



• Research Development

## Office of the Vice Chancellor for Research

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## FEATURE STORY



Christine J. Picard

### **IUPUI maps genome of black blow fly; may benefit human health, advance pest management**

Researchers at the School of Science at Indiana University-Purdue University Indianapolis have sequenced the genome of the black blow fly, an insect commonly found throughout the United States, southern Canada and parts of northern Europe.

Black blow flies have environmental, medical and forensic uses, functioning as nature's recyclers, as wound cleansers and as forensic timekeepers. They have a blue or green sheen and are similar in size to common houseflies.

The female genome was found to contain 8,312 genes; the male genome had 9,490 genes.

"There is nothing special about black blow flies (scientific name *Phormia regina*), but that lack of uniqueness is why scientists are interested in studying them," said [Christine Picard](#), assistant professor of biology and forensic scientist, who led the team that sequenced the genome.

Picard offers the following analogy to explain her research interest in black blow flies: "If you are interested in studying a particular human disease, for instance, you don't start by studying people with the disease. You start by studying healthy individuals, and then you look for differences between the healthy and the sick to make sure any differences that you observe are actually due to the disease and not due to other factors.

"The first step is to figure out what the normal is. That's why I have been studying this fly for a decade and we have been working on sequencing its genome for the past five years: because this is an essentially unremarkable insect. It doesn't do anything that is abnormal. Having sequenced the black blow fly genome, we are providing a major resource for all of the researchers who are studying other insects that have unusual or dangerous characteristics, such as a species of fly that fatally attacks livestock."



Black blow fly

Black blow flies are active insects that perform three tasks that benefit humans: recycling carrion, debriding human wounds and laying eggs on freshly dead bodies. They have no harmful or parasitic behaviors.

Black blow flies feed on decaying flesh and help consume dead vertebrates throughout the environment. Black blow fly larvae, or maggots, are used medically to debride human wounds, as the insects physically remove dead tissue while simultaneously excreting antimicrobial compounds into the wound. With an excellent sense for smelling recently dead tissue, black blow flies are usually the first insects to colonize a human body, frequently within minutes after death. Females lay eggs on recently deceased corpses, setting a "clock" that enables forensic investigators to estimate the postmortem interval, or minimum time since death.

Other gene-mapping projects have been conducted by large, often international consortiums, with one group working on one aspect and others on different aspects, as a collaborative project. IUPUI's black blow fly genome sequencing was primarily conducted over four years by biology doctoral candidate Anne Andere under Picard's mentorship, with input from Texas Tech University biologists R.N. Platt II and David A. Ray.

"[Genome sequence of \*Phormia regina\* Meigen \(Diptera: Calliphoridae\): Implications for medical, veterinary and forensic research](#)" is published online in BMC Genomics. Graduate student Andere is the first author. Picard, the corresponding author, is assistant professor in the Department of Biology and the [Forensic and Investigative Sciences Program](#). She works at the interface of forensic entomology and molecular biology.

Insects constitute slightly more than half of all living species on Earth. In 2011, i5K, an initiative to sequence the genomes of 5,000 insects and other arthropods within five years, was launched. Thus far, however, only 239 arthropod genomes have been sequenced, with now the black blow fly genome available.

"Now that we have described the genome," said Picard, "I plan to continue working toward a better understanding of black blow fly population variation from location to location, and show how the variations influence postmortem interval estimates, with the goal of making these important determinations more accurate."

Picard said the mapping of the black blow fly genome will also help researchers gain better insight into insecticide sensitivity and resistance. Knowledge of the genome will advance understanding of the antimicrobial compounds secreted by these specific insects as well.

The black blow fly gene-mapping results completed at IUPUI have been deposited with the National Center for Biotechnology Information's Sequence Read Archive Database and are accessible to researchers around the world.

Financial support for the sequencing of the black blow fly genome was received from the Department of Biology and the School of Science at IUPUI and the National Science Foundation grants for supercomputing and data analysis awarded to Indiana University and the National Center for Genome Analysis Support, grants DBI-1458641 and ABI-1062432.

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## ANNOUNCEMENTS

Mahomed honored with Sagamore of the Wabash award

Yousuf Mahomed, MD, Professor Emeritus of Surgery, Indiana University School of Medicine, has received Indiana's highest civilian honor, the Sagamore of the Wabash. Bestowed by the governor, the award is "given to those who have rendered a distinguished service to the state or the governor."

