General project description

Welding is one of the most important industrial assembling methods. There are more than 45 million welders worldwide. A welding helmet shields the welders’ eyes from radiation emitted by the welding arc but also restricts vision to the parts to be welded.

The IntARWeld project deals with supporting the welder before, during and after the welding process. One subject during welding is to introduce a Selective Auto Darkening Filter in the welder views which darkens only those parts of the view where the glaring arc occurs. For this the 3D position of the arc relatively to the welder, needs to be extracted by cameras which are suitable to map a high dynamic range of contrast to a gray scale image.

Before and after welding some additional information about the process parameter set and the workpiece shall be blended into the user’s view. For this purpose a framework for using any kind of tracking sensor shall be implemented including the needed VR environment based using OpenSG. Exemplary a 6 DOF gyroscope with compass and bearing sensor shall be used. Depending on the number of the project participants, the work can be expanded to the field of trapezoidal / geometric distortion compensation of the projected image.

Project: Sensor- Projector Framework

The project offered here, deals with a new augmented reality paradigm where the AR data is directly projected onto the environment by using micro projectors.

In order to place the information fixed to the metal sheet a tracking sensor system needs to be implemented with 3 to 6 degrees of freedom. The tracking is used for steering the viewpoint of a virtual camera in a virtual reality world. This VR maps the geometry of the real environment and is enriched with data for the welder e.g. if the welder looks left of his workpiece then the welding machine parameters are projected, if he looks right the actual CAD drawing is shown on the sheet.

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Requirements:

• Good programming skills
• Independent and organized working style, contributing own ideas, producing clean results
• Eager to get into touch with and learn new methods and tools

Recommended lectures:

• C++ Basics and Applications in Technical Systems
• C++ for Advanced Programmers

Advantages:

• OpenGL, OpenSG, OpenCV, Linux
• Experiences with model-driven software development (MDD), UML, object-oriented programming,