

UNIVERSITY OF CENTRAL FLORIDA

UCF Research & Commercialization Fiscal Year 2008 Annual Report



This artwork was created by focusing a short pulse of laser light into the interior of a block of glass. This process (nonlinear optics) is an example of a basic principle that underlies many of the technological breakthroughs in lightwave technology at UCF's College of Optics and Photonics/Center for Research and Education in Optics and Lasers.

Academic Research Fuels

Innovation Economy

Academic research accelerates the innovation economy.

And make no mistake, the innovation economy is the best hope Florida has to compete in the 21st century.

Examples of strong academic research programs buttressing strong local economies abound. Silicon Valley in California (University of California, Stanford) and Route 128 around Boston (MIT, Harvard) represent some of the best.



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THE BUSINESS PUBLICATION *Intellectual Property Today* recently released the Patent Board's Patent Scorecard 2008™. Among the nation's top 10 universities in technology strength are MIT, Stanford, Cal Tech and . . . UCF. Number three in Industry Impact™ is . . . UCF.

WE ARE AMONG SUCH NOTABLE INNOVATION leaders because UCF has developed top-tiered research and graduate programs with the help of our partners in government and industry. This ranking is an objective indication of our progress in coupling our academic research enterprise into the innovation economy. This progress is based upon a three-pronged strategy:

FIRST, we have focused on key areas of research. By hiring some of the best faculty in the world to concentrate on areas compatible with Florida's economic plans, we have brought to Central Florida some of the nation's strongest concentrations of intellectual capital in lasers and optics, simulation and training, computer sciences and solar energy. More recently, we have added biomedical and nanosciences to this list.

SECOND, to harness the proceeds from the scientists working in these areas, we have developed what we refer to as the "entrepreneurship ecosystem." That ecosystem includes UCF's technology transfer services; a venture lab where entrepreneurs work with coaches and mentors to transform their innovative ideas or technologies into business plans; and the UCF Incubation Program, which gives new companies a place to start and succeed. These resources are made available to all the region's entrepreneurs, not just UCF faculty and students.

THIRD, we offer faculty members incentives to work with regional industry so that their expertise, students and labs can help address industry problems.

HOW ARE WE DOING? The proof is in the numbers. Since its inception in 1999, the UCF Incubation Program has expanded to five locations. Companies started in the incubator have already created 900 jobs, received more than \$170 million in investment funds and generate \$200 million in business a year. Perhaps one of the more telling statistics in terms of the success of the partnership is that 70 percent of the incubator clients are from outside of the university.

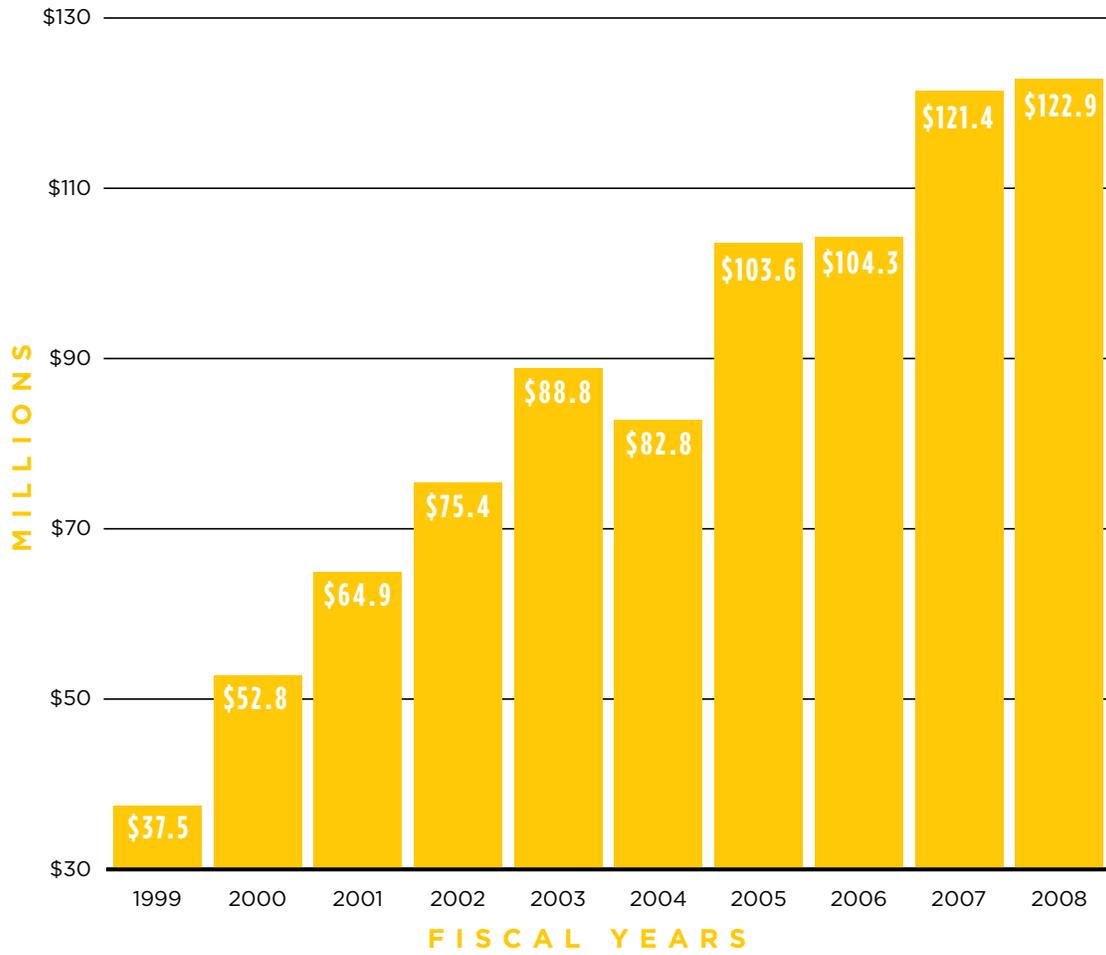
THE FLORIDA HIGH TECH CORRIDOR COUNCIL, a university-industry-government partnership focused on cultivating companies, offers up to \$2 million a year in matching funds for projects in which university faculty members and local companies conduct research. By 2008, the matching fund had supported 615 university research projects with 250 local companies, resulting in a \$130 million benefit to the community.

