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2016 IEEE-USA President

Submitted on
behalf of the IEEE-USA

On FY 2017 Budget Recommendations

To The

House Appropriations Subcommittee on Commerce, Justice, Science and Related Agencies

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The Institute of Electrical and Electronics Engineers – USA (IEEE-USA) is the leading professional society for technology professionals. We represent approximately 200,000 engineers, computer programmers, scientists and others involved in the creation and use of advanced technologies. As such, our members are acutely aware of the important role basic research plays in our economy, and the federal government's role in supporting that research.

Our policy and appropriations recommendations below cover three of the research agencies whose missions span from studying the cosmos to neutrinos: the National Institute of Standards and Technology, the National Science Foundation and the National Aeronautics and Space Administration.

IEEE-USA urges Congress to consider that these agencies support research that is critical to our national economic and security interests. We respectfully request that they be prioritized in the FY2017 budget.

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National Institute of Standards and Technology (NIST)

IEEE-USA urges Congress to strongly support NIST laboratory programs.

While many of our members work as academic and government researchers, the majority work in the private sector. As such, we are acutely aware of the vital research done by the National Institute of Standards and Technology (NIST) and the way this research is used by American businesses.

NIST's work usually avoids the headlines and goes largely unnoticed by society. But while NIST is less known by the American public than other agencies, its engineer and scientist researchers are leading the way globally in areas from biomedical and fire safety, to communications and nuclear security. For over one hundred years NIST has quietly been facilitating research to help the American economy thrive. In these economically uncertain times, it is more important than ever that Congress invest in NIST's work. The public may not know what NIST does, but they certainly know the results – more innovation, more growth and more jobs.

From its modest beginnings as a measurement lab, NIST has grown to include seven major research facilities providing assistance to businesses all across our economy. NIST researchers develop cybersecurity standards, create ways to measure the optical properties of materials, reduce earthquake risk in buildings, and do a thousand other things that help Americans and American businesses. NIST remains a vital, if low-key, part of America's economic prosperity.

Congress needs to ensure that NIST is given the priority it deserves in the FY 2017 budget. America cannot afford to underinvest in one of the core agencies dedicated to making American businesses more productive and American scientists and engineers more innovative. On behalf of America's engineering professionals, most of who work in the private sector, IEEE-USA recommends the following for the FY 2017 budget.

Industrial Technology Services (ITS)

NIST's leading role in federal industrial technology programs directly helps the U.S. manufacturing sector to grow and expand through two hallmark manufacturing programs: The Hollings Manufacturing Extension Partnership

(MEP) program and the National Network for Manufacturing Innovation (NNMI).

These programs provide small and medium-sized businesses with access to federal resources, which in turn allows them to grow and improve the U.S. economy. IEEE-USA supports the President's budget request of $34 million above FY 2016 enacted levels for ITS and, in particular, requests that Congress appropriate $1.9 billion to fully fund a network of 45 institutes within the NNMI program.

Hollings Manufacturing Extension Partnership (MEP)

IEEE-USA supports strong, steady funding for the NIST Manufacturing Extension Partnership Program. NIST's Manufacturing Extension Partnership program enhances U.S. competitiveness by partnering with manufacturers to allow them to better utilize federal resources to address manufacturing challenges. Close to 99 percent of all U.S. manufacturing firms are small or medium sized. The MEP program supports these vital manufacturers in every state and Puerto Rico.

MEP centers helped 29,101 U.S. manufacturers in FY 2015 to develop new products, increase their customers, expand into global markets, and better utilize new technology. MEP services resulted in the creation of over 68,000 jobs, $3.2 billion in cost savings, $3.1 billion in new investments and $8 billion in new and retained sales in 2015.

MEPs are increasingly focused on small businesses in rural areas to improve economic opportunities throughout the U.S.

National Network for Manufacturing Innovation

IEEE-USA supports strong and stable funding for NIST's National Network for Manufacturing Innovation. Competitive funding to establish and grow this network will aid the continual growth of the U.S. manufacturing sector. IEEE-USA members have directly benefited from these manufacturing innovation institutes, which facilitate technology transfer. NNMI has been especially helpful in developing a scalable, cost-effective, and high performing U.S. manufacturing infrastructure. The program also allows for the acceleration and professional development of the next generation manufacturing workforce. Lastly, NNMIs provide opportunities for U.S universities to partner with the private sector to work together to address industry problems.

