# Authoring Augmented Reality Scenarios for Intelligent Tutoring Systems with GIFT

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# Outline

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# Motivation

- Explore how to best use AR-based technology to develop ITS that support in place instruction

- Provide more compelling training experiences

- Examine an interface needed to couple AR scenarios with ITS

# Background

- Lee's SpaceTop (Lee, Olwal, Ishii, & Boulanger, 2013)

- Xin's Napkin Sketch (Xin, Sharlin, & Sousa, 2008)

- Author AR scenarios (Mota, Roberto, & Teichrieb, 2015)

- Authoring in immersive scenarios (Lee, Nelles, Billinghurst, & Kim, 2004)

- Different domains benefitted such as military (Goldberg B. , Sottilare, Brawner, & Holden, 2012) and assembly tasks (Westerfield, 2015)

# Integration with GIFT

- New interop added to GIFT

- GIFT Augmented Reality Authoring Tool (GARAT) introduced

- AR authoring through an Authoring External Application

- AR tutoring through a Tutoring External Application

# Integration with GIFT
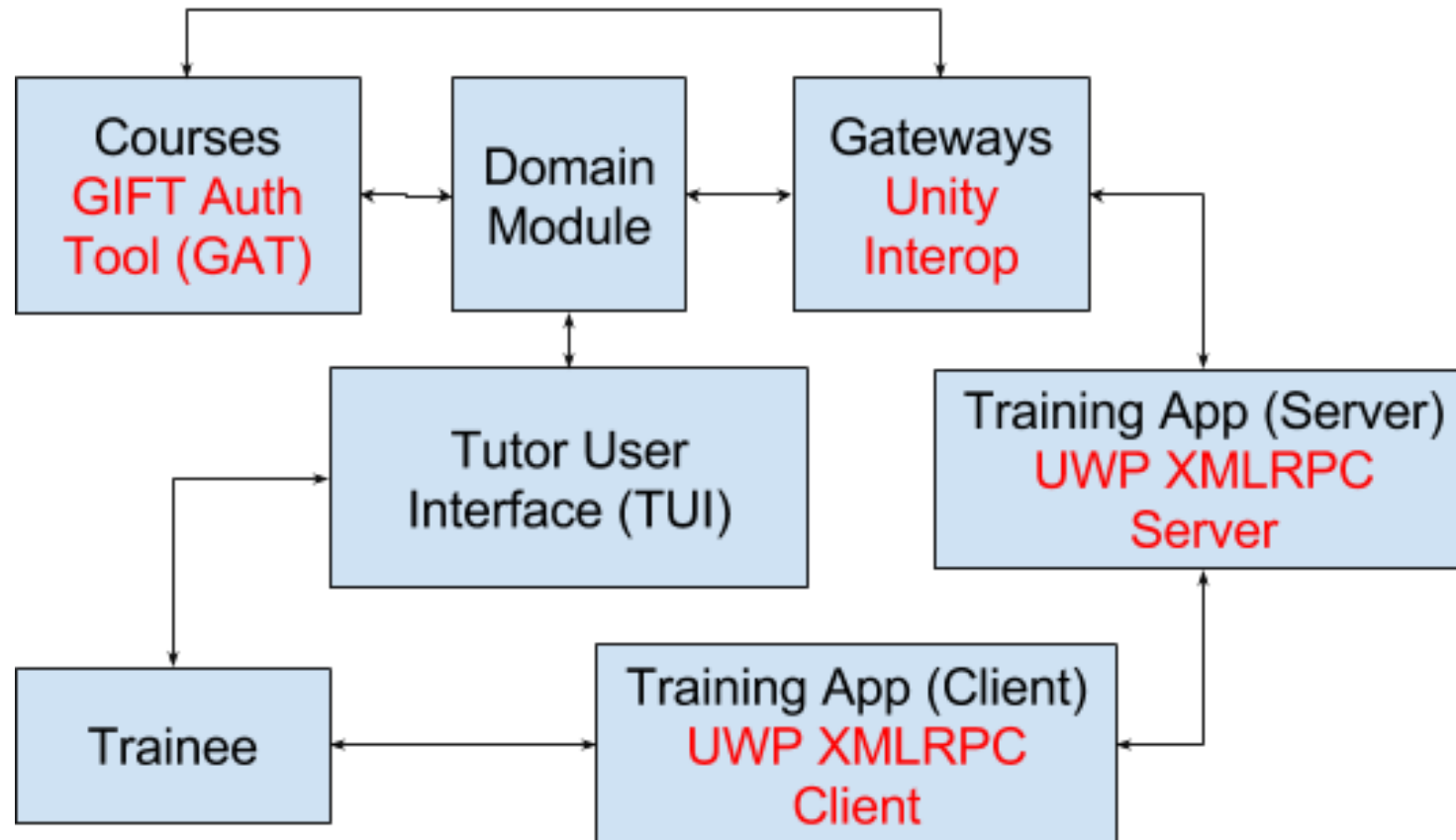
# *Authoring an AR Scenario*

🔵 From the GARAT interface, click start server which runs an XMLRPC server and client instance on GIFT

🔵 Start Authoring Application on HoloLens. (Acquire 3d reconstruction, place anchors, etc.)