Dr. Mahomed served as professor of surgery at IU School of Medicine for more than three decades. He was one of the principal members of the team that started the cardiac transplant program and was an early pioneer in minimally invasive cardiac surgery, arrhythmia surgery and beating-heart surgery. He remains actively involved with IU School of Medicine and is a 2015 graduate of the IU Kelley School of Business of Medicine MBA program.

NIH implementation of Final Research Performance Progress Report (FINAL RPPR)

The National Institutes of Health will replace the Final Progress Report (FPR) with the Final Research Performance Progress Report (Final RPPR) through a new eRA Commons module effective January 1, 2017.

The format will remain largely unchanged; however, organizations will now be requested to submit an "Interim-RPPR" while a renewal application (Type 2) is under consideration. In the event that the Type 2 is funded, NIH will treat the Interim-RPPR as the annual performance report for the final year of the previous competitive segment. If the Type 2 is not funded, the Interim-RPPR will be treated by NIH staff as the institution's Final-RPPR.

The Final RPPR or Interim-RPPR must be submitted via eRA Commons no later than 120 calendar days from the period of performance end date.

For additional information, including a link to FAQs, please see the NIH Guide Notice:

<http://grants.nih.gov/grants/guide/notice-files/NOT-OD-17-022.html>

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## FACULTY SPOTLIGHT



Sohel Anwar

### **NSF funds program to improve engineering students' creativity and problem-solving skills**

The National Science Foundation has awarded \$452,958 to the School of Engineering and Technology at Indiana University-Purdue University Indianapolis to pilot a program that will prepare graduate-level engineering students to support the nation's capacity to out-innovate, out-create and out-think the rest of the world.

A new design track in the master's program in mechanical engineering at IUPUI will accomplish that goal by improving students' creativity and problem-solving skills, said [Sohel Anwar](#), an associate professor of mechanical engineering and principal investigator for the award.

The department currently offers six master's tracks: biomechanics, energy, fluid and thermal sciences, materials, mechatronics and control, and solid mechanical and computer-aided engineering. □

The key to the new track is the integration of the foundational elements of creativity and innovation into an engineering, technology and arts pilot program, Anwar said. □

Three new multidisciplinary courses and a new graduate certificate program will be developed by the [School of Engineering and Technology at IUPUI](#). The IU School of Art and Design in Bloomington and the IU Ernestine M. Raclin School of the Arts in South Bend are collaborative partners in this project. □



Origami

These interdisciplinary courses will be team-taught by faculty from art/design, interactive sculpture, mechanical engineering and electrical engineering technology. □

The first course will focus on training the students in art/design with particular emphasis on origami and complex structures, promoting creative thinking with applications to engineering design through course projects. □

The second course will be a transitional course from static structures to mechatronic actuated/moving

systems, connecting the art/design-oriented first course and the engineering/technology-oriented third course. □

The third course, focusing on environmental pollution and emission control, will allow the application of hands-on skills, knowledge and the creative design processes gained in the first two courses to solve real-world technical and engineering problems with the help of experiential learning. Students will have a chance to have an immersive experience in an industry or national lab setup, either through supervision by experienced mentors or direct placement as trainees at local industry/government labs. □

Experts believe that instilling creativity, innovation and hands-on experience into graduate engineering and other graduate STEM programs is needed if the U.S. is to keep its technological edge. The outcomes of this NSF-funded project are expected to be creative products such as new publications, invention disclosures and copyrighted materials as a result of the student work in the course projects, according to Anwar. □

"Because creativity and innovation are the driving forces for economic growth, it is critical to infuse innovative thinking and hands-on experience into the engineering and technology graduate programs," Anwar said. □

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## STUDENT SPOTLIGHT



Joseph Suelzer

### **Physics graduate receives award for best student paper**

A Ph.D. graduate from the Department of Physics was awarded best student paper at a recent conference. Joseph Suelzer received the award at the SPIE Active Photonic Materials VIII conference for his paper titled "[Parity-time symmetry breaking in optically coupled semiconductor lasers.](#)"

SPIE is an international society for optics and photonics. Suelzer's abstract was reviewed by our program committee members and selected to enter the second phase of the student award competition. Suelzer's presentation was then judged on-site by a panel of experts in the field.