NIST Research Facility Modernization Funding

NIST laboratories and facilities are critical to its research and development activities. The facilities are, however, in need of upgrades to meet modern health and safety standards. Many of these facilities were built decades ago and are in danger of becoming obsolete without major renovations.

IEEE-USA supports the President's budget request of $100 million to renovate and modernize NIST facilities. Improvements and upgrades made to NIST facilities will directly benefit NIST research projects, including those in nuclear security, advanced computing, biomanufacturing, and communications. IEEE-USA was pleased that the 2015 omnibus spending bill provided increases for disaster resilient building and infrastructure programs, cryptographic capabilities, materials genome, and quantum-based sensors programs, but more needs to be done.

Major needed upgrades include the radiation physics buildings in Gaithersburg, MD and Boulder, CO. Flooding at some facilities has hindered research on wireless technology, satellite calibration, radiation exposure for U.S. workers, and medical imaging. NIST nuclear forensic lab activities have been delayed due to needed installations and upgrades.

By increasing building renovation funding, Congress can begin to address the estimated $300 million backlog of basic repairs needed at NIST facilities. We cannot expect NIST researchers to conduct 21st century work in mid-20th century facilities. Infrastructure is expensive, but failing to maintain our research infrastructure will prove to be even more expensive to our economy in the long-run.

National Science Foundation (NSF)

IEEE-USA strongly urges Congress to appropriate modestly increased investments for the NSF that lead to real growth for the agency's programs. In particular, we request funding increases in the Engineering Directorate and other disciplines that fall within the Research and Related Activities Account as well as for major research equipment and facilities construction. Additionally, IEEE-USA requests that Congress appropriate increased funding for NSF's cross-cutting I-Corps program and the agency's cybersecurity research programs.

Over the 66 years of its existence, NSF grants have supported 217 Nobel Laureates. Basic research, which by its nature is the search for new knowledge, has proven many times over to offer significant contributions to the U.S. economy and to our national priorities. The NSF's funding impacts 20,600 senior researchers, postdocs, graduate and undergraduate students, K-12 students, and educators.

The interdisciplinary nature of research, particularly in the earliest stages, is complex and non-linear. Discoveries in engineering fields, for example, have contributed to advancements in understanding gravitational waves. Physics and chemistry research provides the basis for fundamental engineering research which contributes to advances in biomedical devices that cure diseases. The NSF's fiercely competitive grants process helps advance U.S. science and engineering excellence and is the global gold standard for doing so.

I-CORPS

NSF's Innovation Corps program, which partners U.S. university researchers with entrepreneurs, provides the means for university research to better contribute to products and services that grow the U.S. economy. By supporting the unique public-private partnership, the Innovation Corps program affords university researchers with the skill sets necessary to accelerate the development of tangible applications for their research while giving entrepreneurs access to cutting edge ideas.

I-Corps has had many successes in providing pathways to educate researchers and entrepreneurs. In some cases, university-based centers for entrepreneurship and technology transfer offices have formed partnerships with schools of businesses. These unique partnerships have led to the acceleration of many research projects into new economic markets, from energy and materials sciences to biomolecular applications. By supporting collaborations between faculty and student researchers in engineering, sciences, and businesses, the I-Corps program enables U.S. research institutions the opportunity to build on their business models, analytical tools, and customer interactions so their entrepreneurs can better engage with industry partners and local businesses.

NSF Cybersecurity Programs

IEEE-USA's engineers, computer scientists, and other researchers are working at the cutting edge of cybersecurity research. NSF cross-cutting programs provide funding to continue to improve U.S. cyberspace capabilities. IEEE-USA supports the President's budget request of $100 million for the Cyberinfrastructure Framework for the 21st Century Science, Engineering, and Education (CIF21) and also the $150 million requested for the Secure and Trustworthy Cyberspace (SaTC) program.

NSF Facilities Construction

IEEE-USA urges Congress to provide strong support for the National Science Foundation's facilities construction account. For the U.S. to continue to be at the forefront of innovation, the facilities where research is conducted need to be maintained and updated. U.S. high tech companies and the general public ultimately benefit from the federal government maintaining world class facilities.