SPIN-OUT COMPANIES INCLUDE: Raydiance, described by *Business Week* as one of the top 10 disruptive technologies in the nation; OptiGrate, selected by the American Association of Tech Transfer Managers as one of the top 100 university spinoffs in the nation; and PetraSolar, a company in the sustainable energy sector that has secured \$14 million in venture funds.

ALSO, EIGHT of our young faculty members were awarded prestigious National Science Foundation Faculty Early Development (CAREER) awards in 2008, among the highest number ever awarded to a single institution.

IN DIFFICULT ECONOMIC TIMES it is easy to lose sight of the importance of investing in the future. University research partnerships with industry not only accelerate innovation, they provide a substantial return on investment.

10-YEAR RESEARCH FUNDING HISTORY



Individual Projects Fuel Top Three Funded Units



COLLEGE OF EDUCATION

Healthy Marriages Project Keeps Couples, Families Together

More than 1.2 million U.S. couples divorce each year—about 80,000 in Florida. In addition to the effect divorce has on families, it also results in \$30 billion in divorce-related costs.

College of Education Associate Professor Andrew Daire is working to change those numbers. With part of the \$1.5 million in research funding he received in 2008, Daire's Saving Healthy Marriages Together project at the UCF Marriage & Family Research Institute is helping 800 low and moderate income couples get the help they need to keep their marriages, their families, and ultimately the community, strong.



COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Bridging Nations Through Stronger Structures

Earthquakes are to Turkey what hurricanes are to Florida. So when Necati Catbas elected to study engineering in his hometown of Istanbul, it is not surprising that he was particularly interested in protecting buildings from such powerful natural forces.

In 2008, Associate Professor Catbas was inducted into the UCF Millionaires Club for receiving more than \$1 million in research funding. His biggest single award (\$855,259) is leading to new tools to better predict the strength and lifespan of existing bridges and make the bridges of the future even stronger.



