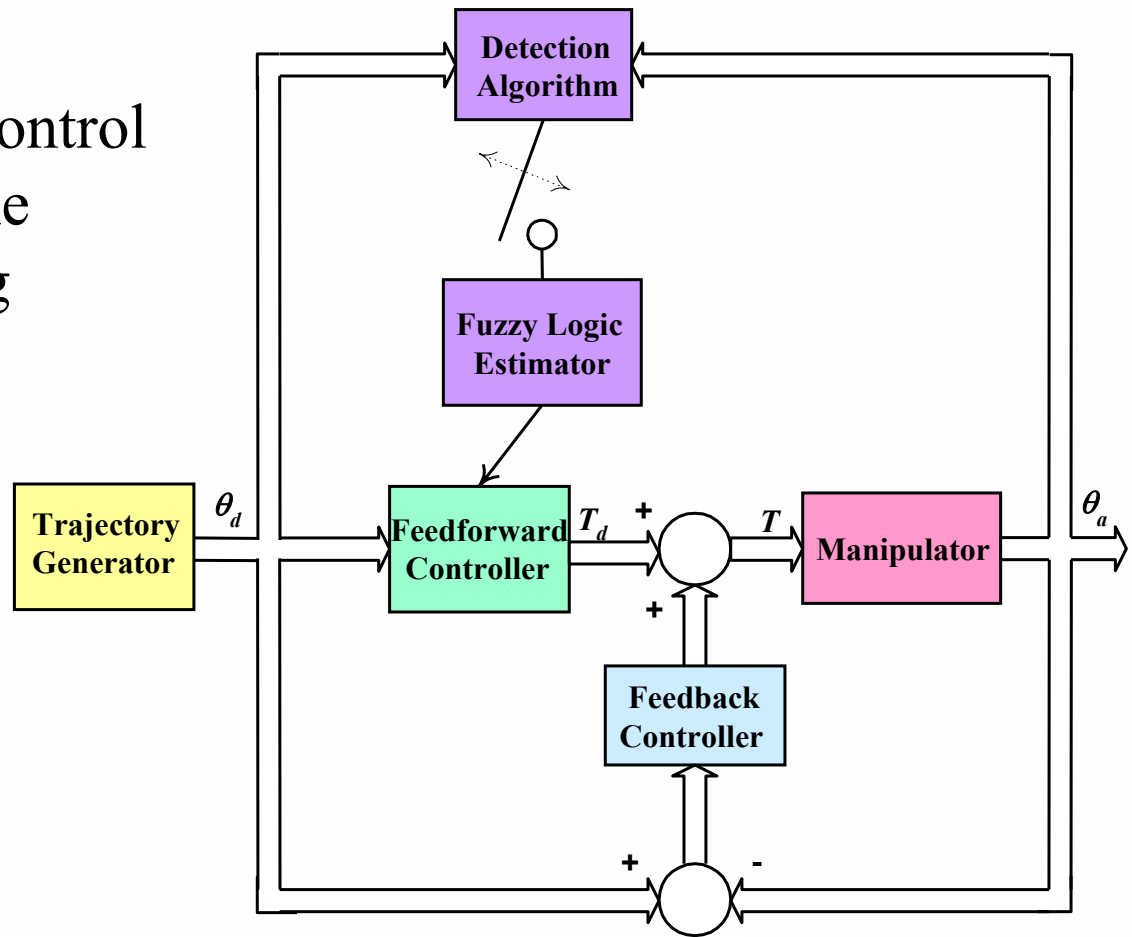


High-Speed Motion Control for Robots

Peter H. Meckl, Calvin Nho, Wit Chatlatanagulchai

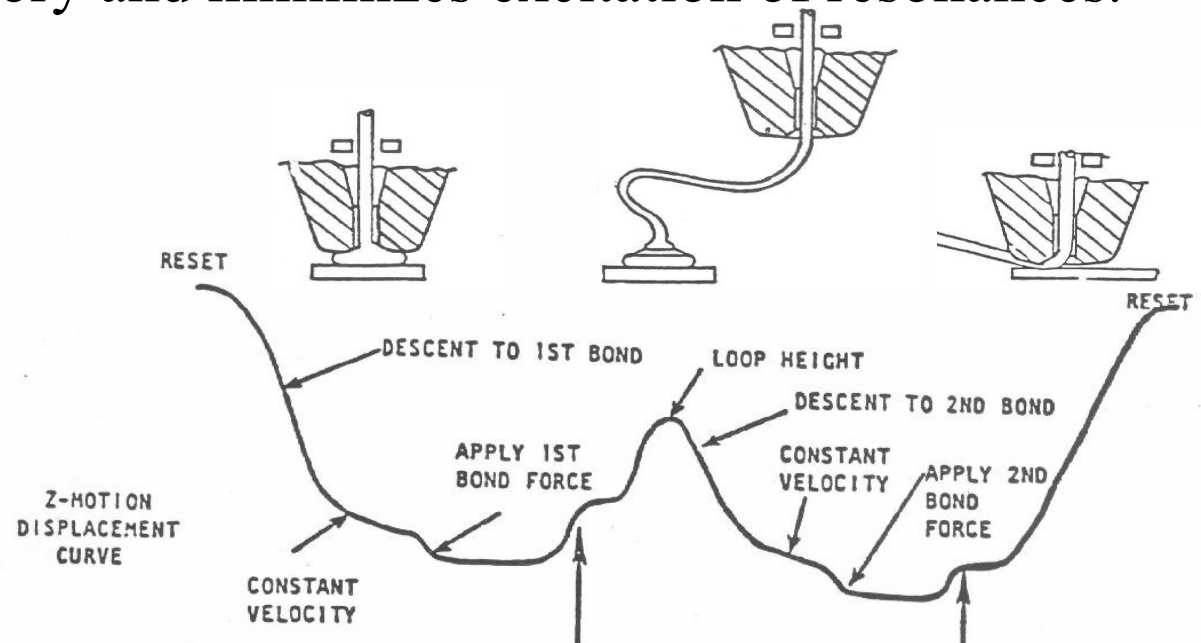
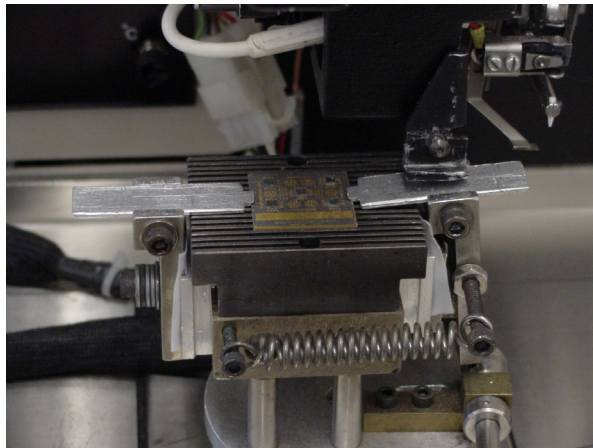
- Problem: Nonlinearities make high-speed tracking difficult.
- Solution: Develop a nonlinear control structure that learns the robot dynamics during motion.



High-Speed Motion Control for Wire Bonder

