

Authoring of Augmented Reality Manuals for Not Physically Available Products

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Abstract : In this work, we compared two solutions for displaying a demo version of an Augmented Reality (AR) manual when the real product is not available, opting to replace it with its computer-aided design (CAD) model. AR has been proved to be effective in maintenance and assembly operations by many studies in the literature. However, most of them present solutions for existing products, usually converting old, printed manuals into AR manuals. In this case, authoring consists of defining how to convey existing instructions through AR. It is not a simple choice, and demo versions are created to test the design goodness. However, this becomes impossible when the product is not physically available, as for new products. A solution could be creating an entirely virtual environment with the product and the instructions. However, in this way, user interaction is completely different from that in the real application, then it would be hard testing the usability of the AR manual. This work aims to propose and compare two different solutions for the displaying of a demo version of an AR manual to support authoring in case of a product that is not physically available. We used as a case study that of an innovative semi-hermetic compressor that has not yet been produced. The applications were developed for a handheld device, using Unity 3D. The main issue was how to show the compressor and attach instructions on it. In one approach, we used Vuforia natural feature tracking to attach a CAD model of the compressor to a 2D image that is a drawing in scale 1:1 of the top-view of the CAD model. In this way, during the AR manual demonstration, the 3D model of the compressor is displayed on the user's device in place of the real compressor, and all the virtual instructions are attached to it. In the other approach, we first created a support application that shows the CAD model of the compressor on a marker. Then, we registered a video of this application, moving around the marker, obtaining a video that shows the CAD model from every point of view. For the AR manual, we used the Vuforia model target (360° option) to track the CAD model of the compressor, as it was the real compressor. Then, during the demonstration, the video is shown on a fixed large screen, and instructions are displayed attached to it in the AR manual. The first solution presents the main drawback to keeping the printed image with everyone working on the authoring of the AR manual, but allows to show the product in a real scale and interaction during the demonstration is very simple. The second one does not need a printed marker during the demonstration but a screen. Still, the compressor model is resized, and interaction is awkward since the user has to play the video on the screen to rotate the compressor. The two solutions were evaluated together with the company, and the preferred was the first one due to a more natural interaction.

Keywords : augmented reality, human computer interaction, operating instructions, maintenance, assembly

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