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Title: Deployment of Robots Remotely in Teaching Programming and Robotics – Future of Engineering Laboratories

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Abstract: Laboratory practices are essential and play an important part in professional and engineering education. Because of the recent outbreak of COVID-19, students have had limited access to engineering labs during this academic year. With social distancing in place, accommodating students for their practical and computing work was one of the biggest challenges facing the Universities, especially the engineering departments. To provide an immersive and engaging experience to students at The University of Glasgow during lockdown situation, we deployed a humanoid robot as a testbed or apparatus that students can access and use remotely for their lab and project work, hence eliminating the requirement to attend the lab physically. More than 200 students from the University of Glasgow and the Glasgow College UESTC (GC-UESTC), China, used the developed robotic system remotely in their course lab and design projects during Fall semester 2020-2021. Students could access the developed robot-based lab setup remotely, either individually or as a group, to perform their experiments and work collaboratively on their design project. Along with 4-external cameras in place, students could observe the output or reaction of the robot through live streaming coming from these cameras and interact with it through voice commands and conversation.