

Remote Software Control of a Fusion Facility*

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Magnetic fusion experiments keep growing in size and complexity resulting in a concurrent growth in collaboration between experimental sites and laboratories worldwide. This scientific collaboration activity is strong at existing experimental sites, is a major element of machines just coming on line, and is also a thrust of experiments that will come on line in the next decade. Computer science research into enhancing the ability to scientifically exploit 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 exploitation to remote hardware control.

This paper examines the issues associated with remote experimental device control and proposes a solution based on a semantic approach that defines 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. 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. Initial testing of the gatekeeper design will be done on a prototype system that works with the DIII-D plasma control system. The results of the gatekeeper design and initial prototype testing will be presented.

*Work supported by the US Department of Energy under DE-FC02-01ER25455.