

# Army Researchers Hope to Lighten Soldiers' Battery Load

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**A**cross all six of the Army's modernization priorities — long-range precision fires, next generation combat vehicle, future vertical lift, network, air and missile defense, and Soldier lethality — there has been a dramatic increase in demand for power as a result of the introduction of new system capabilities and prototypes that are energy hungry, said an Army lead engineer.

Of particular concern for Soldiers is the increase in energy demand in the areas of Soldier lethality, including augmented reality, said Julianne Douglas, Energy Harvesting Technology lead with the Army Communications-Electronics Research, Development and Engineering Center.

Based on her discussions with the Soldier Lethality Cross-Functional Team, which is in charge of overseeing the progress for that particular modernization priority, Douglas said a rifleman today requires an average of 12 watts of power in the form of AA and conformal wearable batteries. That means the weight requirement of batteries for a standard 72-hour patrol is about 15 pounds.

It doesn't sound like much weight, but it adds to the other things Soldiers are hauling like weapons and ammunition, protective gear, and food and water, she said, adding that Soldiers are always trying to be better prepared, so their battery load for a 72-hour mission is probably closer to 25 pounds.

Noel Soto, a systems engineer with the Army Research,

Development, and Engineering Command, said his team is working on a number of experiments to bring down the weight and number of batteries Soldiers must carry. They include:

- Wearable solar panels that are comfortable and flex with the body
- A backpack frame kinetic harvester that produces energy for rechargeable batteries from slight movements of the Soldier's rucksack during dismounted patrols
- A kinetic knee harvester that produces energy for rechargeable batteries from movements of the Soldier's legs

The kinetic knee harvesters have received favorable reviews from Soldiers doing the testing, he said. They are most efficient when Soldiers are moving downhill.

The backpack frame kinetic harvesters are more efficient when Soldiers are going uphill, he said, as that's when their rucksacks wobble the most. Soldiers are taught to tightly fasten everything down on their person, but in this case, having a loose-fitting rucksack results in more energy-harvesting efficiency. That doesn't sit well with Soldiers, who prefer the kinetic knee harvesters. The added benefit of the kinetic knee harvesters is that when Soldiers go downhill, the mechanism helps Soldiers to more efficiently brake so they have a better-controlled descent and reduced fatigue, Soto added.

Read the full article at: [https://www.army.mil/article/210673/army\\_researchers\\_hope\\_to\\_lighten\\_soldiers\\_battery\\_load](https://www.army.mil/article/210673/army_researchers_hope_to_lighten_soldiers_battery_load).



Photos by David Kamm

*During an energy-harvesting technology demonstration at Fort Devens, MA, Soldiers test a photovoltaic Solar Panel Harvester (left), a kinetic knee harvester (middle), and a backpack frame kinetic harvester (right).*