force dimension

touch. instinctive exploration

haptic technology and applications
September 2009

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Philips Applied Technologies
Deutsche Luft- und Raumfahrt
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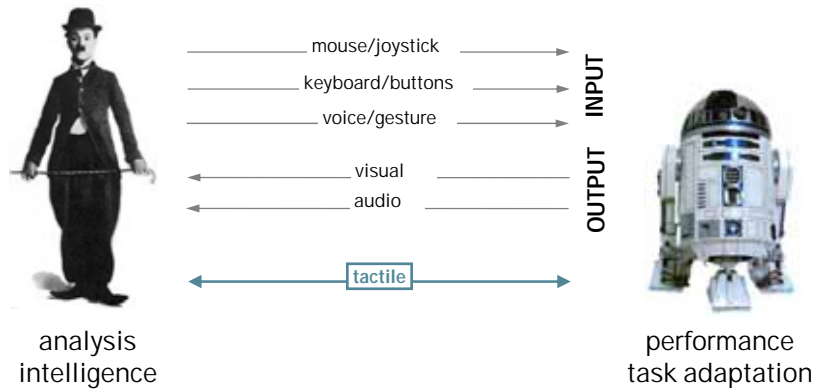Hansen Medical

company presentation

provider of haptics technology

l based on more than 15 years of cutting-edge haptic research
Swiss Federal Institute of Technology (EPFL)
R&D projects with wide range of industrial partners worldwide

l company founded in 2001
headquarters located in Nyon, Switzerland
regional offices in North America and Asia Pacific

NYON

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human perception

human computer interaction

mouse/joystick
keyboard/buttons   INPUT
voice/gesture

visual
audio   OUTPUT

tactile

analysis
intelligence

performance
task adaptation

2

human perception

creating the illusion of continuity

graphics rendering
[25 Hz]

haptics feedback
[1000 Hz]

haptic interfaces

omega.3 | .6 | .7

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haptic interfaces

delta.3|6 – edition 2009

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haptic interfaces

domains of expertise

l haptic solutions
   design
   manufacturing
   technology licensing
   OEM partnerships

l custom hardware
   tailored for specific requirements
   expertise in parallel mechanics design

l software integration
   Windows, Linux, Apple
   real-time platforms (QNX)
   system integration

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applications

3 types

simulation	**tele-operation**	**gesture guidance**
learning, training	remotely control a	collaborative haptic fixture
assessment, certification	slave robot or camera	smart tool-holder
psychophysics	tele-presence	haptically augmented reality
experimentation	augmented reality	
planning	force feedback from any	
design	sensor or model	
virtual realities		
virtual environments		

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robotics

advantages of haptic robot control

- remote operation
  environment hostile to humans
  environment inaccessible to humans
- force scaling
  increase human sensitivity
  increase human strength
- geometrical scaling
  increase human precision
  increase human motion range
- user "feels" the environment
  keep slave robot away from obstacles
  feel obstacles before collision
- user "feels" robot limitations
  workspace boundaries and
  singular postures of slave robot
  velocity limitations
  tracking errors
  dynamics

- add/remove haptic information
  guidance
  virtual grids
  attractors
  exclusion regions
  augmented reality
  vibro-tactile queues
  filter user's tremor
  damping

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medical (Philips)

Tele-Operation of Ultrasound Probe

l Philips Applied Technologies
healthcare division

l provides realistic tactile feedback
necessary for accurate ultrasound exam
allows for remote diagnostic
reduces operator fatigue

l uses omega.6
6-dof position input
contact pressure feedback

PHILIPS
sense and simplicity

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medical (DLR)

MIRO interventional robot

l highly-versatile
dexterity and workspace similar to human arm
kinematically redundant
designed for wide range of surgical tasks

l advanced robotic control
position and torque sensors
end-effector equipped with force sensors

l advanced user console
includes a dual omega.7 setup

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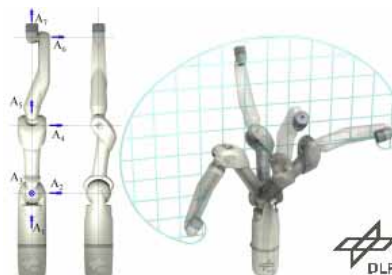
medical (DLR)

MIRO interventional robot

© DLR MiroSurge - a robotic system for research in minimally invasve surgery with haptic feedback

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aerospace (SRI)

operating in critical environments

l bi-manual control of surgical robot
with force-feedback
in micro-gravity or moving contexts

l dynamic gravity compensation
sensors measure environment gravity
haptic device stabilizes gesture

l tested in micro-gravity
using parabolic flights aboard NASA's C9

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medical (Hansen)

haptic workstation

- **high precision force-feedback interface**
  with universal, stylus or grasping capabilities
- **wide multi-screen display**
  to combine multi input imaging systems
- **advanced ergonomics**
  for higher precision and dexterous control
- **certified**
  FDA, CE

hansen MEDICAL

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thank you

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