

## **An Investigation of Secure Remote Instrument Control\***

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This paper examines the computer science issues associated with secure remote instrumentation control for magnetic fusion experiments. Computer science research into enhancing the ability to scientifically participate in a fusion experiment remotely has been growing in size in an attempt to better address the needs of fusion scientists worldwide. The natural progression of this research is to examine how to move from remote scientific participation to remote hardware control. The vision is to define a gatekeeper software system that will be the only channel of interaction for incoming requests to the experimental site. The role of the gatekeeper is to validate the identification and access privilege of the requestor and to insure the validity of the proposed request. The vision for the gatekeeper is that it be a modular system that is simple in design and defined in a way that makes its implementation and operation transparent and obvious. The architecture of the module interface is flexible enough that it can easily allow the future addition of new modules. At the same time, it should be transparent to end-users and allow a high volume of activity so as to not provide a work bottleneck. Appropriate security requires the ability to verify identity (authentication), verify access control (authorization), and validate the appropriateness of requests. The validation process can include provenance and semantic methodologies. The results of the gatekeeper design and initial prototype testing will be presented as well as a discussion on the implication of this research on the operation of fusion experimental machines such as ITER.

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