🔵 Visualize the scene on GARAT, place objects and label them

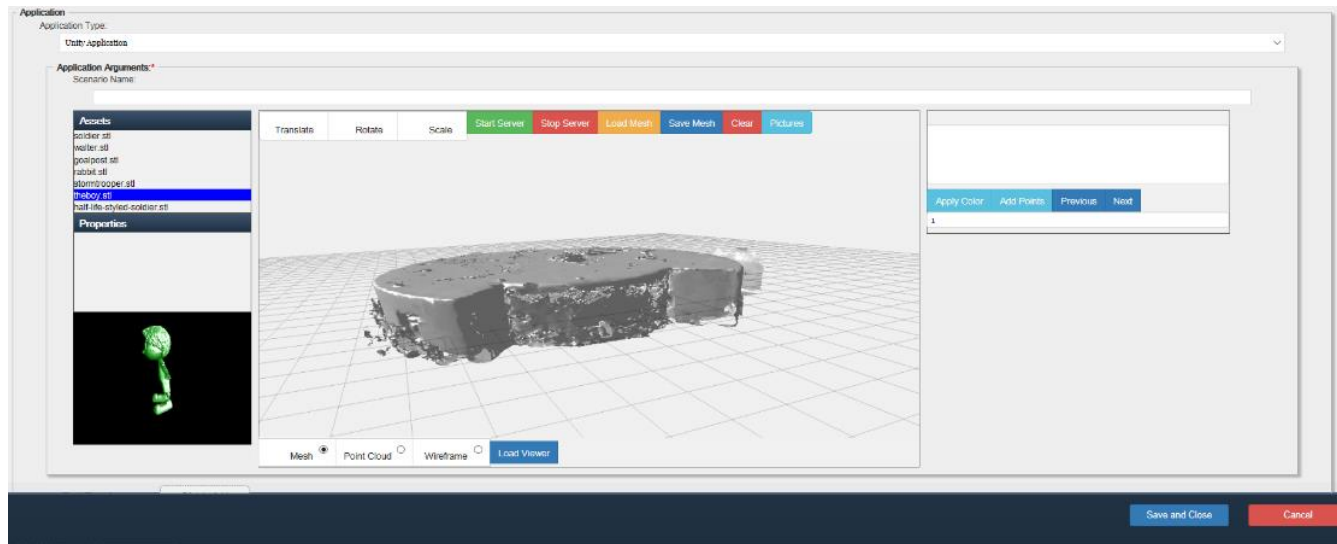🔵 Append a Real Time Assessment

🔵 Save the course

# Authoring an AR Scenario
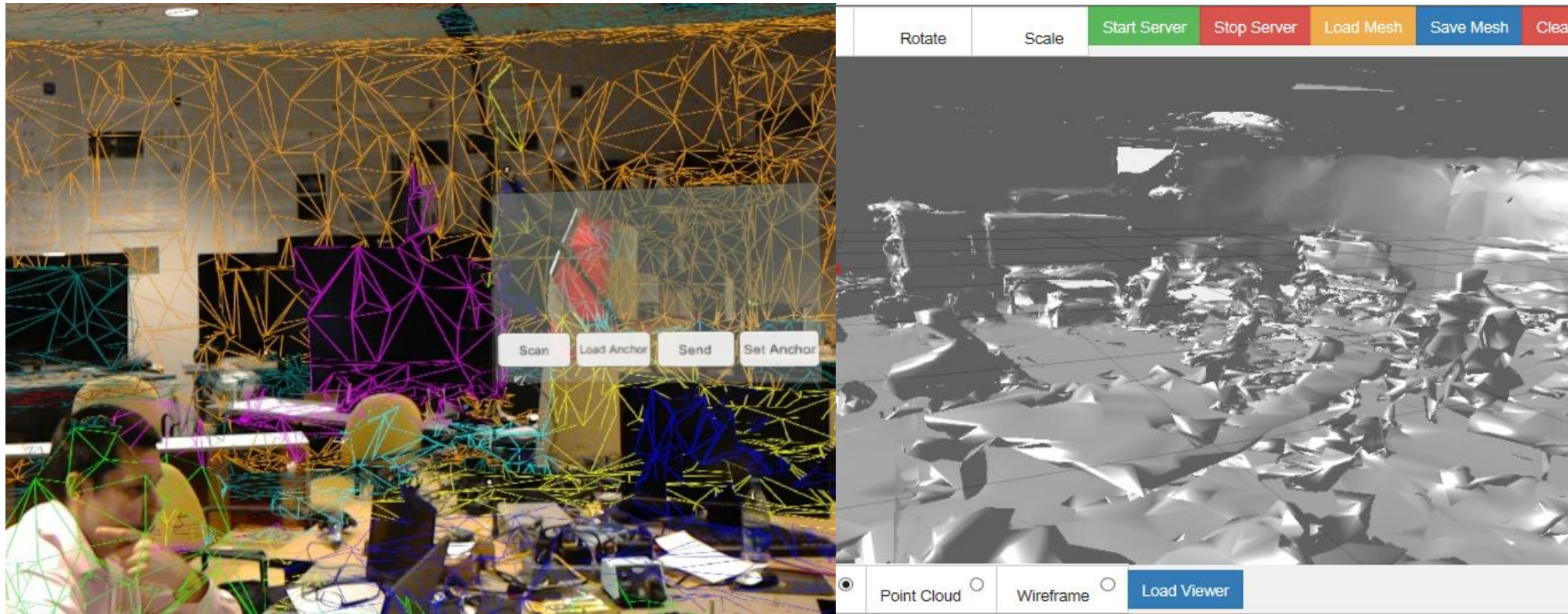
# 3D reconstruction

- The information gathered by the Authoring external application can be visualized in the GARAT interface as a mesh

- A JSON file format is used for the information exchange

# 3D Reconstruction

- Mesh does not provide color information

- Individuals pictures can be taken with RGB, depth and camera parameters information