"[Parity-time symmetry breaking in optically coupled semiconductor lasers](#)" is published in SPIE Proceedings, Volume 9920, Active Photonic Materials VIII (September 16, 2016). Authors in addition to Suelzer are [Yogesh N. Joglekar](#) and [Gautam Vemuri](#).

"Joe was an outstanding graduate student who used his considerable talents of creativity, originality and industry to advance the topic of coupled semiconductor laser physics," said Gautam Vemuri, professor of physics and Suelzer's mentor. "He is richly deserving of this prestigious award for his work on time-delayed PT-symmetric quantum mechanics, which represented a fundamentally new direction in the field of PT-symmetry."

Since completing his Ph.D., Suelzer was awarded a National Research Council (NRC) Postdoctoral Fellowship with the Air Force Research Laboratory (AFRL) at Wright Patterson AFB. His work at the AFRL extends the research he conducted at IUPUI, nonlinear dynamics of optically injected semiconductor lasers.

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## TRANSLATIONAL RESEARCH IMPACT



Sheri Robb

### **Study to examine if music-based play intervention helps young cancer patients and their parents**

An Indiana University School of Nursing researcher has been awarded \$1.4 million to determine if a music therapy intervention can be used to manage acute distress in young cancer patients ages 3 to 8 and their parents.

[Sheri Robb](#) received the award from the National Institutes of Health. She will lead a team of researchers at Riley Hospital in Indianapolis, Children's Mercy Hospital in Kansas City and Children's Healthcare of Atlanta that will examine the impact of play and a specific music-based play intervention on the shared distress that parents and children experience when the child is undergoing intensive chemotherapy. □

A total of 184 pairs of children and parents will be enrolled in the study at the hospitals during the next two years.

"The interventions were designed to diminish parent-child distress that occurs when the child is undergoing cancer treatment and at the same time improve their quality of life and family functioning overall," Robb said. □

Robb said it's well-known that young children cope with difficult life experiences through play. The interventions to be studied include a stories program and a music play intervention that is delivered to both parent and child by a board-certified music therapist, she said. □

"The therapist is trained to tailor music experiences to the specific needs of the child and parent while at the same time providing resources to parents about how they can use music and play between therapist visits," Robb said. The therapists will work with the children and their parents while the children are receiving chemotherapy at the hospitals. □

In addition to examining whether these programs can reduce distress, the researchers will also be examining "how" the intervention works, or the underlying mechanisms that are responsible for any benefits that children and parents might experience as a result of the interventions. □

Up to 75 percent of young children and about 50 percent of parents experience significant emotional distress as the children undergo cancer treatments, Robb said. □

"We know that the distress these children and their parents experience during active cancer treatment is related to the incidence of things like traumatic stress symptoms after treatment ends," Robb said. "Part



of the goal of the intervention is to see whether bringing in an intervention that helps buffer the stress children and their parents face during active cancer treatment can also prevent the incidence of traumatic stress symptoms after treatment ends."□

Co-investigators of the study on the IUPUI campus are Joan Haase, IU School of Nursing; Susan Perkins, IU School of Medicine, Dr. Paul Haut, Riley Hospital for Children, IU School of Medicine; and Dr. David Delgado, Riley Hospital for Children, IU School of Medicine.□

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## EVENTS AND WORKSHOPS



**Stepping Stones of Women in Leadership**  
January 26th, 2017 | 11:45 a.m. - 1:00 p.m. | Fairbanks Hall (FS) 1112



**Maureen Harrington, Ph.D.**  
Associate Dean of Medical Student Education in Foundational Sciences  
Indiana University School of Medicine



Women have achieved significant accomplishments in medicine and science, yet comprise a relatively small proportion of faculty leadership positions, and tend to have smaller professional networks and fewer role models than male colleagues. This series creates a forum where all faculty and students can learn about the personal career journeys of successful women. Please join us in honoring the career of Dr. Maureen Harrington.

Register at <http://faculty.medicine.iu.edu/registration/indexDirect.php?id=2177>.

