The Use of Kinematic Redundancy for Failure Tolerant Robotic Manipulators

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ABSTRACT: Operations in remote or extremely hazardous environments are frequently performed by robotic devices. Unfortunately, the very nature of these environments makes the probability of a failure highly likely. Because by definition the operating environment precludes the intervention of a human to repair or retrieve the device, fault tolerance becomes a critical issue. This presentation will focus on two approaches for designing failure tolerant robotic systems: (a) using kinematic redundancy to maximize potential dexterity after a failure, and (b) implementing real-time control software to anticipate failures and guarantee graceful degradation in performance after a failure.

BIO: Tony Maciejewski received a PhD degree in electrical engineering in 1987 from Ohio State University. He joined the faculty of Purdue University in 1988 and became a full professor in 1998. In 2001 he joined Colorado State University where he is currently Head of Electrical and Computer Engineering.

Maciejewski's research is in the analysis and control of kinematically redundant robotic system and has been supported by industry, national laboratories, and other federal sources. He has over 200 publications and is a Fellow of IEEE. His commitment to education has resulted in four teaching awards. He holds leadership positions in both the R&A and SMC Societies of IEEE.