- In GARAT interface, pictures can be visualized on the right panel

- The color point cloud is generated by projecting the information on the mesh
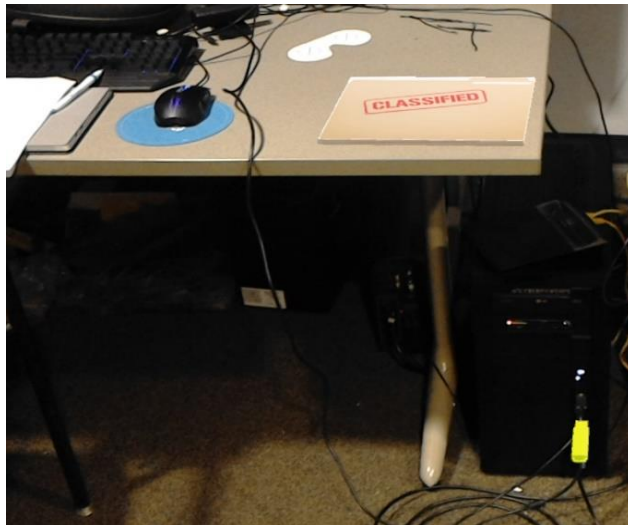
# Color Point Cloud
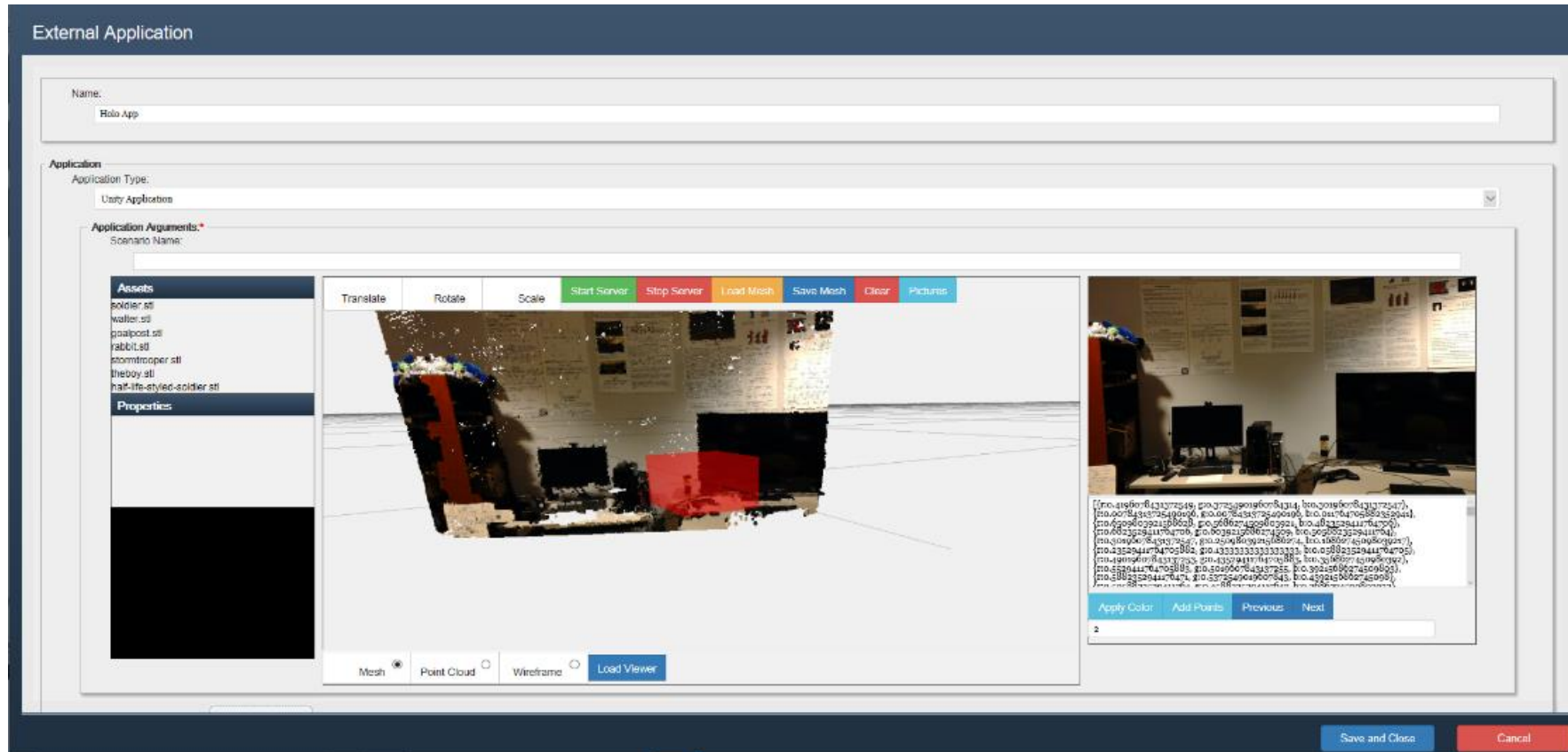
# Authoring Augmented Reality ITS

