

ADVERTISEMENT

NEWS

ARTIFICIAL INTELLIGENCE

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship

A self-replicating 3D printer also scores a prize

BY ISAAC RYU

1 HOUR AGO | 4 MIN READ |



TAGS

IEEE NEWS

IEEE MEMBER NEWS

ARTIFICIAL INTELLIGENCE

STUDENTS

TRANSPORTATION

SPACE

3D PRINTER

MACHINE LEARNING

SCHOLARSHIP

Underride car crashes are among the most deadly accidents in Turkey, according to a report by the country's General Directorate of Highways. The accidents occur when a car collides with the rear or side of a large truck and gets stuck underneath it.

After learning about how fatal the crashes can be from recent news reports, Kerem Bayhan was inspired to develop a technology to help reduce them. Bayhan, who lives in İzmit, Turkey, is set to study medicine this semester at Hacettepe University, in Ankara.

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



current problems such as underride collisions.

Commercial trucks already have guard bars on the back to prevent such accidents, so instead of looking to improve trucks, Bayhan decided to build an attachment for cars. He came up with a mechanical barrier system that attaches to the hood and connects to the car's electronic control unit. The outer layer is made of energy-absorbing material, and the second layer is made of metal. Airbags are placed between the first and second layers to propel the hood attachment forward. When the car's active safety system senses an impact is about to occur, the device extends before the crash happens to protect the driver and passengers.





KEREM BAYHAN

The invention won Bayhan the US \$10,000 IEEE Presidents' Scholarship, which is payable over four years of undergraduate university study. He also received a complimentary IEEE student membership. The award was presented during the Regeneron International Science and Engineering Fair. Established by the IEEE Foundation and administered by IEEE Educational Activities, the award is given annually at the ISEF to one student for an outstanding project that demonstrates an understanding of an IEEE field of interest. Recipients are selected by a team of IEEE members.

Bayhan plans to pitch his device to the Turkish government and car manufacturers. He hopes to talk with Turkey's science minister and the TOGG [Turkish Automobile Joint Venture Group], a new company formed by the government. The TOGG is working on designing electric vehicles.

A SELF-REPLICATING 3D PRINTER

The second-place winner was Brian Minnick, who developed a self-replicating 3D printer. The incoming freshman at MIT won \$600. He plans to study material science and engineering.

began his project three years ago. Several research articles he came across said it was impossible to create such a machine because it would be unable to print motors and other electronic parts. Although 3D printers require conductive materials, Minnick found during his research that commercially available filaments were not conductive enough to print the necessary components.



BRIAN MINNICK

That didn't stop him, however. In fact, the very idea of it seeming impossible is what motivated him to pursue the project, he says.

"I'm a very competitive person," he says, "so I was motivated to try and

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



His solution was to create a sintered solder paste material that was conductive enough and 3D printable. The material is made of a high-metal-load, low-melting-point paste, which is sintered into a thermoplastic scaffold. It was important for the metal in the paste to ensure reliability while its melting point would prevent damaging the scaffolding. The material is distributed from a 3D-printed paste extruder that consists of an outer case, a syringe, and a motor. This development allowed the printer to take shape.

Minnick says the opportunities the printer creates are plentiful. The main application he sees is the creation of a self-replicating spaceship. He says that the unsustainable cost of building spaceships is what prevents long-term space travel. Sending out several spacecraft is far more expensive than sending out one that could self-replicate.

Biopolymers—materials that can be grown rather than manufactured—could be used to build self-replicating factories, Minnick says. Constructing such facilities in underdeveloped countries would lower the cost of industrialization while speeding up processes.

