



Human Machine Interaction in the Information Society

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Augmented Reality

for development, production and service

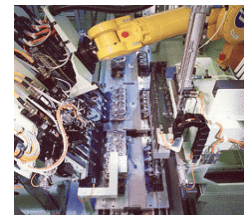
Our Objectives

Our lead project ARVIKA, sponsored by the BMBF (ministry of education and research) and supervised by the DLR (German Aerospace Center), uses augmented reality (AR) technologies to research and create a user-oriented and system-driven support of operation procedures. It focuses on the development, production, and service of complex technical products and systems. Augmented-reality technologies improve your working environment by merging real objects with computer-generated virtual objects to allow for detailed engineering and processing instructions.

The project ideas are realized in various application areas of German industry, such as automobile manufacture and aircraft construction, mechanical engineering and system development. Particularly mid-sized enterprises can use these technologies to improve and facilitate analysis and

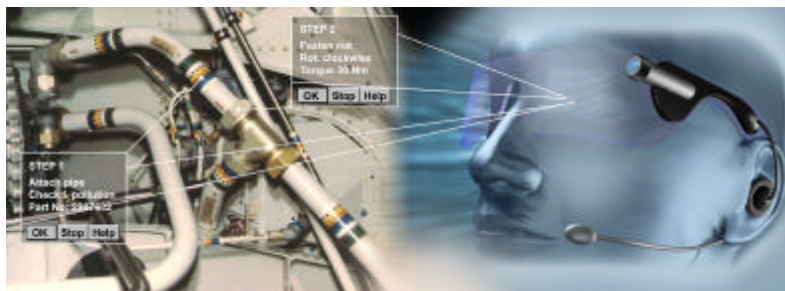


operations to become more efficient and flexible in the global business competition.



What does augmented reality mean?

Augmented reality is a novel approach to the interaction between human and machine. You can, for example, view information using a head-mounted display. The information is displayed context-sensitive, which means that it depends on the observed objects, such



as a part of an assembly. The engineer can now display job-related assembly data, while viewing the real object. In this case augmented reality replaces the conventional instruction manual.

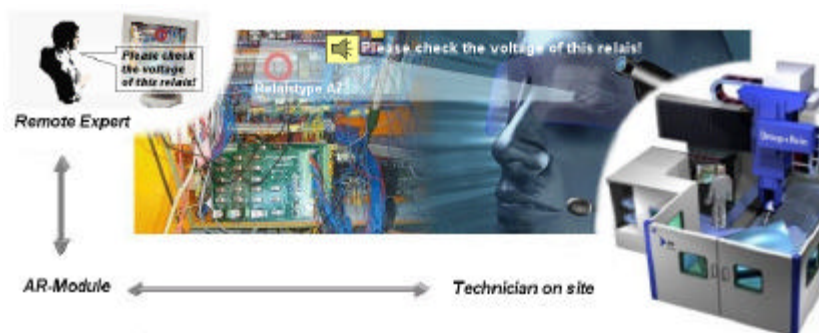
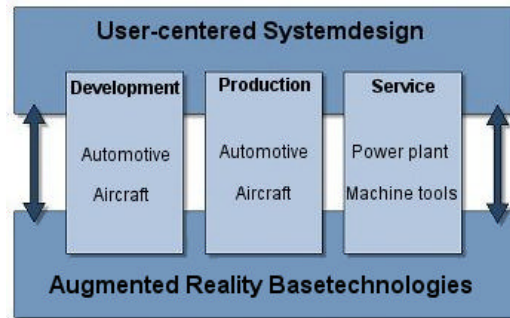
In addition to this, wearable computers can be applied in AR areas where mobility is very important and, for example, if data concerning processes, measurements and simulations are needed to support the task at hand.

The crash test illustration shows another application scenario. After a crash test the development engineer can see the distortion and at the same time use the AR system to display the expected distortion based on simulation. Differences can be detected and analyzed on the spot.



Application areas and procedures

The main application-related topics of ARVIKA aim to verify augmented reality in the development, production and service cycles of the products being used. This also includes the service of the machines and systems required for the production environment. The scheduled project concentrates on the following areas: *development*: automobile and aircraft; *production*: automobile manufacture and aircraft construction; *service*: system techniques, in this case power stations and the tools and machines required for the production. This covers the major application areas of AR, avoids duplicate developments, and enables a profound, application-oriented verification of this novel technique.



The project phases go along with user-centered systemdesign that is based on scientific methods. All application in this research are based on AR Base-technologies supporting both the high-end/power applications in the development process and

the low-end activity of the skilled worker using a belt-worn equipment in the real production and service environment. This is realized by an open platform that allows for different performance grades and especially for true wearability. This project is geared to support market requirements in production, manufacturing, and service-oriented information and communication technologies to be used by skilled workers, technicians and engineers.

The whole project will comprise four years (7/1999 – 6/2003) and is divided into two parts. For each part of the project, prototypes will be provided.

The Consortium

With regard to requirements and tests in industrial applications and scientific research, the interdisciplinary consortium, which comprises different business areas ensures the realization of the ambitious objectives:



- Enterprises in the area of automobile manufacture and aircraft construction: DaimlerChrysler, VW, Audi and Ford
- Mid-sized enterprises in the area of tools and machine production, such as DS Technologie, Hüller-Hille, Gühring, Index and Ex-Cell-O
- Integrators, service and other companies, as A.R.T, UID and VRCom
- For IT technologies: Fhg-IGD, ZGDV and TUM, for the applications: the Werkzeugmaschinenlabor WZL and the Institut für Arbeitswissenschaften IAW of the RWTH Aachen and
- Siemens as a user, integrator, and the head of the consortium.



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