

Robots for Ensuring Human Safety during Disinfection and Cleanup Operations

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Abstract: Disinfection and sterilization of spaces is a critical part of safety measure to control spreading of bacteria and virus-based diseases. The recent pandemic has shown that the COVID-19 virus can linger on surfaces for long periods of time. Solely relying on human workers for disinfection will not be an adequate solution because of the scale of the need during pandemics. Humans are at risk not just from the virus and bacteria, but from some methods of disinfection such as chemicals. Moreover, when humans disinfect spaces, they need to wear protective gear to ensure their safety. This gear limits their mobility and wearing it is physically taxing. This operation needs to be done very carefully without making mistakes. Unfortunately, this type of operation causes significant stress on humans and hence make them prone to make errors and compromise safety. The use of a team of smart robotic assistants can significantly improve human productivity and reduce health risks. This presentation will provide an overview of technologies that enable robots to act as smart assistants during disinfection and cleanup operations by (1) programming themselves, (2) efficiently learning from the observed performance, (3) safely operating in the presence of uncertainty, (4) appropriately calling for help during the execution of challenging tasks, and (5) effectively communicating with humans.

Speaker Biography: Dr. Satyandra K. Gupta is Smith International Professor in the Department of Aerospace and Mechanical Engineering and Department of Computer Science in Viterbi School of Engineering at the University of Southern California. He serves as the Director of the Center for Advanced Manufacturing. He served as a program director for the National Robotics Initiative at the National Science Foundation from September 2012 to September 2014. Dr. Gupta's interests are in the area of physics-aware decision making to facilitate and advance the state of automation. He has published more than four hundred technical articles. He is a fellow of the American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), and Society of Manufacturing Engineers (SME). He serves as the editor of the *ASME Journal of Computing and Information Science in Engineering*. Dr. Gupta has received numerous honors and awards for his scholarly contributions. Representative examples include a Young Investigator Award from the Office of Naval Research in 2000, Robert W. Galvin Outstanding Young Manufacturing Engineer Award from the Society of Manufacturing Engineers in 2001, CAREER Award from the National Science Foundation in 2001, Presidential Early Career Award for Scientists and Engineers in 2001, Invention of the Year Award at the University of Maryland in 2007, Kos Ishii-Toshiba Award from ASME in 2011, Excellence in Research Award from ASME Computers and Information in Engineering Division in 2013, and Distinguished Alumnus Award from Indian Institute of Technology, Roorkee in 2014. He was named “the 20 most influential professors in smart manufacturing” by Smart Manufacturing Magazine in June 2020. He has also received ten best paper awards at international conferences.