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New Monitoring Systems Enhance Quality of Nation's Trails

by Stacy Kish, CSREES

The United States is fortunate to contain miles of hiking, walking, and biking trails that improve the quality of life for rural and urban communities across the country. Unfortunately, managing and monitoring these trails can be time consuming and, at times, cost prohibitive. >>

With funding from USDA Small Business Innovation Research (SBIR) program, scientists in Nevada have developed new technology to ensure outdoor recreation and trail routes are more efficiently maintained and accessible to all individuals.

Peter Axelson and colleagues at Beneficial Designs, Inc., in Minden, NV, developed the Wheeled Instrumentation Sensor Package (WISP) and High Efficiency Trail Assessment Process (HETAP) Software system package.

WISP/HETAP is an automated system that allows for rapid and objective collection of trail data following the Universal Trail Assessment Process (UTAP). WISP/HETAP requires only one person and operates at a speed of about one hour per mile.

UTAP is a tool used by land managers, agencies, and individuals to monitor outdoor trails to improve trail accessibility for all users. "Many trail managers needed a way to complete trail assessments more efficiently,"

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Right: The WISP mounted to an ATV.

Credit: Beneficial Designs, Inc.

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Above: The WISP mounted on a jogging stroller.

Credit: Beneficial Designs, Inc.

Axelson said. “By automating the UTAP, one person could complete a trail assessment in less time with greater accuracy, saving the trail agency time and money.”

The package consists of a user-friendly graphical interface, which improves ease-of-use for the HETAP software. The package collects and stores information including GPS location, pictures, and trail details, such as length, grade and cross slope, surface firmness and stability, and built and natural features.

“The sensors on the wheeled instrumentation sensor cart automatically capture grade and cross slope information, and the dual reed switch allows forward and backup movements with the cart, roll-a-wheel, or all terrain vehicle (ATV) to accurately record location.”

The research and development team mounted the computers and sensors in the HETAP package onto a jogging stroller, roll-a-wheel, and an ATV to monitor trails with different characteristics.

The stroller was designed to accommodate trails greater than 24 inches wide. The stroller is highly maneuverable and represents the stride length and width of a typical hiker.

The sensors on the roll-a-wheel were designed for narrower trails. The adjustable, ergonomic handle and compact construction allow for maximum stability to ensure accurate measurements. A chest harness comfortably holds a laptop at chest height to monitor data collection.

SBIR competitively awards small business grants for innovative research that has the potential of solving important agriculture and rural development problems. For more information, visit:

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Sensors on an ATV measure motorized trails. The HETAP system is securely mounted between the ATV handlebars for ease-of-use. Sensors are affixed to the rear wheel of the vehicle.

Beneficial Designs aims toward universal access to all environments through research, design, and education. The company also aims to enhance the quality of life for people of all abilities by developing and marketing technology for daily living, vocational, and leisure activities.

Axelson believes that “ongoing availability of objective trail data using HETAP will continue to enhance the availability or trail access information for users and trail managers.”

CSREES funded this project with Phase I and Phase II funds through the SBIR program. Through federal funding and leadership for research, education and extension programs, CSREES focuses on investing in science and solving critical issues affecting people’s daily lives and the nation’s future. For more information, visit www.csrees.usda.gov. ■