RIP-CURRENT DETECTION SYSTEM

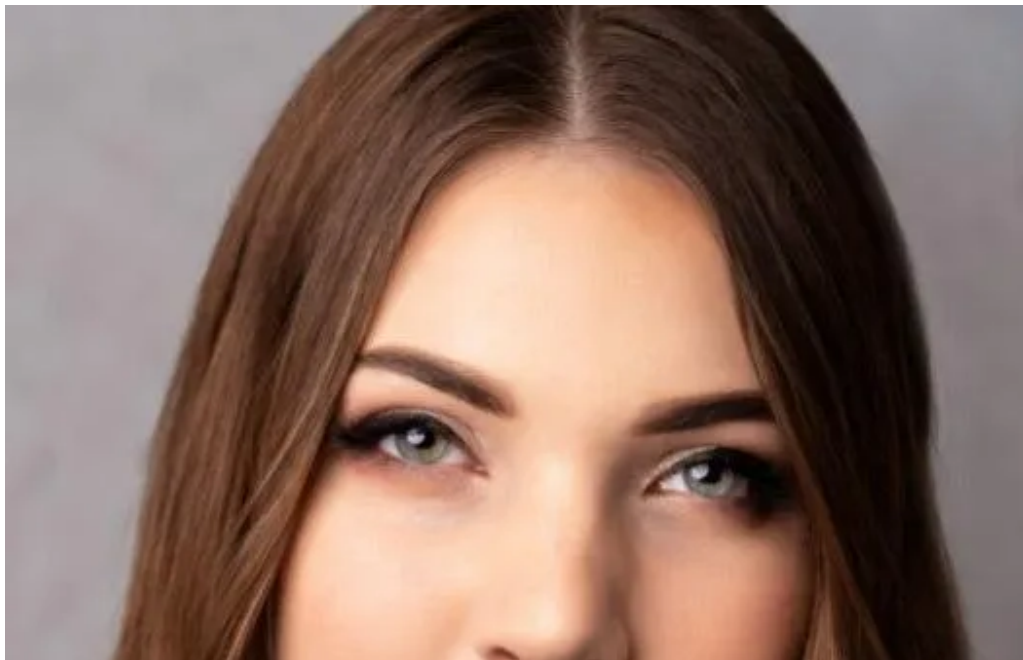
Boglarka Ecsedi, an incoming Georgia Tech freshman studying computer science, created a rip-current detection system that incorporates machine learning. The invention earned her \$400.

Rip currents are dangerous phenomena that can pull swimmers into deep water. Because the currents generally can't be seen by the naked

According to the U.S. Lifesaving Association, there are more than 100 rip current deaths each year.

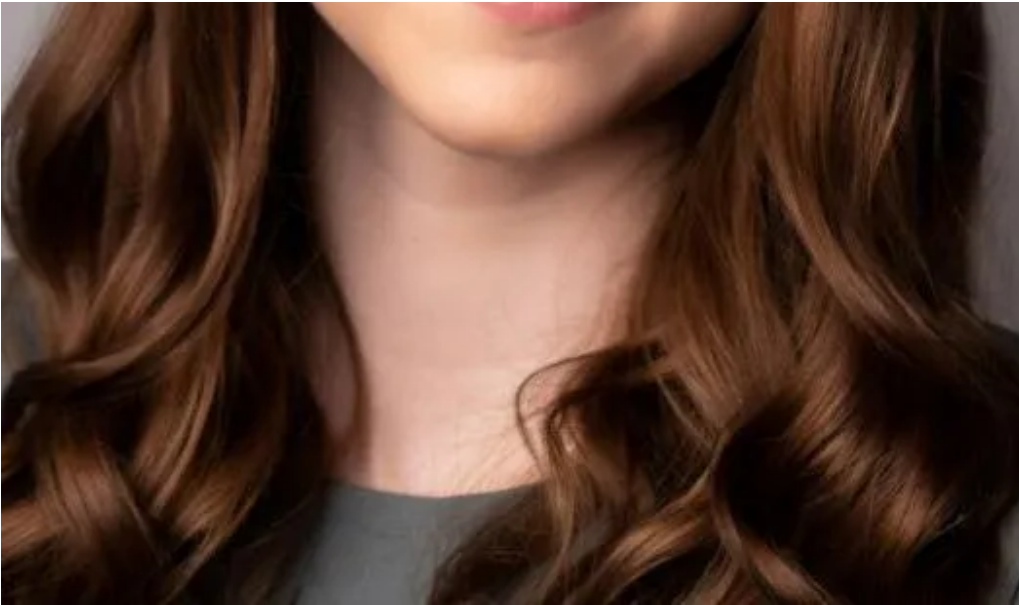
ADVERTISEMENT

Ecsedi says she hopes her project will raise awareness of rip currents among people who don't live near an ocean but vacation at one.



Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship





BOGLARKA ECSEDI

"A lot of people can be exposed to this danger," she says, "especially from landlocked countries, like Hungary," where she lives.

Ecsedi determined that using machine learning could help detect the treacherous currents. Her system uses an image-processing algorithm with a real-time deep neural network that filters through images and video of the water to detect rip currents. Her method has the ability to evolve with new data.

"A machine-learning approach is effective because we can build algorithms that are able to recognize this phenomenon on images and video recordings," she says.

She began working on the project while she was a research intern at the University of California, Santa Cruz. The city was an ideal place to tackle the project because of its beaches, she says.

After returning to Hungary, she had to turn to other methods to finish

annotate more than 1,000 images of beaches in Africa, Australia, and North America.

Ecsedi says she hopes to develop a mobile application that will allow people to detect rip currents just by using their smartphone's camera.

Isaac Ryu, an intern for IEEE Educational Activities, is attending Syracuse University.

TAGS

- IEEE NEWS
- IEEE MEMBER NEWS
- ARTIFICIAL INTELLIGENCE
- STUDENTS
- TRANSPORTATION
- SPACE
- 3D PRINTER
- MACHINE LEARNING
- SCHOLARSHIP

ABOUT THE AUTHOR

Isaac Ryu

READER RESPONSES

SORT BY POPULAR ▾

Reviews: ☆☆☆☆☆ (0)

Add comment...

PUBLISH

READ ALSO



NEWS | **ROBOTICS**

Robot Shows How Simple Swimming Can Be

11 AUG 2021 | 5 MIN READ |

NEWS | **AEROSPACE**

Solar Power from Space? Caltech's \$100 Million Gambit

11 AUG 2021 | 3 MIN READ |

NEWS | **BIOMEDICAL**

A Soft, Wearable Brain-Machine Interface

10 AUG 2021 | 3 MIN READ |

More from The Institute

NEWS | **THE INSTITUTE**

Former CEO of American Electric Power Dies at 94

ARTICLE | **THE INSTITUTE**

This Collection Teaches Engineers How to Protect Data

NEWS | **THE INSTITUTE**

Meet the Newest IEEE-HKN Eminent Member

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



NEWS

THE INSTITUTE

Has a Technical Standard Changed Your Life? Enter this Video Contest

NEWS

THE INSTITUTE

Learn How the President-Elect Candidates Plan to Improve IEEE

ADVERTISEMENT

Get unlimited IEEE Spectrum access

Become an IEEE member and get exclusive access to more stories and resources, including our vast article archive and full PDF downloads

JOIN IEEE

SIGN IN

Get access to unlimited IEEE Spectrum content

Network with other technology professionals

Establish a professional profile

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



Discover IEEE events and activities

Join and participate in discussions

FEATURE

ARTIFICIAL INTELLIGENCE

FAST, EFFICIENT NEURAL NETWORKS COPY DRAGONFLY BRAINS

An insect-inspired AI could make missile-defense systems more nimble

BY FRANCES CHANCE

| 30 JUL 2021 | 12 MIN READ |



ADVERTISEMENT

GETTY IMAGES/RICHARD PENSKA/500PX

In each of our brains, 86 billion neurons work in parallel, processing inputs from senses and memories to produce the many feats of human cognition. The brains of other creatures are less broadly capable, but those animals often exhibit innate aptitudes for particular tasks, abilities honed by millions of years of evolution.

Most of us have seen animals doing clever things. Perhaps your house pet is an escape artist. Maybe you live near the migration path of birds

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship

that lives at the exciting single address with which also lives

your pantry

Keep Reading ↓





Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



ADVERTISEMENT

Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship





Car Crash Prevention System Wins Student \$10,000 IEEE Scholarship



