

CONNECTING THE REAL AND VIRTUAL: INTERFACING SIMULATED SYSTEMS WITH REAL SYSTEMS. P. Fields^a, F. Sahin^{*b}, M. Hosking^{*b}, College of Applied Science and Technology^a, Kate Gleason College of Engineering^b, Multi Agent Biorobotics Lab (MABL), paf5844@rit.edu, feseee@rit.edu, mrh6836@rit.edu.

As time goes on, more and more complex robots are being developed and released for commercial, government, and personal use. The complexity of these systems can make testing very lengthy and expensive. A test involving all real systems is time consuming and is not cost effective, but it allows for real world errors to be pinpointed and reduced to a reasonable level. A simulation with all virtual entities allows for the testing of as many robots as the simulation will allow, which can be in the thousands. This allows for many entities to be tested, but accounting for real world problems requires extensive coding, expensive software, and powerful hardware to run the simulation. One solution to this need for a new type of simulation technique is a simulation environment that enables real entities to interact with virtual entities. In essence, the simulation and the real robots become one system. This work extends the existing agent in the loop research by applying a discrete XML based system of systems approach to the framework. The System of Systems approach fits well with this particular application of hardware and software to organize and manage multiple heterogeneous autonomous entities (robots). To apply this approach and create the simulation environment, the DEVSJAVA software will be used. This environment allows for modeling and simulating with the platform-independent coding language JAVA. A base station that moderates communication between the real and virtual systems serves as the critical link between the two worlds. The cooperative robotic system as a whole will need a way to communicate that can be implemented on a wide range of different individual robotic systems. The use of XML will allow for any new entity to enter the System of Systems provided it can understand and parse XML. The agent in the loop framework will be demonstrated using Ground Scout robots and virtual counterparts applied to a threat detection scheme. This scheme will simulate several sensors and a moving threat, and should result in the disabling of the threat when it is detected.