

Abstract Submitted  
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**Design and Simulation of an Electrothermal Actuator Based Rotational Drive**<sup>1</sup> STERLING BEESON, Angelo State University Department of Physics, TIM DALLAS, Texas Tech Univeristy Department of Electrical Engineering — As a participant in the Micro and Nano Device Engineering (MANDE) Research Experience for Undergraduates program at Texas Tech University, I learned how MEMS devices operate and the limits of their operation. Using specialized AutoCAD-based design software and the ANSYS simulation program, I learned the MEMS fabrication process used at Sandia National Labs, the design limitations of this process, the abilities and drawbacks of micro devices, and finally, I redesigned a MEMS device called the Chevron Torsional Ratcheting Actuator (CTRA). Motion is achieved through electrothermal actuation. The chevron (bent-beam) actuators cause a ratcheting motion on top of a hub-less gear so that as voltage is applied the CTRA spins. The voltage applied needs to be pulsed and the frequency of the pulses determine the angular frequency of the device. The main objective was to design electromechanical structures capable of transforming the electrical signals into mechanical motion without overheating. The design was optimized using finite element analysis in ANSYS allowing multi-physics simulations of our model system.

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