This thesis presents three improvements to the current UCF MANUS systems. The first improvement modifies the existing fine motion controller into PI controller that has been optimized to prevent the object from leaving the view of the cameras used for visual servoing. This is achieved by adding a weight matrix to the proportional part of the controller that is constrained by an artificial ROI. When the feature points being used are approaching the boundaries of the ROI, the optimized controller weights are calculated using quadratic programming and added to the nominal proportional gain portion of the controller. The second improvement was a compensatory gross motion method designed to ensure that the desired object can be identified. If the object cannot be identified after the initial gross motion, the end-effector will then be moved to one of three different locations around the object until the object is identified or all possible positions are checked. This framework combines the Kanade-Lucas-Tomasi local tracking method with the ferns global detector/tracker to create a method that utilizes the strengths of both systems to overcome their inherent weaknesses. The last improvement is a particle-filter based tracking algorithm that robustifies the visual servoing function of fine motion. This method performs better than the current global detector/tracker that was being implemented by allowing the tracker to successfully track the object in complex environments with non-ideal conditions.

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The public is welcome to attend.