- Modify the scene from GARAT interface

- Append Real Time Assessment to the scene
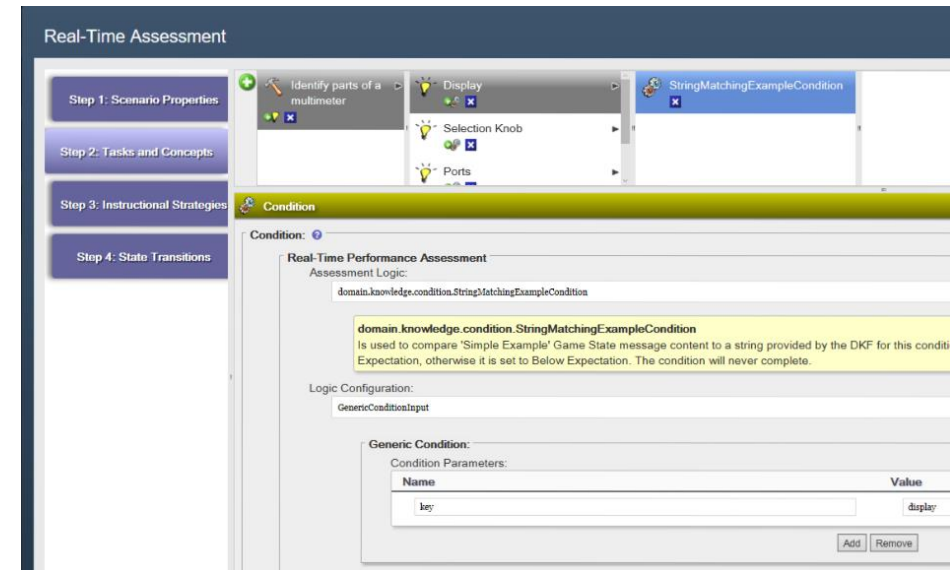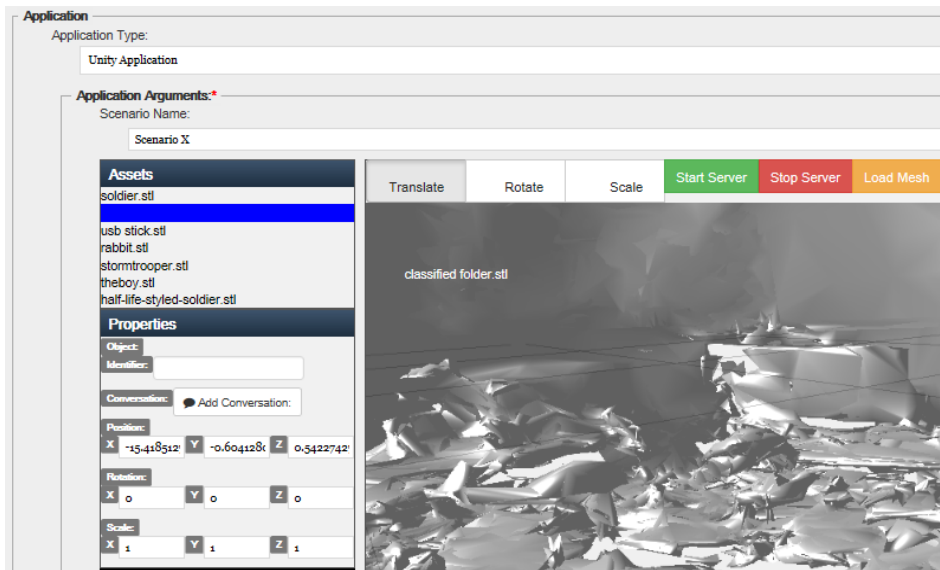
# Examples

- Tutoring System to identify security leaks on a Sensitive Compartmented Information Facility (SCIF)