INSTITUTE FOR SIMULATION AND TRAINING

UCF's New Super Recruit

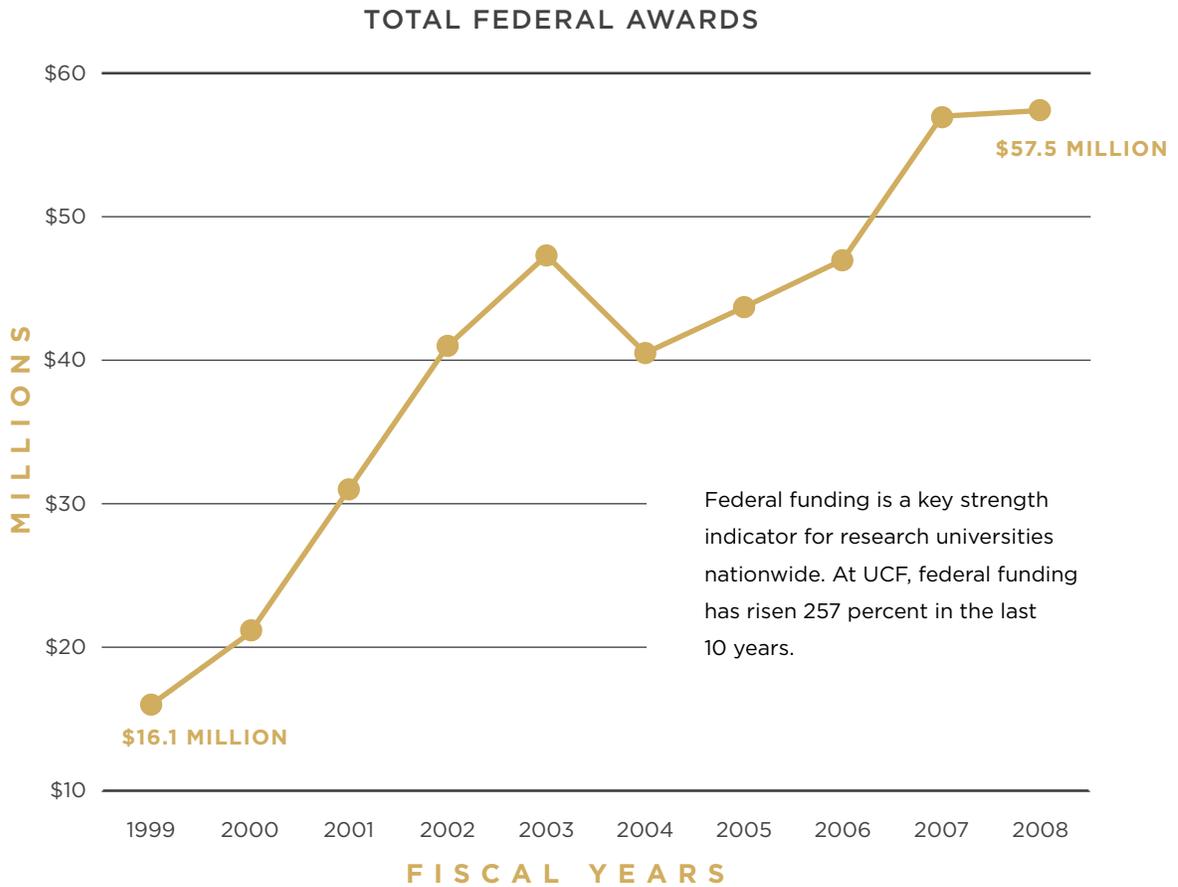
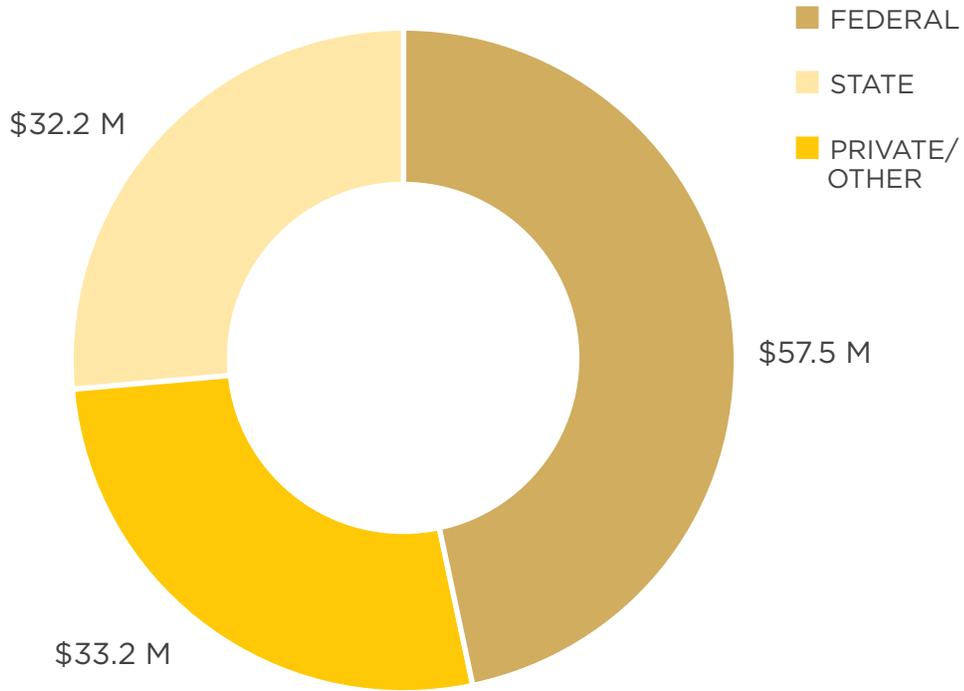
The UCF Institute for Simulation and Training (IST) has a new recruit—a supercomputer that is satisfying the Army's need for large-scale simulations that operate in real time. The new high-performance IBM System Cluster 1350 enables UCF to conduct more realistic training scenarios, allowing thousands of people to join a single virtual world to train or conduct research.

