Control and Architectures
Chairs: James Albus, Ning Xi

4-D/RCS Reference Model Architecture for Unmanned Ground Vehicles

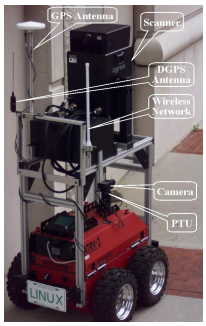
J. S. Albus
National Institute of Standards and Technology

- Hierarchical structure of plans and commands
- Representation of the world at five hierarchical levels
- Planning, replanning, and reacting at five levels
- Many sensors – stereo CCD & FLIR, LADAR, radar, inertial, acoustic, internal

Design, Architecture and Control of a Mobile Site-Modeling Robot

A. Gueorguiev, P. Allen, E. Gold and P. Blaer
Columbia University

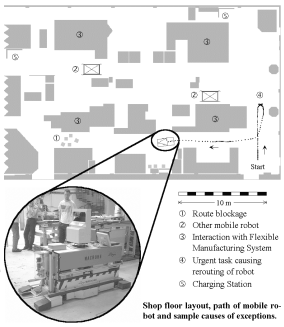
- Autonomous robot navigation
- Sensor integration and distributed architecture
- Successfully followed a 210m complex trajectory
- Sensor integration leads to higher accuracy; distributed computing helps process large amounts of data



A New Approach for Context-Based Exception Handling in Autonomous Mobile Service Robots

D. Glueer and G. Schmidt
Technische Universitat Munchen

- Task oriented exception handling for free navigating robots
- Relational Algebra, Petri Net models, hierarchical system structure
- Evaluated in Shop-Floor and office environments
- Significant reduction of MTBF, cascaded exceptions covered, alternate therapies applicable



Shop floor layout, path of mobile robot and sample causes of exceptions.

BERRA : A Research Architecture for Service Robots

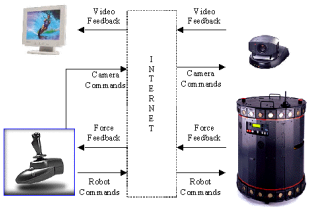
M. Lindstrom, A. Oreback and H. Christensen
Royal Institute of Technology

- Requirements on a Service Robot Architecture
- Design and Implementation Issues
- Experiments performed on our Robots
- Comparisons with other Architectures

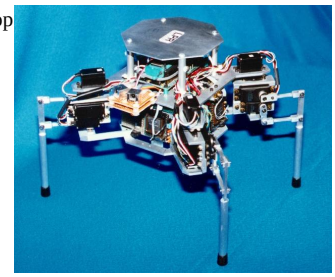
Real-Time Control of Internet Based Teleoperation with Force Reflection

Imad Elhajj[1], Ning Xi[1] and Yun-hui Liu[2]
[1]Michigan State University and [2]The Chinese University of Hong Kong

- Overcoming random time delay in Internet-based tele-operation with force reflection
- Event-based control applied to overcome the instability and de-synchronization caused by delay
- Tele-operation with force reflection was experimented between a robot in Michigan State and an operator in Hong Kong
- First real-time tele-operation with force reflection over the Internet



A Hybrid Architecture for Hierarchical Reinforcement Learning

Manfred Huber
University of Texas, Arlington

- Efficient acquisition of closed-loop control policies
- Uniform treatment of basic actions and learned strategies
- Skill transfer to improve learning speed and quality
- Application to increasingly complex locomotion tasks