$20.4 MILLION
DOD Funding at Vanderbilt in FY 2018

Institute for Software Integrated Systems

Founded in 1998, Vanderbilt's Institute for Software Integrated Systems is a key national player in an effort to design the software-integrated systems that have become an essential part of human lives today - in consumer appliances, vehicles, planes, hospitals, schools, design shops, factories, space systems, and the energy sector. The institute is also advancing the development of protocols for the Internet of Things.

Major sponsors of the institute include the Defense Advanced Research Projects Agency (DARPA), the Air Force, the Army, the Navy, the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), the National Institutes of Health (NIH), and the Department of Education. The institute has received over $200 million in funding since 1998, approximately three-quarters of which is from DOD.

Last year, a Vanderbilt team of researchers and alumni won Round 1 of the DARPA Spectrum Collaboration Challenge (SC2) by helping to solve the century-old approach of allocating bands for specific use on the radio frequency spectrum. This year, they placed 2nd in Round 2, with the Final Round taking place October 2019. Globally, the wireless revolution is fueling a voracious demand for access to RF spectrum, which is a serious problem. DARPA wants to solve the problem, and SC2 is the first-of-its-kind collaborative machine-learning competition to overcome scarcity in the RF spectrum.

Institute for Space and Defense Electronics

The effects of radiation on electronic components and systems are among the most significant reliability challenges facing DOD systems. These effects occur when radiation, in the natural space environment or produced by weapons, interacts with sensitive electronic devices. The effects range from temporary loss of data to catastrophic failure. The Institute for Space and Defense Electronics (ISDE) is the only academic program in the U.S. directly involved in supporting DOD in radiation effects for strategic applications and is one of a very few programs involved in microelectronics research for space applications.

ISDE plays an indispensable role in ensuring that there is a sufficiently trained workforce in these critical technology areas. Over the past decade, ISDE has trained 141 engineers with Master’s degrees and Ph.D.’s. These highly trained individuals go on to support our nation’s efforts in radiation hardening and microelectronics research.

Annual funding is approximately $5 million, with support from the Navy, the Air Force, NASA, the Defense Threat Reduction Agency, and more than 20 commercial enterprises. The institute was a major contributor to radiation hardening the guidance system of the U.S. Navy Trident D5 Life Extension Program. It has also developed a small satellite platform using CubeSats for quickly and inexpensively assessing the radiation hardness of electronic components in space.

Laboratory for Systems Integrity and Reliability

When flying a military helicopter over hostile territory or providing emergency aid to disaster areas, knowing the
equipment can undergo a rigorous operating environment is crucial. Vanderbilt University School of Engineering’s Laboratory for Systems Integrity and Reliability (LASIR) tests advanced sensor systems that can rapidly detect early signs of failure in structures including aircraft, spacecraft, missiles, and ground vehicles. This research has been supported by the Army, the Navy, the Air Force, and the Marines, and has involved partnerships with several large defense contractors and equipment manufacturers.

That 'shine' in gold particles has a new use: finding defects

That glint of gold has always captured our eyes, but now the precious metal has a new use – finding defects in 3D printing. Vanderbilt researchers, with support from the U.S. Office of Naval Research, have developed a technique for gold to actually ‘shine’ inside 3D printed parts to highlight any problems. The innovative process involves mixing gold nanoparticles into the plastic filament used in 3D printing. Once the printed part is finished, it is inspected for defects using a special camera. The interdisciplinary team included researchers from the departments of civil and environmental engineering, chemical and biomolecular engineering, and chemistry, along with help from an undergraduate student studying at Fisk University in Nashville. A patent is pending on the technology.

Prestigious grant for melanoma research

A chemical and biomolecular engineering professor has received a prestigious Congressionally Directed Medical Research Programs (CDMRP) Career Development Award to develop an innovative multi-modal imaging platform for melanoma diagnosis and treatment evaluation. She will use novel immunoactive gold nanostructures (IGNs) in conjunction with PET scanning and Raman spectroscopy to assess tumor immunomarkers – both to enable patient selection for immunotherapy and to spare other melanoma patients from toxic side effects and costly interventions that will be ineffective for them. Melanoma is of particular interest to the CDMRP because it disproportionally affects military personnel and veterans, who are outdoors much of the time.

For more information, please contact Vanderbilt’s Office of Federal Relations:
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