



SUSTAINING MEMBER

UNIVERSITY OF NEBRASKA-LINCOLN

NAI Member Detweiler Aims to Mitigate Wildfires With Drones

When Carrick Detweiler, the Susan J. Rosowski Professor in the School of Computing at the University of Nebraska-Lincoln, noticed that out-of-control wildfires were only growing more frequent and intensifying, he and a colleague began work on a helpful tool: a drone-based system based on their research in the NIMBUS Lab at Nebraska.

In 2015, Detweiler co-founded Drone Amplified with former Nebraska engineering professor Sebastian Elbaum. The company develops and sells integrated drone systems, services and data analytics for wildfire management. Their airborne systems set prescribed burns, map wildfires and provide data to firefighters in real-time.

Drone Amplified's signature product, IGNIS, navigates to locations following a precise GPS-guided pattern and uses ping-pong-ball sized plastic spheres filled with potassium permanganate and injected with ethylene glycol.

It is the result of four years of development, including filing patents with NUtech Ventures, partnering with Invest Nebraska and consulting nearly weekly with the Department of Agriculture's U.S. Forest Service and the U.S. Department of the Interior. The company also received more than \$4 million in research grants.

IGNIS was approved for use for fuels and wildfire management at the National Interagency Aviation Committee in 2019 and has been used by federal, state and private contractors since then.

Prescribed burns help mitigate wildfires by using backfires — fires set in front of an advancing wildfire to starve it of fuel — and clearing lands of shrubs, trees, branches and other things that could intensify a fire.

"What we've invented is the game changer — the technology to more safely, and efficiently, manage fires," said Detweiler. "We can send drones into active fires in any terrain. This is far safer and less expensive than sending in humans on four-wheelers or trying to navigate with helicopters."

In addition to reducing the potential losses of life, the cost differential between the methods is staggering. While the IGNIS system costs around \$1,800 a day, a U.S. Department of Agriculture paper noted that the cost of a suitable helicopter is around \$16,000 per day.

Detweiler, who holds a Ph.D in electrical engineering and computer science from the Massachusetts Institute of Technology, has decades of experience in designing novel robot systems that interact with the environment. He holds multiple patents and was elected to NAI as a senior member in 2021.

Faller Enables Drivers to Walk Away from Crashes

Ron Faller's brainstorm has the potential to save your life.

Faller, director of the Midwest Roadside Safety Facility and a research professor for the Midwest Roadside Safety Facility, worked with a team of researchers and with Traffix Devices Inc. to develop and bring to market the Delta Crash Cushion.



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The device consists of a series of steel three-beam fender panels supported by diaphragms. These panels attenuate energy evenly for all vehicle types with shear bolts tearing through cut-outs of various sizes and shapes. Multi-directional object markers come in chevron, left or right angles and can be quickly changed in the field. It performs in all temperatures and climates and is a low-cost MASH TK-3 non-gating redirective crash cushion.

The cushion's design is the result of a six-year industry partnership between Nebraska researchers and TrafFix Devices Inc. NUtech Ventures and UNL Industry Relations worked with the teams to arrange an industry-sponsored research agreement and manage the patenting and licensing processes.

"We hope it will save somebody's life," said Faller. "That's what it's all about: sending someone safely home to their family."

Faller noted that transportation officials have praised the cushion's simplicity, which requires minimal maintenance and is easy to install. It also meets the highest safety standards, is fully recyclable, cosmetically appealing, fits onboard tractor trailers and overseas, and is cost-competitive, which makes it more accessible to emerging markets.

"UNL's reputation is unmatched in the world for our industry, and it's been an incredible development process for us," said Geoff Maus, vice president of engineering at TrafFix Devices Inc. "The Nebraska team pushed the envelope beyond what I thought was possible."

"TrafFix is a great partner and they had a clear idea of what they wanted out of the device to make it commercially successful," said Bob Bielenberg, research engineer at the Midwest Roadside Safety Facility.

MwRSF, part of the University of Nebraska-Lincoln, is a research organization with a main focus of researching all aspects of highway design and safety. MwRSF conducts safety performance evaluations of various roadside appurtenances, developing new and innovative design concepts and technologies in the area of highway safety.

Its goals are to improve highway safety by making the roadside less hazardous for motorists, design, develop, and crash test roadside hardware, conduct safety performance evaluations of existing roadside features, and perform computer simulation modeling of vehicle impacts with roadside hardware.