Robust Robot Software using Process Orientation

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Cagri Yalcin, Jan Broenink

Control Engineering, University of Twente, The Netherlands
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Work Package 6 (2 PhD Students)

Autonomy: the potential of an intelligent man-made mechanism to interact with its environment without human intervention in its decisions about this interaction.

The robustness of robot autonomy: sufficiently safe, accurate, etc. (i.e. within specifications) interaction over a maintenance interval.
- Physical systems modeling and control point of view
- Concurrent software point of view
- Translation from software dependability to robotics domain
  - emphasis on uncertainty: partially observable, stochastic environment
- Fault Detection, Identification and Reconfiguration (FDIR)
  - At both hard and soft real-time layers of embedded software
Possible Approaches

- Providing design criteria for robot software architectures
- Expert systems & ANN
- Probabilistic decision making via particle filters for faulty state estimation

- Process oriented software
  - Able to represent multiple layers of embedded software
  - Able to represent different robot software architectures (e.g. subsumption)
  - Real-time and robust FDIR (exception handling via channel poisoning (Jovanovic, 2005), run-time priority altering, dynamic network creation)