



Robotics and Virtual Technology Research in Lappeenranta Univ. of Tech.

ABSTRACT:

Institute of Mechatronics and Virtual Engineering (IMVE) is a research laboratory in Department of Mechanical Engineering, Lappeenranta University of Technology. IMVE is expert in dynamics of mechatronic machines ranging from forestry and agricultural machines to industrial robots. IMVE has participated the nuclear fusion reactor program ITER from year 2000. IMVE has been developing the key assembly robotic system for ITER Vacuum Vessel. The robotic system is based on parallel mechanism. The laboratory has also carried out research in other parallel robot applications. In addition to robotics IMVE has developed sophisticated simulation technologies particularly suitable for real-time applications. Modelling methods, algorithms, and motion platforms have been developed for complex mechatronic machines for R&D and training purposes. One of the main goals is to make it possible to use real-time simulators in R&D purposes of mobile machinery to include the test driver into the R&D process and thus improve the usability of new products. The lab also tends to combine cognition science and traditional engineering methods and has recently introduced the psychomechatronic approach.

Heikki Handroos (born 1960) has been Prof. of Machine Automation and Head of Institute of Mechatronics and Virtual Engineering (IMVE) in Lappeenranta University of Technology since 1993. He earned his M.Sc and D.Sc degrees in Tampere University of Technology, Finland 1985 and 1991. His research interests range from modeling, simulation and control of mechatronic machines to serial and parallel robotics. He has published about 150 international scientific journal and conference papers. IMVE is part of LUT centre of excellence in research in virtual design. Handroos has led joint projects between industry and academia whose total budget exceed 10MEuro. He has been leading research group developing a key robotic system for assembly of vacuum vessel of ITER fusion reactor since year 2000.

Raziskave v robotiki in virtualnih tehnologij na Tehnični univerzi Lappeenranta

POVZETEK:

Inštitut mehatronike in virtualnega konstruiranja (IMVE) je raziskovalni laboratorij Oddelka za strojništvo, Tehnična univerza Lappeenranta. IMVE se je specializiral za dinamiko mehatronskih naprav vse od gozdarske in kmetijske mehanizacije do industrijskih robotov. IMVE od leta 2000 sodeluje v programu razvoja fuzijskega reaktorja ITER. IMVE razvija ključni robotski sistem za sestavo vakuumске posode ITER, ki temelji na tehnologiji paralelnih mehanizmov. Laboratorij izvaja tudi druge raziskave na področju le-teh. IMVE je med drugimi razvil tehnološko izpopolnjene simulacije primerne za podporo aplikacijam v realnem času. Izdelane so bile različne metode modeliranja, algoritmi in dinamične ploščadi za kompleksne mehatronske naprave za potrebe R&R in učenja. Glavni namen simulatorjev v realnem času je vključevanje uporabnika simulacij v R&R za izboljšanje uporabnosti novih produktov. V laboratoriju stremijo tudi k združevanju kognitivnih znanosti in tradicionalnih metod konstruiranja. S tem namenom so nedavno predstavili psihomehatronski pristop.

Heikki Handroos (rojen 1960) je predavatelj predmeta Automatizacija strojev in vodja Inštituta za mehatroniko in virtualno konstruiranje na Tehnični univerzi Lappeenranta od leta 1993. Magisterij in doktorat je opravil na Tehnični univerzi Tampere v letih 1985 in 1991. Njegovo raziskovalno delo zajema področja od modeliranja, simulacij do krmiljenja mehatronskih naprav ter serijskih in paralelnih robotskih mehanizmov. Objavil je približno 150 mednarodnih znanstvenih in konferenčnih prispevkov. Laboratorij IMVE je del centra odličnosti LUT, ukvarja pa se z virtualnim konstruiranjem. Handroos je vodil skupne projekte industrije in znanosti katerih proračun presega 10 milijonov Eurov. Je vodja raziskovalne skupine, ki razvija ključni robotski sistem za sestavo vakuumске posode ITER reaktorja od leta 2000.