Peter H. Meckl, Deepak Agarwal, Kamran Gul

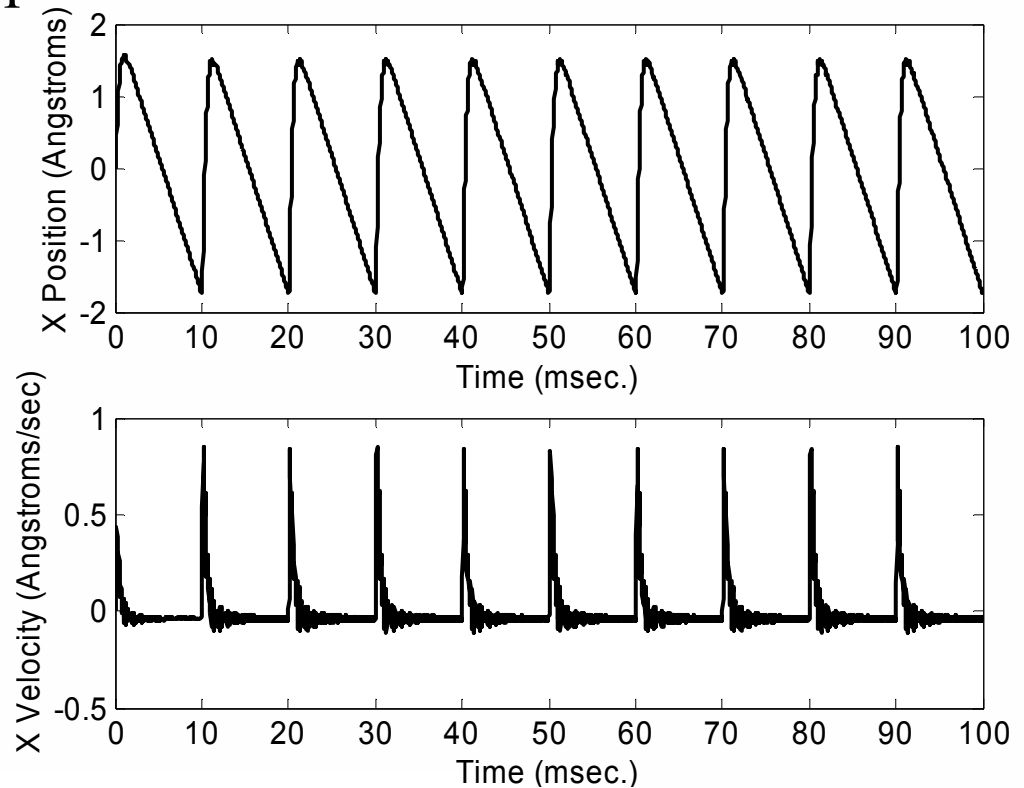
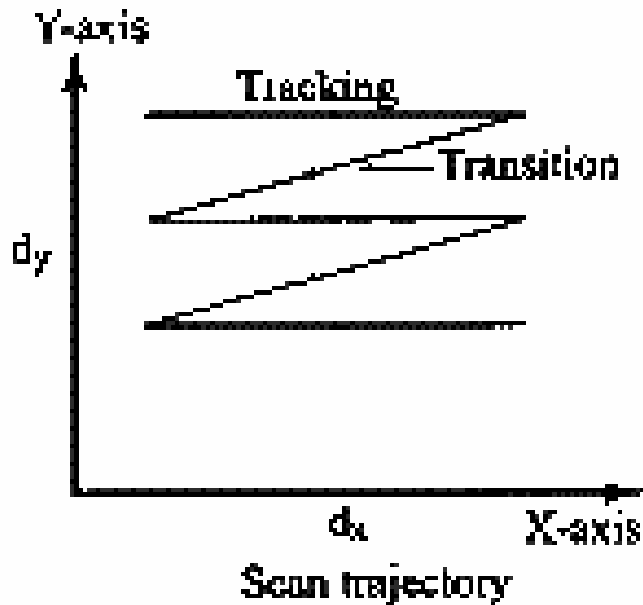
- Problem: Z-axis trajectory must allow wire to follow a specific path for strain relief without causing vibration at the bond.
- Solution: Design a time-optimal motion profile that follows the desired wire trajectory and minimizes excitation of resonances.



