



Designing effective human-automation-plant interfaces: a control-theoretic perspective.

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Abstract: In this article, we propose the application of a control-theoretic framework to human-automation interaction. The framework consists of a set of conceptual distinctions that should be respected in automation research and design. We demonstrate how existing automation interface designs in some nuclear plants fail to recognize these distinctions. We further show the value of the approach by applying it to modes of automation. The design guidelines that have been proposed in the automation literature are evaluated from the perspective of the framework. This comparison shows that the framework reveals insights that are frequently overlooked in this literature. A new set of design guidelines is introduced that builds upon the contributions of previous research and draws complementary insights from the control-theoretic framework. The result is a coherent and systematic approach to the design of human-automation-plant interfaces that will yield more concrete design criteria and a broader set of design tools. Applications of this research include improving the effectiveness of human-automation interaction design and the relevance of human-automation interaction research.

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