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Getting a "Feel" for Haptics:

The Design and Control of Kinesthetic Haptic Displays

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ABSTRACT

Kinesthetic haptic displays use force feedback to render a realistic sense of touch to a human operator. They are used in a wide range of applications such as surgery, mining, and virtual/augmented reality. Ideally, haptic displays should be capable of rendering a large range of dynamics to the operator accurately and precisely. However, designing force-feedback systems is challenging because they have limited control rates, finite sensor resolution, time delay, and they are dynamically coupled to the complex time-changing dynamics of the human operator and environment. This talk focuses on the design and control of force-feedback haptic displays. We introduce examples of haptic systems and their canonical models, and present strategies for creating high performance systems that are simultaneously stable, free of noisy instrumentation error signals, and accurately render the desired dynamics to the human operator.

SPEAKER BIO

Nick Colonnese is a research scientist at Oculus Research in Redmond, Washington. His research centers around the design and control of haptic displays and bilateral teleoperators, which aim to render a realistic sense of touch to a human operator. He received the B.S. degree from the University of Washington in 2009, and the M.S. and Ph.D. degrees from Stanford University in 2012 and 2015, respectively, all in mechanical engineering.