Organization Name: PEREY Research & Consulting
Contact Name: Christine Perey
Contact Email Address: cperey@perey.com

What type of research project?

Analysis of Software or Hardware Issues

Topic of proposed research project:

Objective comparison of real world 3D object trackable capture procedures

Goal of research project (200 words):

Trackable files contain unique features of a 3D object that are used by recognition and tracking algorithms/technologies during the presentation phase of AR experiences. Due to the fact that there are many different recognition and tracking technologies, optimized for different target types (objects with edges, faces, hands and fingers, print, etc), there are many methods for capturing the 3D target.

For any unique object or a class of 3D real world objects each AR SDK has a unique (different) method for capturing a 3D target object in the real world to create a trackable file. The custom methods are based on one of three technologies for 3D reconstruction:
(1) still images (photographs) from many angles
(2) a point cloud generated by depth capture system
(3) Video captured while moving around the object

If the enterprise decides to change or use a combination of AR SDKs, today the trackable capture process must be repeated all over for all target objects.

Which method is best (how is high fidelity capture defined for real world targets?) for which type of object?
How are captured data compressed or stored for use in an AR SDK?
How can an enterprise's inventory be captured once for use in any/all AR SDKs?

At this time these questions are unanswered. There is a dearth of objective, information about different methods for capturing the real world target and creating trackables for use in AR authoring.

Enterprise customers need the AREA to help them streamline the process of getting from a concept and use case to using valuable AR experiences in the workplace and to protect their investments as the technologies improve.

Long term impacts of this research: It would improve interoperability, lower uncertainty and overhead for the enterprise customer if there were one consistent set of procedures to reliably capture a 3D real world object's features with photographs, 3D scanner or video.

What are the specific objectives for the research?:

1. Compare, choose (define) representative classes of non-deforming, non-reflective 3D target objects that apply to many AREA targeted industries. These objects will be used as references for the study. Describe the 3D target objects in 3D models, text and photographs.

2. In a report or spreadsheet, document (all) the different approaches to 3D target capture
(a) Names, vendors, publications in literature
(b) Define/document the capture procedures for the approaches identified

3. Test approaches to 3D target capture with the representative enterprise targets (deliverable #1) in different conditions frequently found in enterprise workplaces. Document the testing results in video/animation and other tools

4. Based on tests with different approaches for different circumstances/classes of enterprise targets (objective #3)
(a) Define metrics for expressing the fidelity (accuracy, precision) of a capture system's output
(b) Develop table of pros and cons for each method
(c) Suggest best practices that enterprises can use

Who do you think has expertise to conduct this research?:

One or more German universities (e.g., TUM)