Precision Control of Piezoelectric Actuators for Scanning Microscopes

Peter H. Meckl, Yongkai Xu

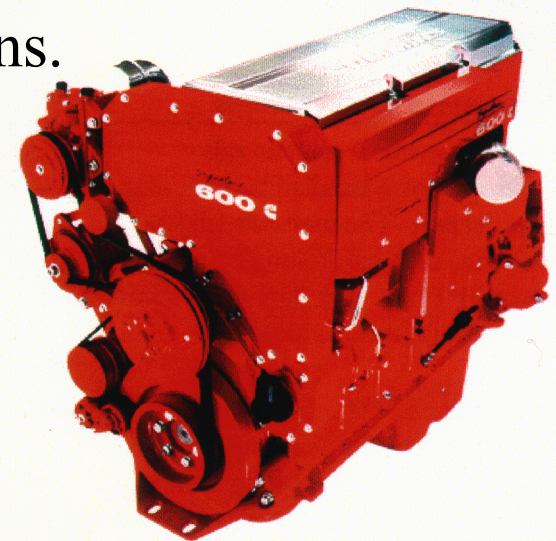
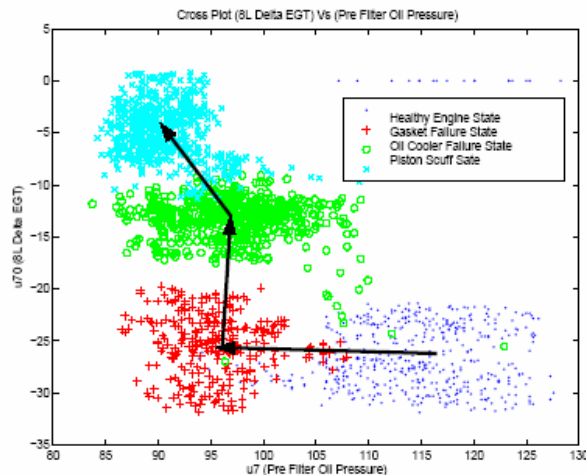
- Problem: Achieve fast turn-around without detrimental vibration.
- Solution: Shape transition profile to minimize time & vibration.



Diagnosing Engine Health with Information-Rich Inputs

Peter H. Meckl, Galen B. King, Alok Joshi, Paul Deignan
Cummins, Inc.

- Problem: Diagnosing faults in engines using few sensor signals
- Solution: Evaluate importance of each signal on engine health using the metric of mutual information; choose most informative sensor set and generate cross-plots; identify data clusters and quantify how these move with fault conditions.



Ruth and Joel Spira Laboratories for Electromechanical Systems