DTP2 Control Systems

Euratom-Tekes Annual Fusion Seminar 2012
Janne Tuominen
DTP2 Remote Handling Environment

- Two teleoperated, waterhydraulic manipulators: CMM and Multi purpose manipulator (WHMAN)
Overview of the RH Control Systems
Operation Management System

- Sequences of coordinated operations to fulfill complex tasks
Command & Control (GUI)

- Operator’s primary tool to control RH equipment
- Displays current equipment states and condition
Virtual Reality

- VR environment reflects data received from the real device’s controllers
- Complex manipulators can be operated without line of sight
Computer Assisted Teleoperation

- Virtual paths can be generated to add artificial forces for guidance
- Virtual walls can be generated around objects
- Operator feels forces that push the slave arm towards the optimal path or away from impending collisions
- Manipulator movement can be stopped before actual collisions
Input Device

- Manipulators can be operated with a slave arm
- Force feedback is used to help the operator
Equipment Controller

- Hard realtime controllers
- Measures joint positions, valve states, pressures, etc.
- Controls all the actuators according to the operators commands
- Monitors the state and performance of equipment
Structural Simulator

- The dynamic behavior of the CMM needs to be compensated in load lifting situations
- A model is used to compensate for deformations during movements
Remote Diagnostics

- Records commands and sensor feedback data
- Detects anomalies in the equipment during operations
- Offline analysis of the recorded data to improve the efficiency of maintenance operations
Viewing System

- A network of cameras will act as the eyes of the operator in the divertor
- Limited possibilities to use cameras due to radiation and shortage of clear space
- Intelligent algorithms are used to track RH equipment
VTT - 70 years of technology for business and society