Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Physical Prototype Development for the Real-Time Detection and Mitigation of Hazardous Releases into a Flow System[1] SARA RIMER, NIKOLAOS KATOPODES, Univ of Michigan - Ann Arbor — The threat of accidental or deliberate toxic chemicals released into public spaces is a significant concern to public safety. The real-time detection and mitigation of such hazardous contaminants has the potential to minimize harm and save lives. In this study, we demonstrate the feasibility of feedback control of a hazardous contaminant by means of a laboratory-scale physical prototype integrated with a previously-developed robust predictive control numerical model. The physical prototype is designed to imitate a public space characterized by a long conduit with an ambient flow (e.g. airport terminal). Unidirectional air flows through a 24-foot long duct. The "contaminant" plume of propylene glycol smoke is released into the duct. Camera sensors are used to visually measure concentration of the plume. A pneumatic system is utilized to localize the contaminant via air curtains, and draw it out via vacuum nozzles. The control prescribed to the pneumatic system is based on the numerical model.

[1]NSF-CMMI 0856438

Sara Rimer
Univ of Michigan - Ann Arbor

Date submitted: 05 Sep 2013 Electronic form version 1.4