Principal investigators who are professors at U.S. research universities need to use advanced facilities, unavailable to them at individual academic institutions in order to conduct experiments. The National Science Foundation, Department of Energy and other research agencies provide funding to support construction and maintenance of these facilities. For our principal investigators to be competitive, we must maintain support for these facilities, especially since our international competitors are building first-rate updated facilities to compete with the U.S.-based researchers.

NSF Engineering Directorate

Whether it is research into manipulating atoms and molecules to create materials with new properties, or NSF's support for advances in information technology, NSF sponsored engineering projects are at the forefront of efforts to maintain our global competitiveness. NSF computing, engineering, nanoscience, material science programs are multi-disciplinary in nature and produce huge benefits to the U.S. economy. NSF's support of physics, chemistry and biology also aids the engineering research community.

IEEE-USA members urge Congress to consider steady, robust funding for the

Engineering and other Directorates within NSF's Research and Related Activities. Without this predictability and support, projects cannot progress in a timely manner and end up costing the taxpayer more in the long term. There is also a risk that our international competitors, many of whose governments invest a greater percentage of their GDP in research than we do, will outpace the U.S., costing us high-skilled talent.

NASA

NASA's balanced support for aeronautics research, exploration operations, and science programs benefit U.S. national security and help us better negotiate with international partners.

IEEE-USA members work in a wide variety of fields that contribute to and directly support NASA. IEEE-USA was elated that Congress sought to provide NASA with $19.3 billion, an increase of $1.27 billion, in last year's omnibus spending bill. The commercial crew program will be one of the primary beneficiaries of this funding, which will allow the agency to launch on schedule. We ask that you maintain these levels in FY2017.

Aeronautics Research

IEEE-USA supports NASA's role in advancing its capabilities in safety, capacity, and efficiency. Projects developed for NASA's use in space regularly transform the way we live as societies here on Earth. The agency's work in aeronautics has drastically altered the U.S. aviation industry, the development of aircraft and unmanned aerial vehicles. NASA aeronautics partnerships with the private sector foster the extensive growth in commercial space flight and space-related manufacturing.

Space Technology

NASA's space technology programs also support the development of the U.S. commercial space sector by working to develop and commercialize new technologies that can be utilized by the U.S. aerospace community. IEEE-USA Members regularly receive NASA's SBIR and STTR grants and strongly support NASA's engagement with academia and industry during the early stages of their research and development projects.

Space Exploration

NASA's exploration and space operations programs are some of its most visible and inspiring. Continued development of transportation systems is imperative if we are to cease paying Russia for crew transport services. Other missions to explore space enhance our understating of the universe and develop advanced technologies that improve the lives of people around the globe. These missions give NASA direction and purpose, making their programs more effective and more productive.

Science

IEEE-USA would like to commend Congress's interest in the James Webb Space Telescope and urges appropriators to provide strong funding for this telescope so it can maintain its 2018 launch date. Hubble images continue to be used to study astronomy and this next generation telescope will allow U.S. researchers increased access to data and information about our universe. Our understanding of space weather will be improved by NASA's launch of two Explorer missions this decade. NASA's missions produce cutting edge results for the scientific and engineering community.

Finally, NASA's unique ability to provide opportunity for educators and students engage the next generation of engineers and scientists. Space, more than other areas of science or engineering, has inspired young students explore the universe and their own surroundings. NASA's Space Grant, Experimental Program to Stimulate Competitive Research (EPSCOR), and Minority University Research and Education Project (MUREP) programs build on student interest in space-related research and provide them resources to pursue their interests at the undergraduate and graduate level.

Conclusion

IEEE-USA recommends that Congress provide steady increased support to the federal research agencies. As the U.S. seeks to continue to be competitive on the world stage, it is critical that Congress provide robust investments in research programs and additionally provide funding for upgrades and maintenance of our research facilities. Doing so will attract talented students to our universities and will provide incentives for researchers from all over the world to come to the U.S.

to conduct scientific and engineering work which in turn will lead to the development of new products, services, and corporations.

IEEE-USA members thank you for your work in determining their appropriations and look forward to working with you as the budget process moves forward.