

Robotic Disinfection of Lower Level Isolation Facility Suites – COVID 19

ABSTRACT

Coronavirus Disease – 2019 is an infectious disease caused by SARS – COV2. The primary mode of transmission is via aerosols emitted through breathing or coughing. However, the respiratory particles settling on surfaces result in fomite transmission. Electrostatic nebulizers or UVC illuminators have proved to be effective in disinfecting both the air and the exposed surfaces. The disinfection process is carried out by essential workers responsible for cleaning. The manual disinfection process exposes essential workers to the pathogen. This poster presents an autonomous robotic solution with UVC illuminators to disinfect bulk of a suite. The Protect Purdue Isolation Facility is a grouping of buildings, comprising the old housing in Purdue Village, that has been outfitted to serve as a quarantine facility for residential Purdue students. The facility houses students exposed or carriers of COVID-19 who are quarantined for a minimum 10 days. The robot is estimated to disinfect a suite with 4 beds in about 95 minutes with an estimated turn time of 120 minutes per suite. The robot performs the initial disinfection to prepare the rooms for humans to finish cleaning, which we anticipate will take about one more day per suite. The robot is fit with an UVC illuminator with programmable relay. The robot is embedded with sensors such as LiDAR, a 3D camera, IMUs and current sensors. The sensor suite enables the robot to perform autonomous navigation without need for human intervention. The sensors also ensure failsafe operation of the robot with error correction through redundancy or remote teleoperation. The robots are designed with remote “backseat driver” teleoperator control dashboard to ensure safe, remote maintenance.