Randall Shumaker, the director of the IST, secured the machine, which is hundreds of times faster than a personal computer. And it's not only open to UCF faculty—the business community can use it, too.

FISCAL YEAR 2008 RESEARCH AWARDS BY ACADEMIC UNIT

College of Education	\$ 22,182,193
College of Engineering and Computer Science	\$ 21,079,579
Institute for Simulation and Training	\$ 16,125,564
College of Sciences	\$ 12,483,524
College of Optics and Photonics (CREOL)	\$ 10,306,792
Florida Solar Energy Center	\$ 9,442,861
Burnett School of Biomedical Sciences	\$ 8,440,724
Administration and Other	\$ 4,368,454
Continuing Education	\$ 3,833,522
NanoScience Technology Center	\$ 3,366,256
Advanced Materials Processing and Analysis Center	\$ 3,165,035
College of Health and Public Affairs	\$ 2,746,182
College of Business Administration	\$ 1,796,212
Student Development and Enrollment Services	\$ 1,639,340
College of Arts and Humanities	\$ 1,089,665
College of Nursing	\$ 409,089
College of Medicine	\$ 192,051
Rosen College of Hospitality Management	\$ 184,276
TOTAL	\$ 122,851,319

FISCAL YEAR 2008 RESEARCH AWARDS BY SPONSOR TYPE



THE PATENT SCORECARD™ 2008 – UNIVERSITIES

BY TAMMY D'AMATO AND SCOTT OLDACH OF THE PATENT BOARD™

The Universities Patent Scorecard represents the universities and university-based laboratories involved in patenting their research in all disciplines.

Ranking & Movement		Universities	Technology Strength™		Industry Impact™		Science Linkage™		Innovation Cycle Time™		Patent Count	
2008	2007		2008	5-Year Average	2008	5-Year Average	2008	5-Year Average	2008	5-Year Average	2008	5-Year Average
1	↔	1 University of California	250.68	420.9	1.12	1.36	25.93	20.25	9.44	8.4	290	425
2	↔	2 Massachusetts Inst of Technology	239.73	281.1	2.24	2.75	20.31	19.39	8.98	8.5	134	142
3	↔	3 California Inst of Technology	194.21	186.8	2.04	2.05	26.24	20.53	9.38	7.8	119	126
4	↔	4 Stanford University	149.21	132.5	1.53	1.97	17.77	17.61	9.28	7.6	122	94
5	△	17 William Marsh Rice University	112.51	115.6	4.40	1.48	23.75	33.79	10.26	9.5	32	108
6	▽	5 University of Texas	91.94	80.1	1.29	1.44	27.91	25.55	9.58	8.2	89	77
7	△	11 New York University	90.36	74.8	3.14	3.68	21.47	25.65	7.63	8.3	36	29
8	△	21 University of Central Florida	87.74	73.5	2.49	1.17	8.2	17.29	9.1	7.1	44	86
9	▽	6 University of Wisconsin	68.37	68.5	0.99	2.02	16.77	8.2	8.4	8	86	47
10	△	20 Harvard University	66.2	65.5	1.53	2.96	36.61	22.23	8.71	6.8	54	30

The University Patent Scorecard includes all U.S. utility patents held by each university. 122 universities are included in the ranking. For those universities, all 2008 rankings and indicators are based on the data from July 2007 through June 2008. The Patent Board continues to evolve their indicators as they advance the importance of Intellectual Property as the New Asset Class.

