Augmented Reality Manuals

Show How It's Done – New Methods for Augmented Reality Manuals

1. *An arbitrary sequence is automatically segmented into single actions and then learned by the system*

2. *To emphasize details the user can add visual overlays or let the system create them automatically*

3. *The display shows what the user currently sees visualized in his Head-Mounted Display*

Digital manuals that are faded in directly into the field of view of the user via a head-mounted display are one of the most often used application examples for Augmented Reality (AR) scenarios. AR manuals can significantly simplify or accelerate maintenance, reparation or installation work on complex systems.

When will AR Manuals have their breakthrough?

In order to make AR manuals really fit for use, the DFKI research department Augmented Vision works on the simplification of their creation by integrating AI technologies. So far, the so-called authoring process happened mostly manually and therefore involves considerable time and effort. The systems often need manually written, script-like descriptions of the activities; moreover, expert knowledge about the tracking system used and the installation of the tracking aids is necessary.

Learning by watching...

At CeBIT 2012, the DFKI research department Augmented Vision presents an AR manual that shows the user the necessary steps for the installation of a RAM bar in a notebook via a head-mounted camera. User-friendliness was in the focus of the development, so the authoring process has been significantly simplified. The system learns the necessary steps by singular or recurring demonstration of the respective action (1). Thereby it doesn't need special markers or other aids and also recognizes free-hand gestures, which distinguishes it from many other methods.

The authoring tool automatically decomposes a one-time viewed plot into single distinguishable parts and subsequently recombines them by means of a stochastic transition model. An observed action can be precisely mapped to one of these parts, and notes concerning the following steps can be overlaid at the exact moment (3). This type of learning ("teach-in") is a cutting-edge research topic in AI and especially in robotics and commonly referred to as "programming by demonstration" in the literature.

...watching and applying

The method also automatically generates respective overlays that fade in a half-transparent "shadow image" of the action to be carried out. Important details or additional references can be highlighted directly in the recorded sequence by inserting graphical symbols like arrows or lines (2).

The simplified authoring and teaching method opens up new fields of applications, for example, in quality management, as it can be used by specialists who are actually trained in those fields instead of software specialists. Skilled employees could record "reference work cycles", thus guaranteeing that subsequent repetitions are carried out in the exact same way (3).

Vision: Usable by everyone

The research department Augmented Vision is already working on an Android-smartphone version that would make the "AR manual" application available for consumers, too. They could thereby be supported, for example, in assembling furniture or when installing and operating household appliances.

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