

## Concept Review

# Lead Through

### Why Learn Lead Through?

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The Lead Through technique enables providers of robotic systems an ability to program unique tasks to a range of robots. The most common use case corresponds to robotic manipulation where an operator will record a series of waypoints required by the manipulator to perform a specific task. Lead Through applications focus on the manual recording and playback of joint level commands.

## Lead Through

Lead Through is used to teach robot tasks such as welding or spray painting, where the path may be customized or non-trivial. The robotic arm is taken through its operating path manually by hand, while the joint position sensors record the joint trajectories. The trajectories are logged at a high enough sample rate in memory such that, when played back, the end-effector will follow a continuous path. This method has the advantage of simplicity but requires reprogramming for each new task. If the operator makes a mistake, the learning process must be restarted.

## A Control's Perspective

From a control's perspective, the human operator acts as the controller. The desired position is the operation path that the end-effector must follow. As the operator holds the robotic arm and guides it through the desired position, the human operator essentially applies forces/torques to the manipulator's joints in any direction necessary. The relative position of the end-effector compared to the desired setpoint is captured by human eyes which form a feedback loop to the control system.

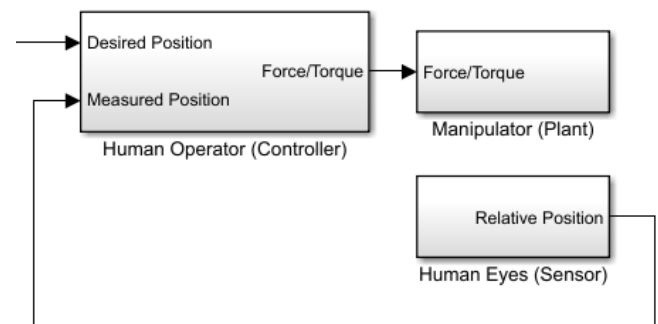


Figure 2 Control Block Diagram for Lead Through

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