UC San Diego
JACOBS SCHOOL OF ENGINEERING

Stefan Savage, computer scientist, named MacArthur genius

Stefan Savage, a renowned cybersecurity expert and professor of computer science at UC San Diego, was awarded a fellowship by the MacArthur Foundation. Savage was recognized for his work understanding how cars are vulnerable to hacking; investigating the world of cybercrime and its economics; and creating new strategies to defend against malware. Savage takes an expansive view of cybersecurity by taking into account economics, policy and regulations, not just technology.

Learn more: bit.ly/StefanSavage2017

Campus to become a living lab for autonomous vehicles

UC San Diego will turn its campus into a test bed for self-driving vehicles starting in January 2018. The project will be implemented in stages, starting with self-driving mail delivery carts. "We are trying to solve the 'last mile' problem, when autonomous vehicles get off the freeway and onto crowded neighborhood streets," said Henrik Christensen, director of the Contextual Robotics Institute, who is leading the effort. The university will harness its expertise in areas including wireless and vehicle-to-vehicle communication, radar, cyber security and driver monitoring to develop these vehicles, explained Christensen, who was just named Qualcomm Chancellor's Endowed Chair in Robotic Systems.

Learn more: bit.ly/SmartCarts

UC San Diego creating an aerodrome to fly experimental drones

UC San Diego is creating an outdoor aerodrome where it can test unmanned aerial vehicles as part of the Contextual Robotics Institute. With support from Qualcomm and Northrop Grumman, the aerodrome will be 250 square feet covered with a 30-foot tall net cage. The facility will help promote the school's rapidly expanding research into autonomous robotic systems. Research to be performed at the facility is supported by the Army Research Laboratory, National Science Foundation and DARPA.

Learn more: bit.ly/UCSDaerodrome

Machine learning detects marketing, sale of opioids on Twitter
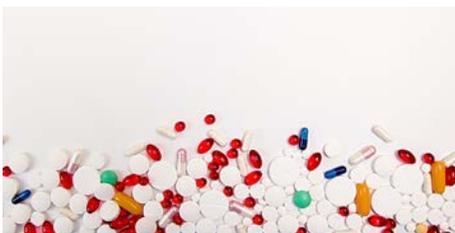
Using advanced machine learning, a team of UC San Diego researchers developed technology that mined Twitter to identify entities illegally selling prescription opioids online. Using a three-step process that involved cloud-based computing to collect large volumes of tweets filtered by keywords; machine learning to isolate tweets related to the marketing of opioids; and web forensic examination to analyze posts that included hyperlinks to external websites, the researchers detected 1,778 posts that were marketing the sale of controlled substances over a five-month period. This is a collaboration between the UC San Diego School of Medicine and Jacobs School of Engineering.

Learn more: bit.ly/MLOpioids

Facial recognition for molecules
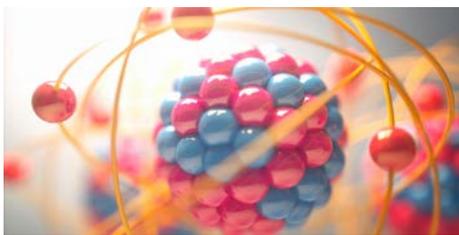
Nanoengineers, computer scientists and oceanographers at UC San Diego collaboratively developed a method to identify the molecular structures of natural products that is significantly faster and more accurate than existing methods. It works like facial recognition for molecular structures: a piece of spectral data unique to each molecule is run through a deep learning neural network to place the unknown molecule in a cluster of molecules with similar structures. This development could represent a paradigm shift in the chemical analysis, pharmaceutical and drug discovery fields since 70 percent of all FDA-approved drugs are based on natural products.

Learn more: bit.ly/MolecularStructure

Laser cavities take on new shapes and functionalities

Researchers have demonstrated, and published in *Science*, the first laser cavity that can confine and propagate light in any shape imaginable, even pathways with sharp bends and angles. The new cavity, called a topological cavity, could enable laser components to be packed more densely on a chip, leading to higher speed optical communication technologies that can be fabricated in an efficient and scalable manner using photonic integration techniques. "Our goal is to overcome the fundamental limitations of optical devices and uncover new physical principles that can enable what was previously thought impossible," said Boubacar Kanté, a professor of electrical and computer engineering at UC San Diego and the study's senior author.

Learn more: bit.ly/TopologicalCavity

Mapping the microbiome of everything

The Earth Microbiome Project, an extensive global research effort to sample as many of the Earth's microbial communities as possible, released its first data set after seven years of research. Rob Knight, UC San Diego computer science and pediatrics professor and director of the Center for Microbiome Innovation, is one of the co-founders of the collaboration. The researchers collected more than 27,000 samples and aim to advance scientific understanding of microbes and their relationships with their environments. The paper describing this effort was published in *Nature*.

Learn more: bit.ly/EarthMicrobiomeProject