



LEADING INDICATORS

2014 ANNUAL REPORT OF RESEARCH

Oregon State
UNIVERSITY

GLOBAL PARTNERSHIPS

OSU research reaches around the world

Oregon is known for its exceptionally beautiful coastline, rivers, mountains and deserts. Right alongside those natural jewels are businesses and research institutions that have global impact.

- » Technology firms are working with Oregon State University researchers and spinoff companies to make semiconductors and display screens faster, less expensive and more environmentally friendly.
- » Pharmacists and other health care providers are working with OSU scientists to make advances in pharmaceuticals, medical isotopes, reproductive care and diet that save lives and money.
- » New production methods developed at OSU are showing up in forest products, transportation, electronics, energy and agriculture.

These accomplishments don't stem from one or two labs alone. They are the result of partnerships extending around the world — from Oregon and across North America to Asia, Europe, South America and Africa.

In this annual research report, we focus on Oregon State University's strengths in Earth ecosystems, human health and economic and social progress. We provide you with a glimpse at OSU's grants and contracts for the 2014 fiscal year. Bolstered by a new record in support from the private sector, they reflect a research portfolio that is deep and wide.



A white, cursive signature of Ron Adams on a dark background.

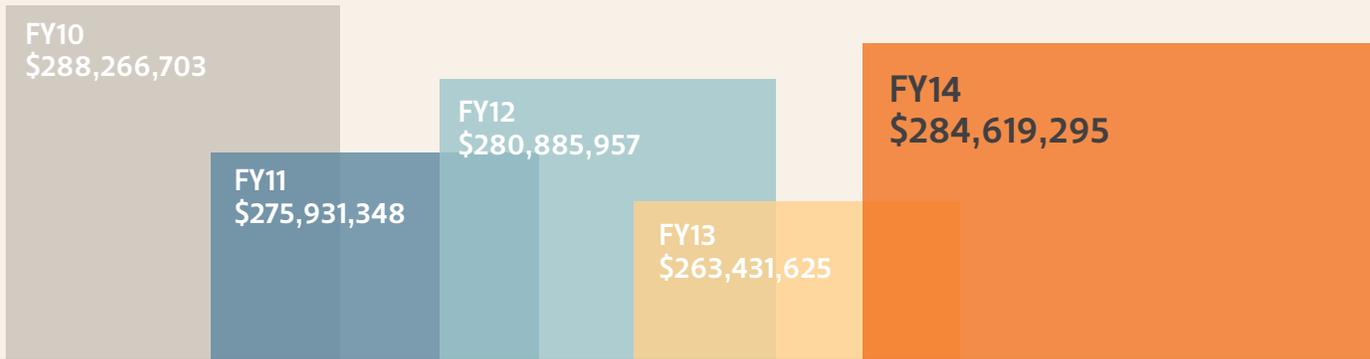
Ron Adams
Interim Vice President of Research

On the cover:

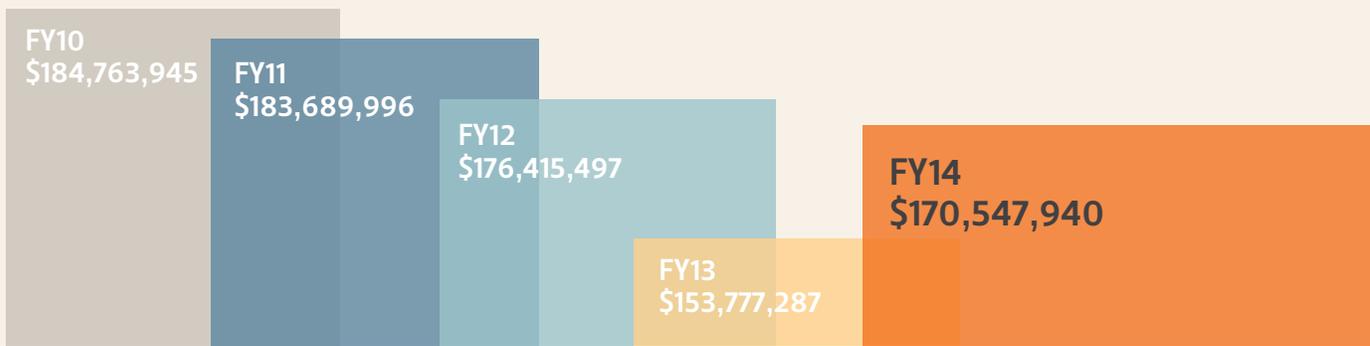
Oregon's strengths in electronic technologies and natural resources are reflected in this solar energy array in Bend, where OSU-Cascades offers one of the nation's few degree programs in Energy Engineering Management.

