

Newsletter

Issue 2 | December 2013

Visualization of Instructions

Within the Know4Car project the knowledge framework is used to support the training of operators through the advanced user interfaces and augmented reality (AR) techniques. The main objective is to reduce the overall training time of blue collar workers as well as to better communication between them and design engineers.

In order to support the operator the following four areas are being investigated in the Know4Car project.

Object Recognition and Tracking. Objects are tracked by using a template based object recognition algorithms that uses the CAD model of the object to be tracked.

User Interaction. The user interaction aims to perform the interaction between the system and the user.

Remote Assistance. Remote assistance functionality is thought to assist the shop floor operators in the performance of the operations from a remote location. The remote expert will be able to see through the goggles of the operator what is happening in the shop floor and help in the current task, by voice or by interacting with the virtual information.

Visualization. The visualization ROS node is able to visualize augmented content on top of live video in the correct position and orientation

Researchers from University of Patras and Technalia has built a tool that uses the Know4Car Knowledge Platform to track objects to be assembled and present both graphical and text-based instructions to the operator for how to complete the operation. An example of the information presented to the user is in Figure 1 below.

The approach will be evaluated together with the Centro Ricerche Fiat.

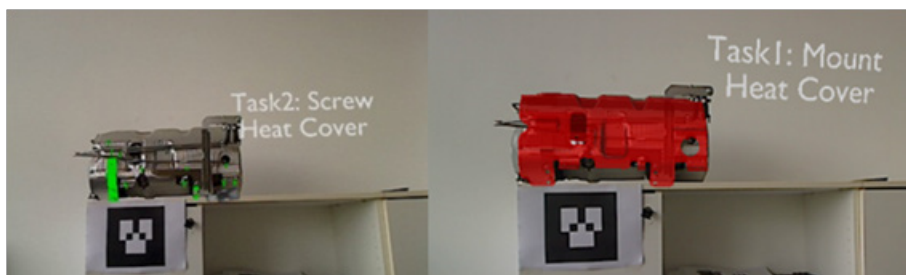


Figure 1. The instruction "mount heat cover" is represented now by highlighting the heat cover and by a text describing the task.

Training with Visual Tracking of Shop-floor Operators

The main aim is to improve training sessions by making them more enjoyable for the user. To aim is to use RGB-D cameras to track an operator while in training. This will make it possible to base on the Know4Car Knowledge Platform to give the operator context-aware work instructions. Due to the use of Cameras and advanced tracking technology this does not require any involvement of the operator. Researchers at Chalmers University of Technology are together with AB Volvo evaluating the technology.

The approach to use RGB-D to track and support operators being trained by giving context aware and accurate instructions are novel. Recent advances in RGB-D cameras and efficient tracking algorithms that are able to do real-time tracking has recently become available.

The measurements focus on time related measurements. The first reason is that time related measurement can easily be compared between different sessions, and they clearly make sense to the end-user. The second reason is that during production a maximum assembly time is allowed per station: a delay in one station would delay the whole assembly line.

To not be intrusive to integrity of the operator only the hand movements of the operator might be tracked, this is illustrated in Figure 2.

The graphical visualization of instructions and the tracking of operators complements each other in the sense that tracking will enable better understanding of what the operator is currently doing and that information can be used to provide more accurate instructions to the operator.

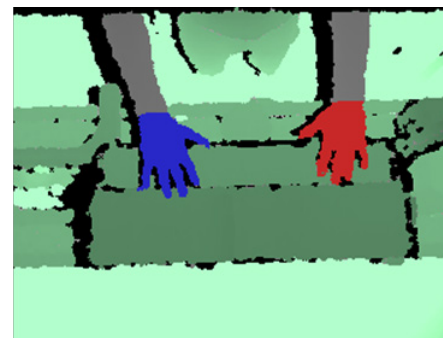


Figure 2. RGB-D camera used to track hand movements of worker performing assembly operation.

News

Know4Car General Assembly Meeting

When: March 31, 2014 from 09:00 AM to 12:00 AM

Where: Online - GoToMeeting

Contact Name: Dr. Nikolaos Papakostas

Recent publications

A Knowledge based collaborative platform for the design and deployment of manufacturing systems

George Pintzos, Loukas Rentzos, Konstantinos Efthymiou, Nikolaos Papakostas and George Chryssolouris, PLM Conference 2013.

Online support for shop-floor operators using body movements tracking

Julien Provost, Amir Hossein Ebrahimi, Knut Åkesson, 12th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems.

Augmented Reality for Human-based Assembly: Using Product and Process Semantics

Loukas Rentzos, Stergios Papanastasiou, Nikolaos Papakostas, George Chryssolouris, 12th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems

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