

Development Report:

USA² – Ubiquitous and Robot Assisted Cloud Manufacturing in an Ageing Society

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In the project USA² (Ubiquitäres und Selbstständiges Arbeiten in einer alternden Gesellschaft), a robotic, mini-factory-like workspace was developed which integrates novel technologies from the field of telepresence, cooperative robotics, seamless interaction, 3D printing and cloud manufacturing.

Keywords: robot assisted working, cloud manufacturing, seamless interaction, mini factories, ageing society

Due to an ageing society, in 2030, Germany will have 7 million less workforce than today. This threatens to lower the gross national product by about 16% and also translates to an enormous loss of knowledge [1]. This project, depicted in **Fig. 1**, therefore examines the topic of productivity of the elderly, knowledge transfer, and in particular the use of complex production and assembly knowledge in the context of an ageing society. The project takes into account that Germany has a high level of education and technology and can achieve competitive advantages internationally, in particular through the production of complex and individualized product-service systems. The project also specifies options that aim at integrating the elderly in their home environment in such manufacturing processes and focuses on techniques from the field of cloud manufacturing while simultaneously making use of personal assistance technology (**Figs. 2 and 3**). The elderly can be supported by such concepts and working in various forms of decentralized “home labs” representing important nodes in a value-creating network of resources. The project explores and shows how the integration of decentralized workspaces for manufacturing, planning and service provision into the living environment of elderly could be accomplished, so that the social participation, life perspective and health of the elderly are influenced in a positive way.

Individual nodes in such a network are highly flexible and can connect to various temporary value chains. The USA² assisted workspace integrates a set of advanced technologies (a Telepresence System, Kinova’s JACO robotic arm (visible in **Figs. 3 and 4**), mechatronically-actuated shelves, vital signs measurement technologies, Vuzix smart glasses, robotic mobile platform) into a complex system. Furthermore, the workspace integrates a system for laser scanning and a system for 3-D printing [2] (see **Fig. 4**). The integrated systems of the desktop man-

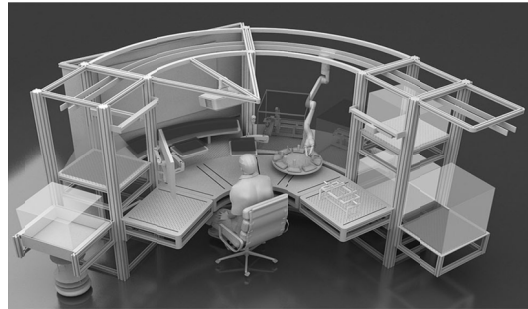


Fig. 1. Outline of workspace.

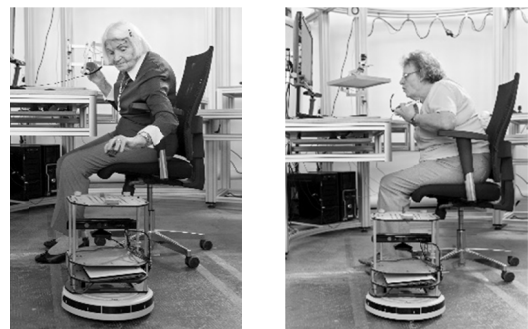


Fig. 2. Product manufacturing by elderly.



Fig. 3. Usability study with an elderly test person.



Fig. 4. Manipulation of objects with Kinova’s JACO robot.

ufacturing mini factory allow “one of a kind” production of highly complex, customized products.

References:

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- [2] H. Lipson and M. Kurman, “Fabricated: The New World of 3D Printing,” New Jersey: John Wiley&Son, 2013.