Professor's animal monitoring innovation earns patent with donor assist

Biology professor Katrina Gobetz received a U.S. patent for her Animal Monitoring Data Station, a novel idea developed at JMU and supported by donors from Madison Trust. Gobetz' invention allows scientists to observe the tiniest of animals without injuring or stressing them in a trap.

During a JMU study-abroad trip to Ireland, Gobetz spent much of her time close to the ground, where she saw how inadequate the standard metal trapping boxes were for fragile pygmy shrews—barely the size of a peanut.

"I had been excited. I had never seen one before," she recalled, but her first subjects struggled to survive when trapped. "We lost two. One was too tiny to handle, and one catapulted over my shoulder and escaped. I felt terrible." But what seemed like failure became an epiphany: She wanted to capture the data, not the shrew. "I knew I had to figure out how to do something differently."

When she returned to campus, Gobetz collaborated with biology professor Bryan Cage to build a new kind of trap, one the animal was free to leave. Using 3D-printed plastic, she equipped it with scales, cameras, a Raspberry Pi computer and a USB drive. The animal could enter, eat sunflower hearts or other bait, and then simply run back out. Every whisker would be captured on high-resolution video.

Her idea is working, with applications beyond academia. Gobetz and Cage presented the device to Madison Trust, a group of JMU donors who provide seed money for innovative faculty ideas. "I really felt uplifted by the energy and support of the investors we met," she said. They suggested the data station could be of interest to backyard wildlife enthusiasts as well as scientists, and fully funded the concept.

"They believed in our project and its potential. They were really part of the reason this could take off," Gobetz said.

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The Madison Trust investment supported her work of perfecting prototypes, earning a U.S. patent in 2020, and envisioning a future route to mass production. Gobetz' innovation will allow researchers, school children and citizen scientists around the world to catch a glimpse of the delicate ecosystem underfoot by simply uploading videos to their iPads.

Already, the incoming data excites biology graduate student Shannon Gillen. From bait stations placed in the Edith J. Carrier Arboretum, Gillen is able to identify individual creatures by physical traits, record their dramatic winter weight changes and research how supplemental food—and possible pilfering by birds—affects them.

The North American least shrew (Cryptotis parvus) in an Animal Monitoring Data Station placed in the Edith J. Carrier Arboretum. For context, the bait container the female shrew eats from is only about 2 centimeters from the floor.

"Prior to Dr. Gobetz inventing this device, the main way to study these animals was through trapping them. This requires constant checking of the trap, and it becomes dangerous, particularly in very cold or very hot conditions," Gillen explained. "Even an hour or two in a trap can kill them if they didn't have enough food prior to entering it." Now, she can collect data-rich videos not just of shrews but anything that ventures inside. "We have also gotten mouse species in this unit and once a bird," she said.

Gobetz agrees. "So much of the early data has been unexpected and edifying," she said. "And I could not have done this without JMU. The resources available to us here, anytime, those have been so incredible to me." Now she's ready and watching, sharing her budding knowledge of what even the tiniest creatures can teach us.

— JAMIE MARSH

GOBETZ AND GILLEN PHOTOGRAPH BY JUSTIN ROTH