

Abstract Submitted  
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**Scalability and Function of Lithium Thionyl Chloride Batteries for Encoders in High-Degree-of-Freedom Robotic Systems**<sup>1</sup> RICHARD STEVENS, Whitworth University, Department of Physics and Engineering, RENE MAURA, ERIC WOLBRECHT, JOEL PERRY, University of Idaho, Department of Mechanical Engineering — Encoders are used to indicate the location of each component in robotic systems. Long-life, low-current batteries are used to provide power to encoders when motor drivers are powered down. In medical devices, correct encoder readout is critical to patient safety. Lithium Thionyl Chloride batteries are a common choice for maintaining encoder location integrity. This type of battery has a long shelf life and stable output voltage. Our specific application is a Bilateral Upper-extremity Exoskeleton for Simultaneous Assessment of Biomechanical and Neuromuscular Output (BLUE SABINO) that will measure bilateral aspects of motor intention and motor performance in the human arm. The system will have 30 degrees-of-freedom, 18 of which are controlled by Harmonic Drive motors using 17-bit encoders. The expectation of Harmonic Drive is to have an independent battery for each encoder. Our hypothesis is that, for large systems, a single battery might be used to power 10 or more encoders, reducing cost and maintenance, while maintaining the safety of the system. V-I curves for several different sizes and brands of batteries will be presented, along with projected lifetimes in example applications and specific current requirements by the encoder.

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