RESEARCH GRANTS AND CONTRACTS

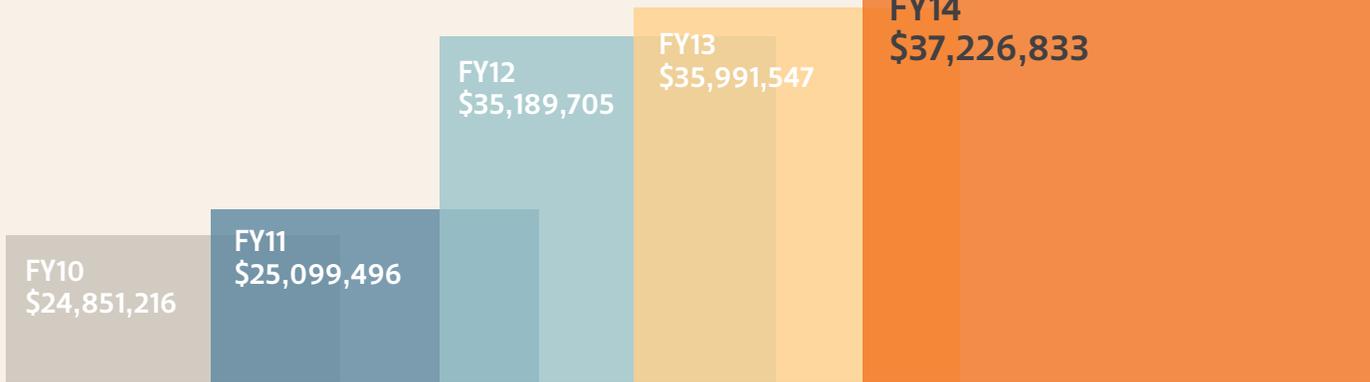
TOTAL



FEDERAL AGENCIES



INDUSTRY



Total Oregon State University research revenues grew by 8 percent in the fiscal year ending June 30, 2014. An increase in federal grants led the way, while private sector funding continued a steady climb. Recording the largest revenue totals were the colleges of Agricultural Sciences (\$45 million); Earth, Ocean, and Atmospheric Sciences (\$41 million); Engineering (\$38 million); and Public Health and Human Sciences (\$16 million).

“We have support from more than two dozen state and federal agencies,” says Ron Adams, interim vice president for research. “And on the strength of that

work, we continue to attract investment by business, industry and private foundations.”

Other revenue sources not shown here include state and local governments, nonprofit organizations and land-grant formula funding.

Other statistics (proposals submitted, revenues from all sources, award data by month, invention disclosures and so forth) are available online at research.oregonstate.edu.

Next-generation **ELECTRONICS**

Faster, safer and market driven

Silicon is the workhorse of our computers, smartphones and other electronic devices. Now Oregon State researchers are doing their best to enhance or replace it with materials that are faster, greener and less expensive to manufacture. Before these products end up in our purses and pockets, scientists need to understand how technology markets align with their research.

The solution for students in the Center for Sustainable Materials Chemistry (CSMC): Innovation Workshops. The goal, says CSMC director Doug Keszler, is not to turn scientists into entrepreneurs. It's to "understand how science can lead to breakthroughs that solve a real market problem."

Working in "proto-venture teams" with private-sector mentors (Brad Zinger, Pivotal Ventures; John Brewer, ONAMI; Richard McCurdy, McCurdy and Associates), students have been meeting with industry representatives and attending professional gatherings. They participate in "Lens of the Market" sessions that help them to determine if innovations have commercial value and to create research and business plans.

