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CorteX: A Standardised Remote Operations Communications System that is Inherently Designed to Accommodate Change

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Robotic remote operations are commonly used to conduct necessary work such as maintenance, decommissioning and experimental reconfiguration in environments that are hazardous to humans. This is especially prevalent within the nuclear fusion world, where devices such as JET, ITER , DEMO, and CFETR do or will require the remote execution of robotic remote operations of significant number and complexity. This poses many challenges, including the need to integrate many different bespoke and COTS systems from a variety of international suppliers, the need to address ongoing changing operational requirements, and through-life issues such as obsolescence management and protection. It is clear that it is advantageous to modularise, encapsulate, and decouple these systems to maximise efficiency, maintainability, and value.

We present a new communications protocol and software framework that begins to address many of these issues. CorteX is a distributed, homogeneous architecture for integration of devices, software, and intelligence within a complex remote operations environment, the core of which is based around a communications standard that is presented. In conjunction with a suitable hardware design, this framework provides the means to allow systems to quickly and seamlessly integrate and interoperate. It is explicitly designed to accommodate foreseen and unforeseen changes to the overall remote maintenance capability whilst minimising the impact of those changes on other subsystems and on the operations team. Inspiration has been taken from the experiences of operating and modifying a remote handling system at JET over the course of several decades.

The communications standard will be presented along with a new compatible software framework that has been implemented. Initial systems integration and operational trials conducted in a laboratory environment in order to determine and demonstrate capability will be presented for the first time. This includes integration of a complete end-to-end remote handling system incorporating tens of devices including a variety of robotic systems similar to those seen in fusion and other remote maintenance environments, as well as various software systems such as Command and Control interfaces and Virtual Reality synthetic viewing systems.

We will describe future direction of the work including further integration of the system into various environments including work related to JET, ITER, DEMO, and the European Spallation Source (ESS).

Eligible for student paper award?

No

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