Save the date: RESPECT Center conference is March 3

Mark your calendar for IUPUI RESPECT Center's 2017 conference, "Let's Talk Palliative Care: Challenges, Controversies, and the Cutting Edge," on Friday, March 3, at Ritz Charles, in Carmel,

Indiana. Keynote speaker is Angelo Volandes, MD, Harvard Medical School. Poster abstract submissions will be accepted through Jan. 20. For details, [view the call for poster abstracts](#) □.

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## RECENT EXTERNAL FUNDING AWARDS

### Grants and Awards – October 2016

PI	Agency	Project Title	School	Department	Total
King Thorius, KathleenAnn	U.S. DEPARTMENT OF EDUCATION	Midwest and Plains Equity Assistance Center: Civil Rights Training and Advisory Services- Equity Assistance Centers Program	EDUCATION	EDUCATION	\$8,256,394
Kareken, David A.	NATIONAL INSTITUTE ONALCOHOL ABUSE AND ALCOHOLISM	Alcohol-seeking behaviors and dopaminergic function	MEDICINE	NEUROLOGY	\$2,695,704
Evans-Molina, Carmella	NATIONAL INSTITUTE OFDIABETES, DIGESTIVE & KIDNEY	Mechanisms of BetaCell Function in Health and Disease	MEDICINE	ENDOCRINOLOGY	\$1,681,767

Mendonca, Marc S.	RADIATION RESEARCH SOCIETY	Radiation Research Society Journal at IUSM	MEDICINE	RADIATION ONCOLOGY	\$1,674,713
Duman Scheel, Molly	U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT	Field Assessment of Yeast Interfering RNA Larvicides Targeting Zika Vector Mosquitoes in Belize	MEDICINE	IUSM-SOUTH BEND	\$875,756
Wang, I-Wen	METHODIST HEALTH FOUNDATION	Cardiac Transplant Translation Lab	MEDICINE	CARDIOSURGERY	\$600,000
Hulvershorn, LeslieAnn	INDIANA FAMILY AND SOCIAL SERVICES ADMINISTRATION	Riley Adolescent Dual Diagnosis Clinic and Assertive Outreach for School-Based Screening and Intervention	MEDICINE	PSYCHIATRY	\$400,000
	NATIONAL CANCER	Identifying insulin resistance biomarkers and metabolomic	FAIRBANKS SCHOOL		

Zhang, Jianjun	INSTITUTE	signature as predictors of precursors to pancreatic cancer	OF PUBLIC HEALTH	EPIDEMIOLOGY	\$375,187
Kelley, Mark R.	AMERICAN CANCER SOCIETY, INCORPORATED	IU Simon Cancer Center ACS Institutional Research Grant	MEDICINE	CANCER CENTER	\$360,000
McKinley, Todd Owen	JOHNS HOPKINS UNIVERSITY	REPAIR: Rehabilitation Enhanced by Partial Arterial Inflow Restriction	MEDICINE	ORTHOPAEDIC SURGERY	\$252,783
Pisoni, David B.	OHIO STATE UNIVERSITY	Family Processes in Developmental Outcome of Pediatric Hearing Loss	MEDICINE	OTOLARYNGOLOGY & H/N SURGERY	\$189,033
	LUTRONIC	Projects 1 & 2: To Assess the Beneficial Effect of Selective Retinal Therapy (SRT) on Stem Cell Recruitment, Integration and			

Boulton, Michael E	CORPORATION	Regeneration of the Retina / To determine if SRT leads to proliferation of human RPE and if this is age-dependent	MEDICINE	OPHTHALMOLOGY	\$120,533
Wiehe, Sarah Elizabeth	INDIANA STATE DEPARTMENT OF HEALTH	2016 Community Health Engagement Program Community-Based Research Pilot Projects	MEDICINE	CLINICAL TRANSLAT SCI (CTSI)	\$105,000
Moody, Karen Marie	INDIANA UNIVERSITY HEALTH	NICU IMPACT: Neonatal Intensive Care Unit and Integrative Medicine & Palliative Care Team: Integrating Palliative Care into Treatment Decisions for High Risk Newborns	MEDICINE	PED-PALLIATIVE CARE PROGRAM	\$100,000
Loehrer, Patrick J.	WALTHER CANCER FOUNDATION, INC.	Center Directors Developmental Funds Award	MEDICINE	CANCER CENTER	\$100,000

