The PowerWalk™
Kinetic Energy Harvester

Wearable technology for charging batteries.

Bionic Power’s PowerWalk® Kinetic Energy Harvester generates substantial power from normal walking with minimal metabolic effort¹. Its 11 W output can be used to keep batteries charged, extending mission duration and reducing battery weight carried.

How
Its smart harvesting technology uses regenerative braking similar to a hybrid electric vehicle. While walking, muscles are constantly accelerating and decelerating the knee joint. The PowerWalk® takes advantage of this by assisting the muscles with braking to decelerate the knee joint and simultaneously generate power. The system is comfortable and offers no noticeable impediment to mobility through the use of flexible materials and a patented, tracking knee linkage.

Benefits
• Power in remote locations for an unlimited duration
• Reduced load by reducing quantity of batteries carried
• Increased mission flexibility
• Reduced resupply logistics
• Fatigue reduction on downhill
  - Regenerative braking reduces effort downhill

Features
• Impact resistant carbon-Kevlar shells
• Titanium knee-tracking linkage
• High efficiency generator and electronics
• Microprocessor-controlled smart harvesting algorithm
  - Analyzes user gait to determine when to harvest
• Quiet belt drive
• Controlled flex, PEBAX subshells

FIELD TRIAL INQUIRIES
Yad Garcha | 1.778.330.4217 | yad.garcha@bionic-power.com

“A soldier typically carries 16-20lbs in batteries on a 72-hour mission. If a soldier can generate 10-12 watts of power while wearing energy harvesting devices, we can potentially reduce the soldier’s load, reduce the logistics tail and the unit’s reliance on field resupply, and extend the duration and effectiveness of the mission.”

Noel Soto, Systems Engineer, U.S. Army, Natick Soldier Research, Development and Engineering Center


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System Integration
The PowerWalk® Harvester is designed to be flexible with built-in battery charger functionality.
- Charge a soldier system battery connected to a power hub
- Charge a battery directly
- Connect into the auxiliary power input on a harvesting enabled power manager

Trials
Biomechanical and Human Factors testing has been conducted at the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC). The biomechanical testing showed that knee-based kinetic harvesting has the lowest cost of harvesting (COH - metabolic effort per watt power) and best power to weight ratio of all harvesting systems evaluated to date. No mobility impairment was observed and an average of 11 W was measured.
- US Army Labs (NSRDEC) – 12 systems
- Defence Research and Development Canada (DRDC) – 28 systems
  - No significant difference in CanLEAP obstacle course performance or Rate of Perceived Exertion (RPE)
- US Marines (scheduled later this year) – 30 systems

Specifications

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<table>
<thead>
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<tbody>
<tr>
<td>Level ground Power</td>
<td>10-12W</td>
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<tr>
<td>Downhill or Jogging Power</td>
<td>20-30W</td>
</tr>
<tr>
<td>Uphill Power</td>
<td>5-6W</td>
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<tr>
<td>System Weight (both legs)</td>
<td>2.2 Kg / 5lb</td>
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<td>Battery compatibility</td>
<td>4 cell Li-Ion (BB2590, CWB-150, CWB-85, Li-80)</td>
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<tr>
<td>Charging communications</td>
<td>SMBus</td>
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<tr>
<td>Acoustic Noise</td>
<td>46 dBA @ 1M</td>
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<tr>
<td>TRL</td>
<td>6</td>
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<tr>
<td>Environmental</td>
<td>IP67, -20 to 50C</td>
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<tr>
<td>Sizing (3 sizes)</td>
<td>US Army 5th-95th percentile</td>
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<tr>
<td>Output Voltage</td>
<td>10 – 32V</td>
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<tr>
<td>Output Current</td>
<td>5 Amps maximum</td>
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<tr>
<td>Knee Torque</td>
<td>12 Nm maximum</td>
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About Bionic Power
Bionic Power makes wearable technology for charging batteries. The PowerWalk™ Kinetic Energy Harvester enables users to produce power as they walk. Wearing a harvester on each leg, users produce an average of 10-12 watts of electricity which, over the course of an hour-long walk, can charge up to four smart phones. The walk-recharge capability of the harvester reduces user requirements to carry backup batteries, as well as the need for battery resupply in the field. Development and testing of the PowerWalk is supported by the U.S. Army and U.S. Marine Corps as well as the Canadian Department of Defense. Contact Yad Garcha about field trials.

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