

Police Reports

The Bozeman Police Department reports for Sunday included the following:

- A caller reported a man had lots of clothes and hats while having a couple of drinks at a bar. An officer warned the man for theft.
- An officer found a set of keys outside a Main Street bar.
- Around 2:10 a.m., an officer gave a warning to a man for driving with no lights.
- A caller reported a group of boys were biking on a frozen pond. The caller was concerned the ice might not be thick enough to hold them.
- Officers responded to 105 calls.

for Sunday included the following:

- A deputy gave two individuals a ride home from a Belgrade bar.
- A caller reported barking dogs. A deputy located the dogs, but was unable to locate the owners. A warning was left on the door.
- A woman spoke to a deputy about people using a trail to walk their dogs, trespassing on her property. The deputy suggested building a fence and advised the woman that there is no leash law in the county.
- A caller reported a rock in a bike lane.
- Deputies responded to 80 calls.

The Gallatin County Sheriff's Office reports

The Gallatin County jail held 159 inmates Monday.

MSU team to turn space radiation into useful tool

By MARSHALL SWEARINGEN
MSU News Service

Like turning lemons into lemonade, a Montana State University research team hopes to turn the radiation of outer space into a cybersecurity tool that could protect sensitive data transmitted by satellites.

Backed by a \$275,000 grant from NASA, the team will design, build and test a device that puts to use the high-energy particles emitted by the sun and other celestial bodies — radiation that has long been an expensive design concern for NASA.

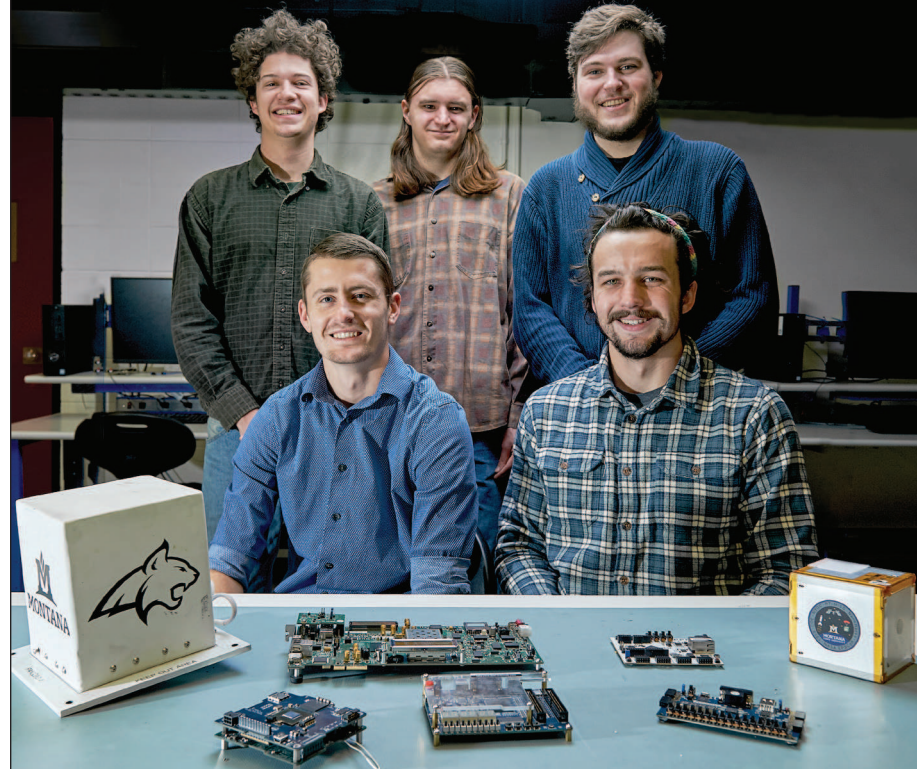
The idea for the new technology emerged from a decade-long MSU project to develop radiation-resistant space computers that are more affordable than the bulky models used now, said Brock LaMeres, professor in MSU's Department of Electrical and Computer Engineering. LaMeres is leading both projects.

"We started to ask, 'What if we actually used (the radiation) to our advantage?'" LaMeres said.

In a conventional space computer, it's a problem when radiation particles strike transistors, the tiny electronic switches that are the building blocks of modern computing. Charged radiation particles can randomly open or close the switches, resulting in computing errors, LaMeres explained. The particles are mostly blocked from the Earth's surface by the planet's atmosphere.

The new technology is intended to convert those switching events into the random numbers needed for encryption, a process in which data is encoded — and then decoded by its intended recipient — using a key, which could be a long sequence of numbers.

"Truly random numbers are hard to get in outer



Montana State engineering students, clockwise from top left, Brendan Gleason, Stefan Andersson, Connor Edling, Luke Middlestadt and Eli Sutherland are pictured with components of a satellite.

space," LaMeres said. Currently, satellites use their own software to generate pseudo-random numbers, which determined hackers could crack by detecting patterns. On Earth, random numbers used for encryption are generated, among other ways, by measuring physical events, such as the time between keystrokes on a computer.

