R&D-activities related to 3D motion analysis and visualization at HiST
AITeL

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R&D-activities related to 3D motion analysis and visualization at HiST,
AITeL

• PhD-studies:
  – “Motion capturing, 3D-visualization and analyses of ski jumping” (Atle Nes)
  – “Real time Markerless motion capture and visualization of human movement” (Rune H. Bakken)

• The TrondheimSim
  – Simulation and 3D-visualisering of virtual Trondheim

• R&D- projects
  – “Real time 3D Data Capturing and Visualization of Human Motion in Complex Environments”

• LocMoc-project

• Cooperation with:
  – NTNU- IDI, -Programme for Movement Science, -Geomatics, HiST AHS,
    Olympiatoppen dep. Trh., Bonn Univ. College, IT-University København,
    StatoilHydro, Kongsberg SIM

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Prior R&D-project

HYDRIV:

Development and implementation of novel Imaging Velocimetry techniques suited to large scale hydraulic facilities. 2000-2003

Coriolis lab in Grenoble: Rotating tank, diam = 13 m

PhD-Study

www.hist.no
Video-recordings in Granåsen
PhD-scholarship holder Atle Nes

• Ski Jumping Hill:
  Calibration points (Metal bolts white balls + well defined features points)

• Ski jumper:
  Signalised points (Strategically placed on the jumping suit)

Software and accuracy

• Synchronised video recordings
  (Own developed software)

• 3D-Motion capturing Calculations
  (Own developed software)

• Camera system calibration
  (Distance 40-60m 5 cm xyz accuracy)

• Visualization
  (Own developed software)
3D Visualization

Granåsen ski jumping arena

3D-Visualization

- A 3D digital model of a ski jumper
3D-Visualization

Video 1  Video 2 (from helmet)

Simulation and 3D-visualization of virtual Trondheim (demo)
R&D project
"Real time 3D Data Capturing and Visualization of Human Motion in Complex Environments"

Main objective:
Develop a high precision, low-cost portable system which integrates real-time 3D motion capturing and visualization of human and industrial movements, in complex environments.

Ongoing activities:
• Software/hardware integration
• Algorithms development
• Motion capturing
• Real time visualization of 3D-models
• Establishing of a Motion capture and visualization laboratory

Motion Capture and visualization laboratory

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Motion Capturing System for laboratory 1

**Kamera: Oqus 3 Serie (Qualisys)**

- Infrared and high speed video
- CMOS image sensor: 1280 * 1024 pixels
- Max recording frequency with full resolution and FOV: 500 Hz (image/sec) With reduced FOV: 10000 Hz

Software: QTM (Qualisys)
System Calibration and motion analysis
2D and 3D data can be exported to e.g. C3D, TSV and directly to Matlab file formats

Motion Capturing System for laboratory 2

**3AVT Marlin F080B (b/w)**

Digital Video Cameras:

- Digital interface: 1394a FireWire I/IDC.
- Picture size: 640x480 (VGA) x 30 fps
- Resolution depth: 8-bit greyscale.

[Link to Allied Vision Technology](http://www.alliedvisiontec.com)

Video data + Control signals

Synch pulse

[www.hist.no](http://www.hist.no)
Motion Capturing System for laboratory 3

• Two Projectors: 2 F1+ SXGA+ 1 (Projection Design)
  Resolution: 1400 * 1050 pixels
  Light: Up to 4200 lumens
  Lenses: Ultra Wide 1:1
  Two projectors mounted in a special constructed frame for passive stereo
  3D-visualization

• Two front projection screens 3.00m * 2.25m and 2.13m * 1.53m (Da-Lite Cinema Contour)
  One back projection screen: 2.20m * 1.65m (Stewart Film Screen)

• Surround sound: Logitech Z-5450

• Workstation: Dual core processors Intel Core Duo E6600 2.4 GHz, 4 MB cache, four
  PCI-e busses
  Hard disk: 2 * 10 000 rpm i RAID-5
  Graphic card: ASUS GeForce 7600 GS (nVidia) 2GB RAM (PC2-6400)

The LoCMoC project(2008)

• LoCMoC is a Bachelor project at HiST, AITeL
  – Computer Engineering Programme

• Main objectives
  – to develop a lowcost visualization system for motion capture data

• Video, Application

• The students:
  – Are Akselsen,Tommy Fredriksen,Håvard C. Skåle

• http://stud.aitel.hist.no/locmoc/
R&D - Motion capture and 3D-visualization staff at HiST AlTeL

Associate Prof. Mildrid Ljosland
PhD-scolarship holders Atle Nes og Rune Bakken
Assistant Prof. Grethe Sandstrøk
Associate Prof. Jan H. Nilsen
Assistant Prof. Tomas Holt
Associate Prof. II Bjørn Sæther, (Ikke tilstede)

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