

Robots for COVID-19 Pandemics: Protecting Essential Workers in Different Phases

Abstract:

The paper discusses how robots can assist to protect the essential workers as well as the general public during reopening from COVID-19 pandemic. From the experience of deploying a teleoperating medical co-robot prototype to the front-line hospitals during onset phase, key lessons on different spread models and strength of personnel protection are identified. A disinfection co-robot prototype is then developed based on these lessons as the focus of protection shifted to the retail workers and wider general public during quarantine and reopening phases. The disinfection co-robot involves multimodal disinfection -- air treatment and surface spraying, which blocks two major paths for horizontal spreads. Robot PPE is proposed as the amulet of the robot from being contaminated by the pathogen and becoming a source of spread. By mounting an air treatment unit on a mobile robot, pathogen spread in the indoor air is significantly reduced given multiple hidden sources, compared to a fixed unit. The effectiveness of the disinfection co-robot is shown to be similar to having multiple static filters near the sources. Therefore, the disinfection co-robot is capable of protecting the retail staffs, educators, and students during reopening phase of the pandemic.