- Tutoring System on the use of a Multimeter

# Identify security leaks on a SCIF

- Brief a user on specific rules for handling classified information
- In the tutoring application the user is asked to "Identify risk threats in the office"
- A risk can be identified by gazing and tapping over the virtual object
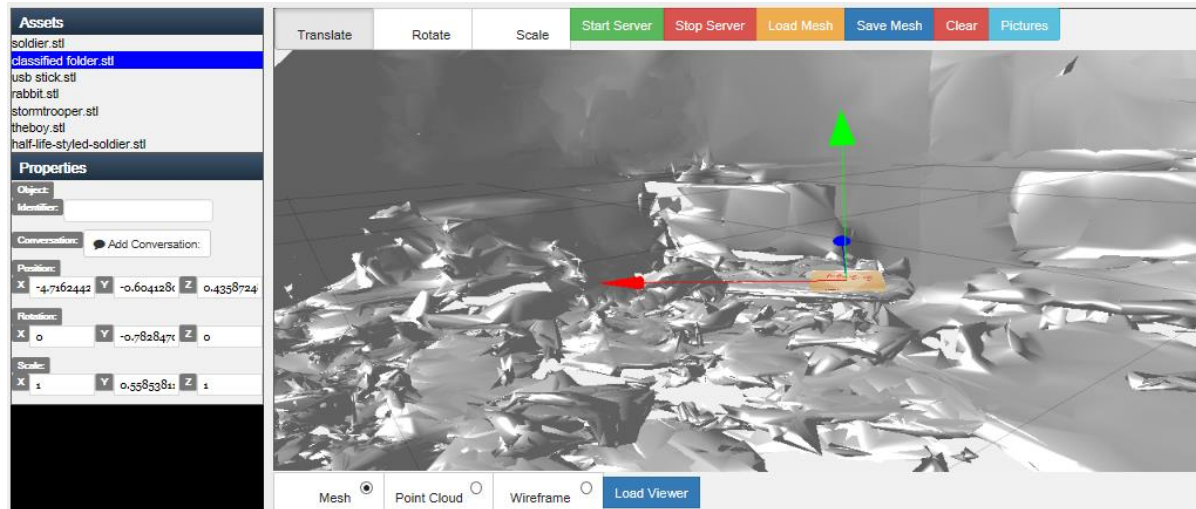
# *Use of a multimeter*

- Augments information over a multimeter
- The multimeter is divided in three parts: display, selection knob and ports
- The participant is asked to request information about the multimeter parts
- Information is requested by gaze and tap on the multimeter part
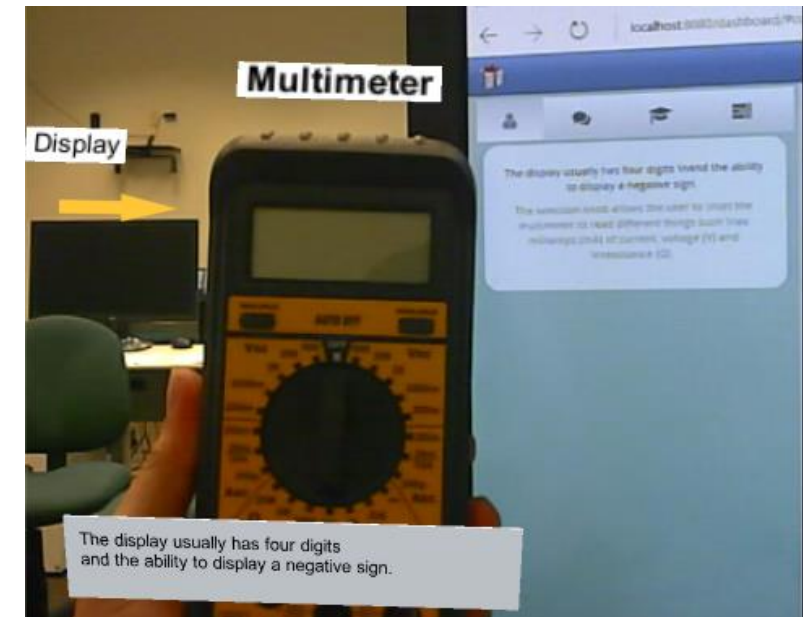
# Conclusions

- Development of a complete tutoring experience from GIFT represents a challenge due to the different capabilities, interaction techniques, physical tasks, etc. that could be needed

- This work aims to ease the pipeline introducing the GARAT tool

- Contribution:
  - Initial exploration in the use of GIFT as a generator of augmented reality tutoring courses
  - Tool for content generation of Augmented Reality scenarios
  - An XMLRPC server implementation to connect Windows Universal Apps to GIFT

# Future Work

- Develop an authoring tool for device tutoring

- A system that requires minimum programming needs to be developed and tested with regular users

- Scale the interface to produce more complex behaviors and training scenarios inside GIFT

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