sensory content that is otherwise not present
  - Head’s Up Display?
- Separate from virtual reality (“VR”), where everything is computer generated content
- Mixed reality (“MR”)?
  - Allowing real and virtual elements to blend and interact with one another
- Everyone has seen augmented reality in some form, probably on a regular basis

How Does It Relate to Modeling?

- AR requires a highly detailed understanding of the physical environment to work optimally
  - AR generates computer graphics that are overlaid onto a view of the real world
  - Understanding the real world is key
- Capturing the details of the real world typically done using LIDAR or point-cloud capture
  - Depth is detected at myriad points around the viewer's location
  - Computer algorithms connect the points and overlay them to form a surface mesh
- Example capture device:
  - Intel Realsense camera
  - Range: 30'
  - Resolution: centimeter depth accuracy (millimeter at closer range)

Example Point Clouds





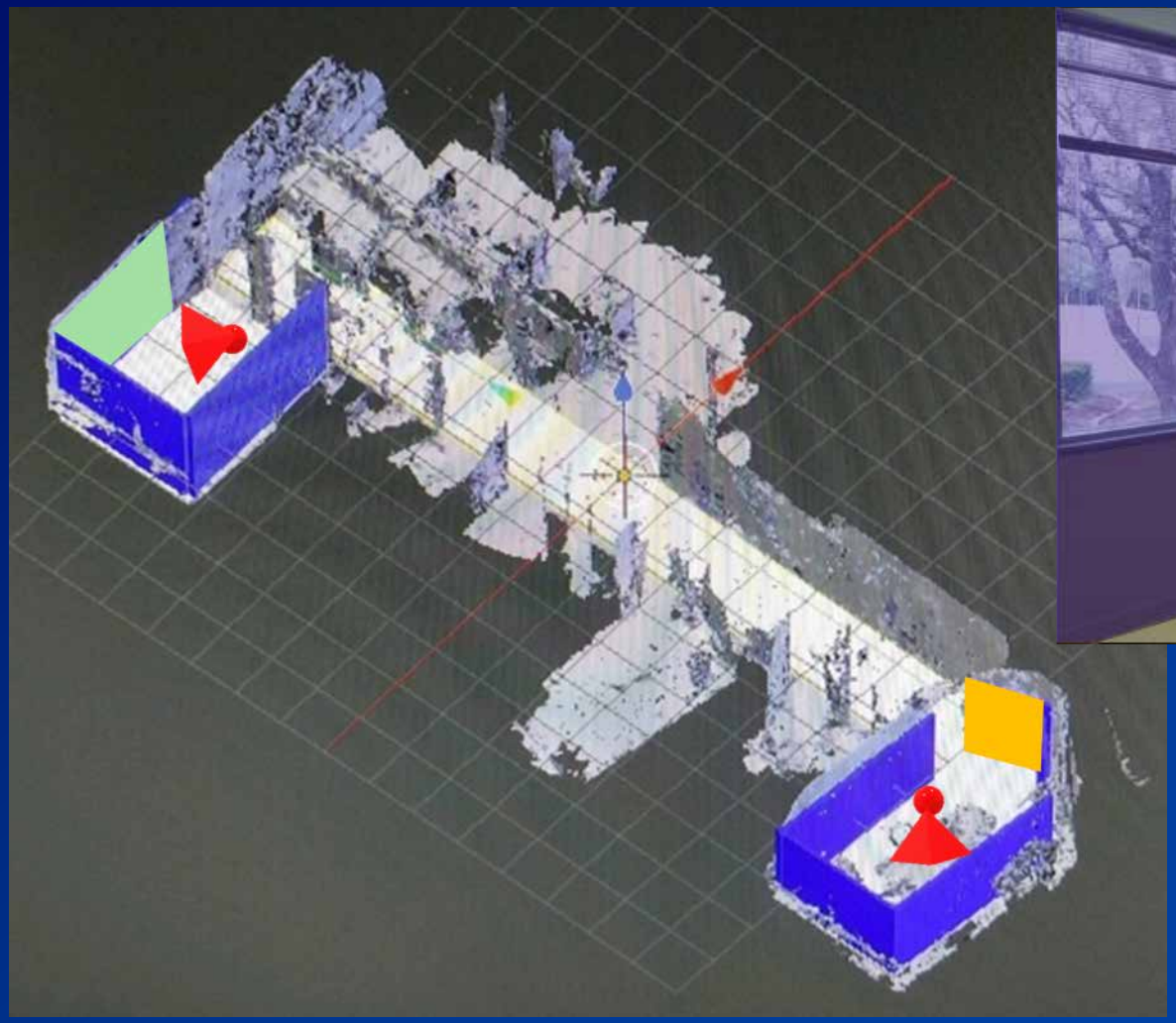
Applications of Point Clouds

- AR graphics placement
- Precise viewer position (and orientation)
- Object tracking / identification
- Motion recognition
- Navigation
- Scene reconstruction
- Damage or structural integrity assessment

- Modeling the world

Point-Cloud Capture, Manipulation

- Inbuilding point-cloud capture and manipulation



First person view

Leveraging Augmented Reality

- AR itself presents potentially new ways of modeling and representing wireless propagation

Leveraging Augmented Reality

- AR itself presents potentially new ways of modeling and representing wireless propagation

Future of World Modeling

- Extremely high resolution physical model, but in isolated/limited environs
- Better processing of point-cloud data to reduce noise
- Longer range, low-cost capture devices
- Automated capture through use of autonomous drones