

Abstract Submitted
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A Portable, Air-Jet-Actuator-Based Device for System Identification WAYNE STAATS, JESSE BELDEN, ANIRBAN MAZUMDAR, IAN HUNTER, MIT — System identification (ID) of human and robotic limbs could help in diagnosis of ailments and aid in optimization of control parameters and future redesigns. We present a self-contained actuator, which uses the Coanda effect to rapidly switch the direction of a high speed air jet to create a binary stochastic force input to a limb for system ID. The design of the actuator is approached with the goal of creating a portable device, which could be deployed on robot or human limbs for in situ identification. The viability of the device is demonstrated by performing stochastic system ID on an underdamped elastic beam system with fixed inertia and stiffness, and variable damping. The non-parametric impulse response yielded from the stochastic system ID is modeled as a second order system, and the resultant parameters are found to be in excellent agreement with those found using more traditional system ID techniques. The current design could be further miniaturized and developed as a portable, wireless, on-site multi-axis system identification system for less intrusive and more widespread use.

Jesse Belden
MIT

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