Already one new company has emerged from this process. Beet Inc. is developing a thin-film solar energy cell with the objective of increasing the conversion of sunlight into electricity to an industry-leading 30 percent. The goal is to make solar energy more competitive with fossil fuels.

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OCEAN CONSERVATION

Protecting marine mammals

In their migrations and feeding patterns, whales and their kin cross paths with humans, sometimes with unfortunate consequences. From the tropics to the poles, these majestic animals may be struck by ships or entangled in fishing gear. But by understanding where whales go to feed and reproduce, Oregon State's Marine Mammal Institute (MMI) is leading efforts to protect them.

MMI has reduced risks from energy exploration and helped shipping companies curb collisions with whales. MMI-designed satellite tags enable scientists to gain insights into the incredible mobility of blues, humpbacks, grays, minke, fins and other species.

Genetic investigations by MMI researchers have identified species killed as fisheries bycatch (the portion of commercial fish caught unintentionally) and untangled complex migratory relationships of living whales. Studies of Weddell seals in Antarctica and sea lions on the West Coast and in Alaska are providing critical information on the life history and population dynamics of these species.

With partners around the world, the institute advances the knowledge of marine mammals so that future generations will inherit this rich heritage and benefit responsibly from ocean productivity and biodiversity.

Contact: Marine Mammal Institute, Oregon State University Hatfield Marine Science Center, 2030 SE Marine Science Drive, Newport, OR 97365, 541-867-0202, mmi.oregonstate.edu.

Photo: Betsy Hartley



Taking a **DEEP BREATH**

In China, Africa and the Middle East, air pollution raises health risks

Staci Simonich and her lab have measured air quality in some dusty places: Beijing, China; the Sahara Desert; and Riyadh, Saudi Arabia. They have tracked air pollutants from sources that are nearby and an ocean away. In America's national parks, Simonich has found pesticides and combustion products — polycyclic aromatic hydrocarbons — in air and snow.

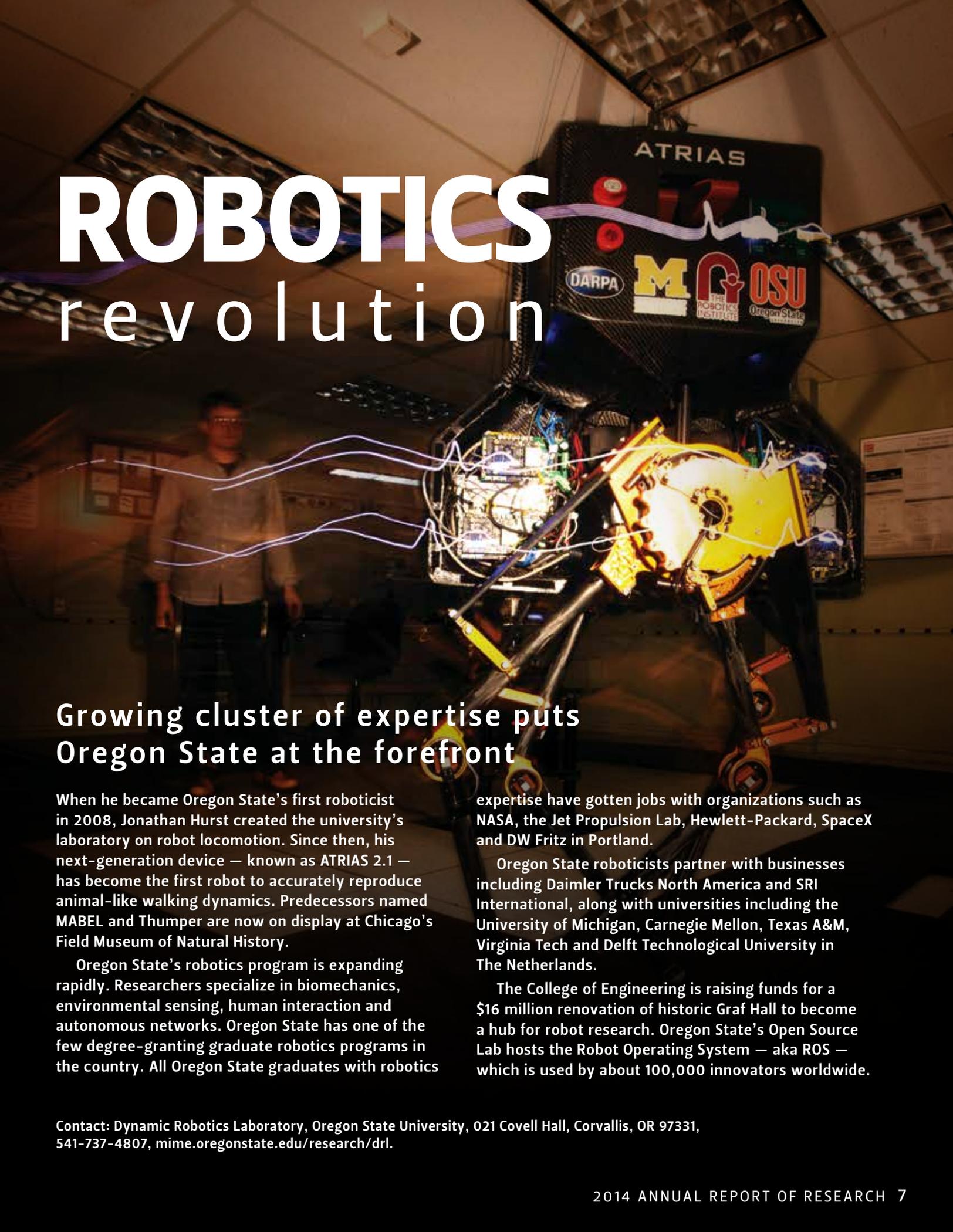
As a world authority on transboundary air pollutants, Simonich consults with scientists at Peking University and the Chinese Academy of Sciences. She has shared her expertise with students in the Middle East. Her groundbreaking analyses of emissions from electronics waste recycling and of air particulates