In the concept for the new technology, LaMeres explained, transistors are programmed to represent the digits in an encryption key. Any switching caused by radiation particle alters the digits unpredictably, producing a ready supply of truly random keys.

The MSU team includes five undergraduates in MSU's Norm Asbjornson College of Engineering who will take the computing concept and build the device for their capstone project, which engineering majors complete as a requirement of graduation. All five students also re-

ceived grants from MSU's Undergraduate Scholars Program to fund additional research that is more than what is expected in a traditional capstone, LaMeres said.

"I'm curious to see what they come up with," said capstone mentor and project manager Trevor Gahl, who is earning his master's in electrical engineering and previously worked on LaMeres' radiation-tolerant computer project.

"They have a lot of ideas." This summer, the MSU students will test the device aboard a high-altitude helium balloon operated by World View Enterprises, an Arizona-based company. The balloon will rise to an altitude of roughly 100,000 feet, where the blackness of outer space is visible and radiation is considerably more intense than on Earth, LaMeres said. "They get to be involved with a real mission," he said.

"I like the magnitude

of the impact this could have in terms of cybersecurity," said Brendan Gleason, a senior majoring in mechanical engineering technology and a member of the capstone team. "It's cool to know we're working toward something that could benefit society."

Ultimately, the encryption tool would be implemented in tandem with MSU's radiation-tolerant computer technology, called RadPC, which would oversee the generation and use of the random numbers. Whereas traditional space computers have used oversized circuitry to fortify against the radiation particles, RadPC uses multiple inexpensive processors like those found in personal computers. The processors are programmed to operate in parallel, so that when a radiation particle disrupts one, the others recognize the fault, continue the computation and re-program any damaged computer memory.



COURTESY MONTANA FWP

FWP is seeking information on a poached moose found earlier this month in the Hyalite drainage.

FWP seeks info on poached bull moose

By MICHAEL WRIGHT
Chronicle Staff Writer

Montana Fish, Wildlife and Parks is seeking information on a poached bull moose found in the Hyalite area south of Bozeman.

Christmas tree hunters found the moose carcass on Dec. 1, about a mile up Moser Creek Road and reported it to FWP on Dec. 3.

Wardens investigated the area that day and

found the moose's head had been removed.

The animal was likely killed a few days before Dec. 1, FWP said in a news release.

FWP is asking anyone with information about the case to call Warden Justin Feddes at 406-579-6267 or call 1-800-TIP-MONT. Callers can remain anonymous and could be eligible for a reward of up to \$1,000 for information that leads to a conviction.

Trump plan to reclassify nuke waste alarms environmentalists

SPOKANE, Wash. (AP) — The Trump administration wants to reclassify some radioactive waste left from the production of nuclear weapons to lower its threat level and make disposal cheaper and easier.

The proposal by the U.S. Department of Energy would lower the status of some high-level radioactive waste in several places around the nation, including the Hanford Nuclear Reservation in Washington state — the most contaminated nuclear site in the country.

Reclassifying the material to low-level could save the agency billions of dollars and decades of work by essentially leaving the material in the ground, critics say.

The proposal joins a long list of Trump administration efforts to loosen environmental protections. Just last week, the Environmental Protection Agency acted to ease rules on the sagging U.S. coal industry.

Tom Carpenter of Hanford Challenge, a nuclear watchdog group, said it wants a thorough cleanup of the Washington state nuclear site, which is half

the size of Rhode Island. That includes building a national repository somewhere else to bury the waste once it has been stabilized.

"The cleanup of the site is really at stake," Carpenter said about the proposed change.

He noted that Hanford is located in an environmentally sensitive site adjacent to the Columbia River and susceptible to earthquakes, volcanoes and flooding.

Hanford was established by the Manhattan Project in World War II to make plutonium, a key ingredient in the atomic bomb dropped on Nagasaki, Japan. The plant went on to produce most of the plutonium for the nation's nuclear arsenal.

As a result, the site also contains the nation's larg-

est collection of nuclear waste. The most dangerous is stored in 177 aging underground tanks, some of which have leaked. The tanks hold some 56 million gallons of radioactive and hazardous chemical wastes waiting to be treated for permanent disposal.

Cleanup efforts at Hanford have been underway since the late 1980s and cost about \$2 billion a year.

Current law defines high-level radioactive waste as resulting from processing irradiated nuclear fuel that is highly radioactive. The Energy Department wants to reclassify some of the waste that meets highly technical conditions.

The agency says the change could save the federal government \$40 billion in cleanup costs across the nation's entire nuclear weapons complex, which includes the Savannah River Plant in South Carolina and Idaho National Laboratory.



COURTESY OF DAVE HALEY

A train struck a truck east of Belgrade on Monday afternoon.

Collision/from A3

No one in the train was injured. The train had minor damage. Crews cleared debris from underneath the train to get it moving. The semi-truck was totaled.

Bernard said there are no known causes for the crash.

The wreck happened shortly before 3 p.m. Dave Haley was driving by at the time and saw the train hit the cab of the truck, sending parts of it flying in a large cloud of dust. He and others pulled over to help pull the driver from the cab.

Haley said the truck was demolished. "There was nothing left of it," he said.

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