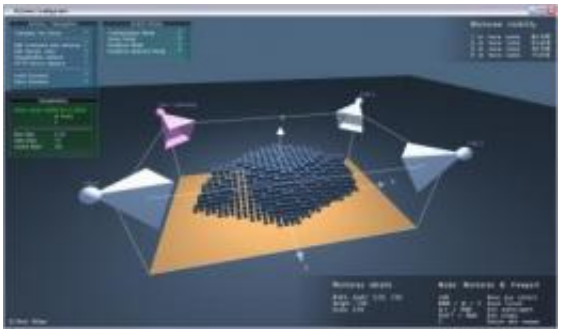
# 'Good-bye, blind spot' -- man and machine always in view

March 22 2011



The intelligent monitoring system illuminates the entire production hall in an optimum manner. This is how dangerous situations between man and machine can be prevented. Credit: Fraunhofer IDMT

Particular care must be taken in a production hall where robots and men work together, where even minor carelessness could result in serious accidents or stop production. At the Hannover Messe trade fair that is taking place from April 4-8, Fraunhofer researchers are introducing a new prototype for intelligent safety monitoring in industrial workplaces.

Move forward, pick up the component, immerse it in the galvanizing bath, move backwards, and deposit the component – the immersion robot is working continuously to coat metal plates. If an employee is not watchful, collisions can occur. If the person suffers an injury, the process stops. In case the duration of the stop is too long, parts of the robot and components must be completely replaced. Peter Pharow, head

of the Data Representation and Interfaces Group at the Fraunhofer Institute for Digital Media Technology IDMT in Ilmenau, Germany, is familiar with this problem. Working with several partners from the Thuringia region, the IDMT specialists have developed an intelligent monitoring system for industrial workplaces that makes it possible to predict dangerous situations between man and machine. The roster of partners includes an image processing center, several manufacturers and companies that work with image processing and the use of robots.

The configuration tool "Sim4Save" is part of the monitoring system. Sim4Save is an in-house development of the IDMT and helps furnish the production hall with an optimum number of cameras. To achieve this, they simulate a 3-D model of the production hall displaying the various working areas of interest. The system tells the user how many cameras are required to be able to monitor all safety-relevant areas of the production hall. There are no more blind spots or dark corners. "The number of cameras may vary depending on the safety requirements of the company," says Peter Pharow. "Not only does our system help set up the cameras optimally and eliminate long trials, but it also aids in targeting their viewing angle".

In addition to the Sim4Save configuration tool, other newly developed components of the intelligent monitoring system include a communication platform, the connected hardware – robots in particular – and various pre-processing systems. During routine operation, data from all cameras, ideally also fastened to the gripping arms of the robots, are recorded in real time, analyzed and evaluated. "Our specialty is predicting dangerous situations. In an ideal situation the employees can be warned early enough so that there are no accidents," explains Pharow. The scientists use the communication platform they developed, to which configurator data have been transmitted ahead of time. If a collision is imminent during the work process, an alarm will sound, and the system will automatically be slowed down or even stopped. The response time

and the reaction itself depend, just like the number of cameras, on the safety requirements of the respective company and the working behavior of the robot. Such an appropriate reaction could range from a simple sound to an immediate total shutdown of the affected machine.

The intelligent monitoring system has been in development for three years, in the "BildRobo" project. The term is composed from the two areas involved: image processing and robotics. "Developing a prototype and not a series-ready product was the goal from the beginning. Our next step is to prepare for mass production," explains the IDMT project manager. IDMT researchers will show the Sim4Save configuration tool at Hannover Messe in Hall 17, Booth E58.

In addition to the configuration tool, more projects from the numeric simulation will be introduced at the joint Fraunhofer booth. For example, the "Factory DNA" from the Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB in Karlsruhe: Can an old production facility be used to produce a new product? How many parts will have to be replaced? The Factory DNA answers these questions – a virtual planning system. Just as with human DNA, the simulation helps interrelate the life cycles of factory objects – products, production facilities and IT systems. A universal synchronization guarantees consistent data management and continuous data exchange within the IT systems. These data permit evaluation of the extent to which production facilities and IT systems can be used to manufacture new products.

Provided by Fraunhofer-Gesellschaft