Universities are patenting a wide range of technologies; however, over three quarters of the patents are related to the health care and high-tech industries. Biotechnology is the primary focus for 82 universities in the scorecard – comprising 32.5% of all university patenting in the last six years. Other health care related industries hold top spots as well with Pharmaceuticals 2nd at 12.7% and Medical Devices in 5th at 7.7%. Holding the third spot for patenting is Semiconductors at 10% with other high-tech industries such as Electronics & Instruments, Information Technology and Telecom all in the top spots at 6.3%, 4.6% and 2.9% respectively. Chemical related patenting accounts for 7.9% landing it in 4th position overall.

The top 10 universities ranked by Technology Strength in patenting – there are six universities that have their highest concentration of patents related to Biotechnology, two in Semiconductors, one in Chemicals, one in Medical Devices and one in Electronics & Instruments. No surprise that **Massachusetts Institute of Technology (MIT)** and **California Institute of Technology (CIT)** have the most patents in Semiconductors, however they both have over 10% of their patents in Biotechnology, as well. Number 1 rank University of California has over half of their patents in the health care segment.

The University with the highest Industry Impact score is **William Marsh Rice University**, with an impact that is over four times that as compared to the rest of the universities' recent citation frequencies. So while they have the lowest volume of patents they are influential, which is not surprising considering the majority is nanotechnology related. Their top patenting area of chemicals accounts for over 50% of recent citation activity, however, a medical device related patent has received the most cites from the recent year pertaining to the use of "Optically-active nanoparticles for use in therapeutic and diagnostic methods". It is used for delivery of heat and the localized imaging of biological materials. The delivery may be in vitro or in vivo and is useful for the localized treatment of cancer, inflammation or other disorders involving over proliferation of tissue. The method is also useful for diagnostic imaging.

Looking at the Industry Impact of the top 10, it is not surprising that Biotechnology focused universities are lower than the high-tech industries as the rate of citation frequency varies greatly between the two technologies. With Biotechnology having a much lower rate than an industry such as Semiconductors, on the other hand, one would expect the Biotech patenting universities to have a higher link to science, but the California Institute of Technology (Caltech) has the 2nd highest score within the top 10 and its patenting volume at 22.4% is in Semiconductors.

Data for the Scorecard provided by the Patent Board™ (www.patentboard.com) and published in the September 2008 issue of Intellectual Property Today™ (www.iptoday.com).

The Patent Board™ ranks the strength of patents from the nation's top universities. In 2008, UCF's patent portfolio was ranked in the top 10 out of 122 universities, ahead of Harvard and along with MIT, CalTech and Stanford.

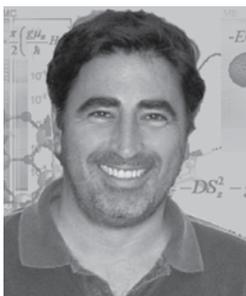
UCF Recipients

National Science Foundation

CAREER Award 2008

Eight UCF faculty members have been awarded the National Science Foundation's Faculty Early Development (CAREER) award, which recognizes the nation's most promising young researchers and educators. Together, UCF faculty members will receive approximately \$2.8 million in CAREER funding, to be dispersed over five years. The CAREER award honors teachers and scholars who are likely to become academic leaders in the future. Since 2000, UCF faculty members have received 22 CAREER awards.

2008 RECIPIENTS



Enrique Del Barco, assistant professor, Department of Physics. Del Barco will develop the necessary experimental and educational tools for the study and understanding of the quantum dynamics of nanometer-sized molecular magnets under a broad range of experimental conditions.



Andre Gesquiere, assistant professor, NanoScience Technology Center and the Department of Chemistry. Gesquiere will address the issues of light absorption and conversion of absorbed light to free charge carriers in active conducting polymer materials for solar energy conversion and will develop a new class of composite nanoparticles that will be studied in a device environment.



Saiful Khondaker, assistant professor, NanoScience Technology Center and the Department of Physics. Khondaker will develop a novel design engineering technique for parallel fabrication of controllable, scalable and reproducible single electron transistor (SET) devices using carbon nanotubes (CNTs).



Stephan M. Kuebler, director, Nanophotonic Materials Group, and assistant professor, Department of Chemistry, College of Optics and Photonics (CREOL). Kuebler will investigate processing, deposition and growth phenomena relevant to preparing 3-D optical multi-scale metallodielectric materials (MDMs) and develop predictive capabilities that relate the resulting nano- and micron-scale structure of MDMs to their electromagnetic properties and performance, enabling new devices and applications.



