

SIMBA GAO

Mechanical / Mechatronics Engineer

MS Mechanical Engineering – CMU | BSE Mechanical Engineering University of Michigan – Ann Arbor



simbag@andrew.cmu.edu



<https://www.linkedin.com/in/simbagao>



+1 (734) – 985 - 1240

01

6-DOF Arm & Autonomous Mobile Base

Mechanical Design · Prototyping · ROS2 · Sensors



BACKGROUND

Built a modular robotic manipulation platform integrating custom actuation with an autonomous mobile base.

APPROACH

CNC/3D-printed prototyping of the arm and strain-wave gearbox, integrated sensors and ROS2 on Jetson Nano to achieve autonomous navigation.

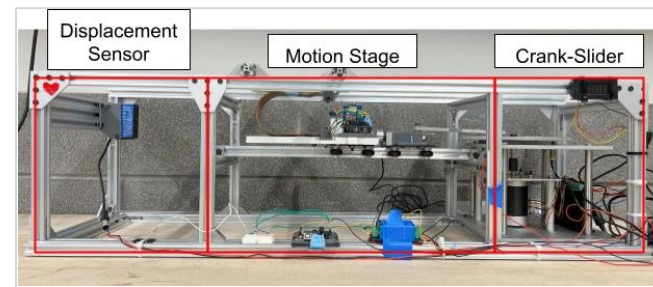
RESULT

~20 arcmin backlash, 8:1 or 64:1 gear ratio, as well as successful delivery of autonomous mobile base

02

ASML DUV Stage Rolling-Loop Test Rig

Dynamic Systems · DAQ · Test Fixtures



BACKGROUND

Characterized changing cable dynamics during high-g motion in an ASML DUV precision stage

APPROACH

Linkage-driven crank slider test fixture and a synchronized 1.6 kHz DAQ involving accelerometer, laser displacement sensor, load cell, and encoders.

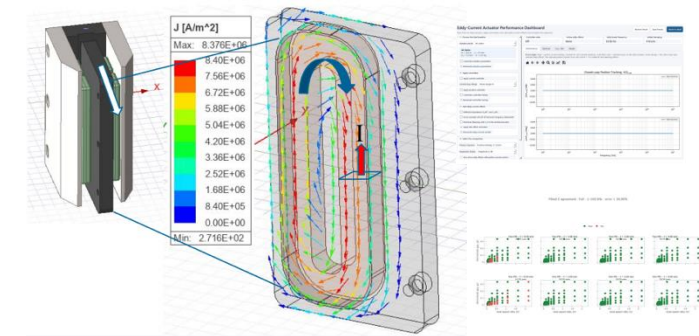
RESULT

Dynamic effective-mass model experimentally validated to with ~13% error

03

Aerotech Eddy-Current Modeling & Analysis

Electromagnetics · FEA · Python · Controls



BACKGROUND

Modeled eddy-current effects in precision voice-coil actuators to predict closed-loop tracking performance degradation.

APPROACH

Analytical modeling, electromagnetic FEA (FEMM, ANSYS Maxwell) and automated DOE

RESULT

6000+ simulations used to develop models and tools for eddy-current prediction, validity spaces, and mitigation

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04

HackerFab Atomic Layer Deposition System

Thin-Film Deposition · Vacuum Systems · Process Control



BACKGROUND

Developed and characterized an automated ALD system for repeatable thin-film processing.

APPROACH

Thermal control + pressure sensing, automated GUI for different recipes, and XRR for thin-film inspection.

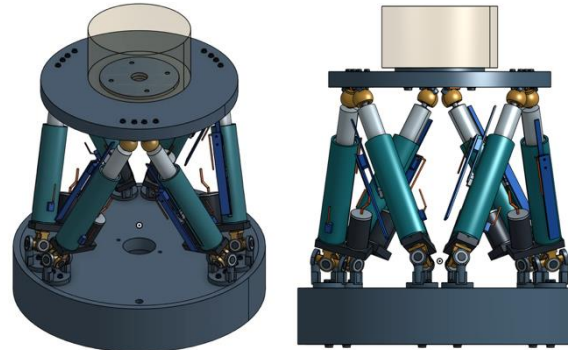
RESULT

± 2 °C thermal regulation, ~1 mTorr pressure resolution, and 250+ thin-film growth cycles

05

Precision Hexapod Design & Optimization

CAD / FEA · Stewart Platform Kinematics and Dynamics



BACKGROUND

A six-axis positioning mechanism needed geometry that balanced travel, stiffness and positioning error.

APPROACH

Built CAD, a kinematic model and geometry optimizer. Evaluated manufacturing, compliance and thermal errors through virtual calibration and compensation.

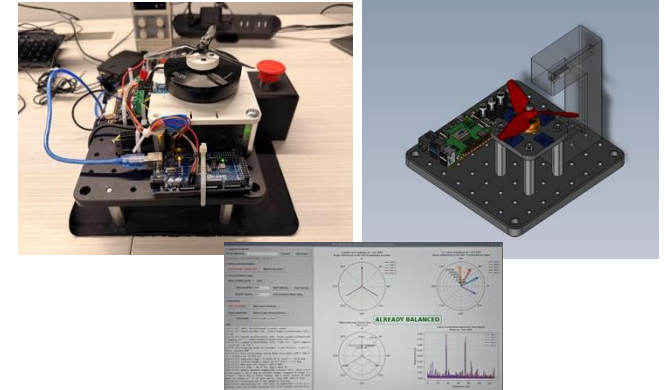
RESULT

Delivery of computational Stewart platform model that met required wafer positioning specs

06

Dynamic Drone Propeller Balancer

Vibration Analysis · Motor Control · Signal Processing



BACKGROUND

A compact balancing rig needed to estimate the correction mass and location for an unbalanced propeller.

APPROACH

Integrated ODrive, encoder and accelerometer sensing. Used synchronous vibration magnitude and phase with influence-coefficient balancing on a physical prototype.

RESULT

Successful identification of mass imbalance