

# Elastic Mixed Criticality Parallel Real-Time Scheduling for Real-Time Hybrid Simulation

Chris Gill, Professor of Computer Science and Engineering,  
Washington University in St. Louis

Even as the state of the art in real-time hybrid simulation (RTHS) has become ever more capable of representing realistic-scale structures at the speed of sound, new challenges have emerged from the fundamental resource constraints of existing multicore computing platforms and from the next generation of experiments these new capabilities enable. In particular, envisioned next generation RTHS experiments may involve non-linear specimens and/or simulations, whose high-fidelity control and/or computation require potentially variable computational loads and rates, while at the same time demanding rigorous assurances of timeliness. Furthermore, resource limits mean that sufficient variability in some components of an RTHS experiment may require some other components to degrade their behaviors gracefully while still maintaining integrity of the experiment overall.

This talk will first survey recent results in RTHS, in parallel real-time elastic scheduling, and in parallel real-time mixed criticality scheduling. It will then present a vision for how a combination of those three cutting-edge research topics is both plausibly achievable and likely beneficial to support envisioned next-generation RTHS experiments with non-linear or otherwise highly variable components.