Nina Orlovskaya, assistant professor, Mechanical, Materials & Aerospace Engineering. Orlovskaya will create an integrated research and educational project to develop hard and tough boron carbide and aluminum magnesium boride-based laminates with controlled compressive and tensile stresses in separate layers.



Pawel Wocjan, assistant professor, College of Engineering and Computer Science. Wocjan will work to discover novel ways of harnessing quantum phenomena to advance the computational capabilities of information processing devices. This research provides a deeper understanding of the computational capabilities of information processing devices operating in the quantum regime.



Lei Zhai, assistant professor, NanoScience Technology Center and the Department of Chemistry. Zhai will investigate how to increase the efficiency of organic electronics by building ordered polymeric structures. Conductive polymers, i.e. plastics that can conduct electricity, have been proved to be very promising in replacing inorganic materials such as silicon in electronics.



Huiyang Zhou, assistant professor, College of Engineering and Computer Science. Zhou will introduce novel architectural support for bug detection, bug isolation to find the relevant bugs based on cause-effect relationship between the potential bugs and the program failure, and bug validation to generate quick fixes to the isolated bugs, thereby forming a complete process of automated debugging.

Office of Research and Commercialization

MILLIONAIRES

Researchers in areas ranging from education to simulation to photonics made the ninth edition of the UCF Millionaires list, which began in 2000 to celebrate the accomplishments of highly funded researchers, much in the same manner that universities traditionally celebrate the success of sports teams.

The sole criteria for entrée into the exclusive order is externally sponsored research funding of \$1 million or more during a given fiscal year. The 2008 class of millionaires, and their cumulative funding for FY 2008, is as follows:

Dr. Sandra Robinson	College of Education	\$ 13,685,519
Dr. Denise Nicholson	Institute for Simulation & Training	\$ 4,185,948
Mr. Ernest Smart	Institute for Simulation & Training	\$ 2,826,612
Dr. Brian Goldiez	Institute for Simulation & Training	\$ 2,513,647
Dr. Martin Richardson	College of Optics and Photonics (CREOL)	\$ 2,457,782
Dr. Subrato Chandra	Florida Solar Energy Center	\$ 2,129,947
Ms. Carrie Whitcomb	College of Sciences	\$ 1,923,396
Mr. Brian Plamondon	Institute for Simulation & Training	\$ 1,713,139
Dr. Eric Van Stryland	College of Optics and Photonics (CREOL)	\$ 1,568,858
Dr. Issa Batarseh	College of Engineering and Computer Science	\$ 1,559,500
Dr. Andrew Daire	College of Education	\$ 1,535,502
Dr. Randall Shumaker	Institute for Simulation & Training	\$ 1,443,824
Dr. Lee Cross	College of Education	\$ 1,416,986
Dr. Martin Wanielista	College of Engineering and Computer Science	\$ 1,325,777
Dr. Jaydeep Mukherjee	College of Engineering and Computer Science	\$ 1,316,809
Dr. Sudipta Seal	Advanced Materials Processing & Analysis Center	\$ 1,312,853
Ms. Lynn Hansen	Student Development and Enrollment Services	\$ 1,274,390
Dr. Niels Da Vitoria Lobo	College of Engineering and Computer Science	\$ 1,200,000
Dr. Ali T-Raissi	Florida Solar Energy Center	\$ 1,180,957
Dr. Zheng Shen	College of Engineering and Computer Science	\$ 1,180,880
Dr. Eduardo Salas	College of Sciences	\$ 1,099,327
Dr. Michael Georgiopoulos	College of Engineering and Computer Science	\$ 1,098,740
Ms. Tammie McClellan	Institute for Simulation & Training	\$ 1,096,997
Dr. Ella Bossy-Wetzel	Burnett School of Biomedical Sciences	\$ 1,095,915
Ms. Eileen Smith	Institute for Simulation & Training	\$ 1,089,902
Dr. Chad Nye	College of Health and Public Affairs	\$ 1,056,178
Dr. Mary Little	College of Education	\$ 1,055,775
Dr. Necati Catbas	College of Engineering and Computer Science	\$ 1,034,148
Mr. Stephen Barkaszi, Jr.	Florida Solar Energy Center	\$ 1,020,000
Ms. Eunice Choi	College of Business Administration	\$ 1,005,360
Dr. Peter Delfyett	College of Optics and Photonics (CREOL)	\$ 996,831
Dr. Vassiliki Zygoris-Coe	College of Education	\$ 960,000