during the 2008 Summer Olympics raised awareness of pollution consequences for human health.

Just as air pollutants pay no attention to political boundaries, students in Simonich's lab come from around the world to study alongside their American counterparts. Graduates work for agencies, including Environment Canada and the U.S. Food and Drug Administration, and universities including Cornell, Baylor and the University of Otago in New Zealand.

The National Science Foundation and the National Institutes of Health have funded much of Simonich's research.

Contact: Staci Simonich, Department of Environmental and Molecular Toxicology, 1141 Ag Life Sciences Building, Oregon State University, Corvallis, OR 97331, 541-737-9194, staci.simonich@oregonstate.edu.



ROBOTICS revolution

Growing cluster of expertise puts Oregon State at the forefront

When he became Oregon State's first roboticist in 2008, Jonathan Hurst created the university's laboratory on robot locomotion. Since then, his next-generation device — known as ATRIAS 2.1 — has become the first robot to accurately reproduce animal-like walking dynamics. Predecessors named MABEL and Thumper are now on display at Chicago's Field Museum of Natural History.

Oregon State's robotics program is expanding rapidly. Researchers specialize in biomechanics, environmental sensing, human interaction and autonomous networks. Oregon State has one of the few degree-granting graduate robotics programs in the country. All Oregon State graduates with robotics

expertise have gotten jobs with organizations such as NASA, the Jet Propulsion Lab, Hewlett-Packard, SpaceX and DW Fritz in Portland.

Oregon State roboticists partner with businesses including Daimler Trucks North America and SRI International, along with universities including the University of Michigan, Carnegie Mellon, Texas A&M, Virginia Tech and Delft Technological University in The Netherlands.

The College of Engineering is raising funds for a \$16 million renovation of historic Graf Hall to become a hub for robot research. Oregon State's Open Source Lab hosts the Robot Operating System — aka ROS — which is used by about 100,000 innovators worldwide.

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Oregon State research at your fingertips

You can find more information about Oregon State's \$285 million research enterprise at a new website, research.oregonstate.edu. The newly organized and redesigned site offers updated news, fiscal-year statistics, resources for industry and assistance for faculty. The OSU Research Office has launched an e-newsletter, which will be sent three times a year, to complement the university's research magazine Terra. To subscribe to the Terra newsletter, send email with your name and postal address to TerraNewsletter@oregonstate.edu. And see Terra magazine online at oregonstate.edu/terra.



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