Soldiers turn a march into a charge

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Engineers at the University of Leeds (UK) are developing a way to capture the kinetic energy produced when soldiers march and use it to power their equipment.

The new system designed to convert foot-power into battery power could help troops reduce the weight of their packs by up to 10kg.

The devices will use high tech ceramics and crystals as piezoelectric transducers in order to convert mechanical stress into an electric charge.

The project will consider the optimum placement of the 'energy harvesting' devices, including the back-pack straps and around the knee to provide active support, capturing energy but also cushioning the impact when legs are bent, joints compressed or their boots strike the ground.

Professor Andrew Bell, Director of the Institute for Materials Research at the University of Leeds, who is leading the £1m research project says:

"As well as the obvious green issue of using so many batteries, it could also reduce a soldier's pack weight by around 15 per cent. And this technology could potentially have lots of applications in civvy street too."

The project has been designed to address the needs of soldiers serving in Iraq and Afghanistan. Heavy packs can severely limit a soldier's mobility and also lead to long term health problems.

Ground troops typically carry electrical equipment including including torches, personal radios, the Bowman communications system plus kit for electronic counter measures.

The typical pack weight of an infantry soldier on a 6 hour patrol is around 75kg, with batteries making up 10kg of the load. Essential kit such as ammunition and water make up much of the rest.

A similar energy harvesting idea has been used in cars for some time where braking force is stored and later used to drive the vehicle forward. However harvesting energy from people walking has always proved difficult due to the flexibility and strength of the materials required and the fact that everyone's walking patterns are different.

Professor Bell says his team will succeed where others have failed because they are taking a holistic approach.

"By using the latest materials and electronics combined with taking into account personal differences in walking style we are confident we can make this work without adding to the burden or fatigue of the soldier wearing the device," he says.

Another key part of the project will be adapting radio equipment to run on a reduced power budget. The new style low power radios will run on 'standby', only boosting up to full power when an important message is received or a transmission is required.

The 2-year project, due to start in September this year, also involves scientists from Bristol, Essex, Liverpool, Sheffield, Southampton and Cranfield universities. The project is funded by the Engineering and Physical Sciences Research Council (EPSRC) and the Defence Science and Technology Laboratory (DSTL).

The Leeds-led kinetic energy project is part of a larger programme of research called the 'battery free soldier', commissioned by DSTL and EPSRC, which includes research into converting and storing and other sources of energy such as solar power and body heat.

Source: University of Leeds (news : web)