This research is centered around the integration of computer-vision based perception capabilities with existing machines for the purpose of developing human-machine collaboration applications. In this research a 6-DOF hydraulic manipulator controlled via a haptic device is integrated with a standard HD webcam and two computer-vision-based applications were developed. Vision-based teleoperation is used to control the manipulator through the use of a fiducial marker replacing the haptic device. Additionally, a second application was developed in which a virtual safety wall is created around the manipulator to improve safety in environments where operators work in close proximity to moving machines.

Embedding fiducial markers onto clothing for the use of human identification and tracking was also tested via a third application in which the markers are tracked in a 3D environment to produce a 2D map of the user’s movements along with travel metrics.

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