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Energy Efficient Mobile Systems: A Legged Robot Case Study

Mobile robots hold great promise for maneuvering in and interacting with dangerous or contaminated environments. Legged and bipedal robots in particular, provide the ability to traverse unstructured terrain and maneuver in areas originally designed for humans. Despite advances in autonomy and control, the performance of such robots remains limited by their energy requirements. Mobile robots must carry their own power supplies, and many state-of-the art bipedal systems are limited to **30-60 mins** of operation.

Our team in Sandia's High Consequence Automation and Robotics group has developed new capabilities for studying efficient legged locomotion. We combine data driven analysis, full-scale testing, and biomechanical insights to develop general techniques and principles that predict dramatic reductions in the energy consumption of bipedal robots.

These lessons were used to develop a highly efficient, full size (90kg), 27 degree-of freedom bipedal robot named: Walking Anthropomorphic Novelly Driven Efficient Robot for Emergency Response (WANDERER). WANDERER was demonstrated at the 2015 DARPA Robotics Challenge Finals where it walked ***4+*** hours on a single battery charge, and traveled ***2.8km***.