

Robotic Deburring

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Abstract

Deburring of machined parts is a crucial task in the aerospace and automotive industry. This process is still performed manually to a large extent due to the unpredictability of burr formation as well as the complex interactions between the human arm and the workpiece. Poor ergonomics, repetitive stress and strain injuries for the human operators, as well as high cost are all reasons to automate this process. In this work, we first study how skilled operators perform deburring, which is a hybrid force and position control task, by using a motion capture system, force sensor and an IMU to record and recreate the process. Next, we explore the interaction dynamics and explain the importance of the dynamic characteristics of a spring-mass system to successfully deburr an edge. We come up with control strategies that allow a backdrivable robot to accomplish the same task using a hybrid controller made up of a sliding mode controller and a proportional controller acting in parallel.

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