## Grants and Awards – November 2016

PI	Agency	Project Title	School	Department	Total
Renbarger, Jamie L	NATIONAL INSTITUTE OF CHILD HEALTH, HUMAN DEVL.	Indiana University Center for Pediatric Pharmacology and Precision Medicine	MEDICINE	PED- HEMATOLOGY/ONCOLOGY	\$3,656,199
Pisoni, David B.	NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMM. DIS	Executive Functioning and Speech-Language Skills in Cochlear Implant Users	MEDICINE	OTOLARYNGOLOGY & H/N SURGERY	\$3,087,192
Lamb, Bruce Timothy	U.S. DEPARTMENT OF DEFENSE	The Role of Inflammation in Development of AD Following Repetitive Head Trauma	MEDICINE	STARK NEUROSCIENCES RES INST	\$635,176
Tomlin, Angela M	HEALTH RESOURCES AND SERVICES	Interdisciplinary Leadership Education in Neurodevelopmental	MEDICINE	PED-CHILD DEVELOPMENT CENTER	\$616,392

	ADMINISTRATION	and Other Related Disabilities			
Foroud, Tatiana M	ALZHEIMER ASSOCIATION	Amyloid Neuroimaging and Genetics Initiative (ANGI)	MEDICINE	MEDICAL & MOLECULAR GENETICS	\$449,400
John, Chandy C	DORIS DUKE CHARITABLE FOUNDATION	Optimizing hydroxyurea therapy in children with sickle cell anemia in malaria endemic areas	MEDICINE	PED-INFECTIOUS DISEASE RESEARCH	\$300,000
McAllister, Jeanne Walker	INDIANA STATE DEPARTMENT OF HEALTH	Enhancing the System of Services for Children and Youth with Special Health Care Needs through System Integration	MEDICINE	PED-HEALTH SERVICES RESEARCH	\$297,105
Vest, Joshua Ryan	AGENCY FOR HEALTHCARE RESEARCH AND QUALITY	Use of push and pull health information exchange technologies by ambulatory care practices and their impact	FAIRBANKS PUBLIC HEALTH	HEALTH POLICY & MANAGEMENT	\$293,694

		on potentially avoidable health care utilization			
Roach, Peter J.	UNIVERSITY OF KENTUCKY	Lafora Epilepsy- Basic Mechanisms to Therapy (Admin Core)	MEDICINE	BIOCHEMISTRY/MOLECULAR BIOLOGY	\$281,630
Officer, Starla DH	JPMORGAN CHASE FOUNDATION	River West GreatPlaces Entrepreneurship Center	EXTERNAL AFFAIR	FAMILIES, SCHOOLS& NEIGHBORHOOD ENGAGEM	\$150,000
Dixon, Brian Edward	CENTERS FOR DISEASECONTROL AND PREVENTION	Assessing Adherence to and Impact of Syphilis Testing in Pregnancy and STD Medical Examinations in Immigrants and Refugees	FAIRBANKS PUBLIC HEALTH	EPIDEMIOLOGY	\$144,433
Green, Mark A	PROPORTIONAL TECHNOLOGIES, INC.	Receptor-Targeted Neuroendocrine Tumor Imaging with Generator- Produced Cu-62	MEDICINE	RADIOLOGY &IMAGING SCIENCES	\$112,334



## CURRENT EXTERNAL FUNDING OPPORTUNITIES

Funding opportunities in this section include selected current grant announcements from federal agencies for new initiatives and changes to existing programs. Announcements with limited scope are not listed here but instead are sent directly to IUPUI School Deans. For comprehensive coverage of funding opportunities, please use the links below to search online tools.

### BURROUGHS WELLCOME FUND

Innovation in Regulatory Science Awards (IRSA): BWF identified Innovation in Regulatory Science as an area. The IRSA initiative is designed to provide financial support to stimulate research efforts in the important, underfunded area of Regulatory Science. The awards provide support to academic investigators developing new methodologies or innovative approaches in regulatory science that ultimately inform the regulatory decisions the FDA and others make. This would necessarily draw upon the talents of individuals trained in mathematics, computer science, applied physics, medicine, engineering, toxicology, epidemiology, biostatistics, and systems pharmacology, to name a few.

Regulatory science has been defined as the “development and use of new tools, standards, and approaches to more efficiently develop products and to more effectively evaluate product safety, efficacy, and quality.” Regulatory science has become a centerpiece of the FDA’s strategy for fostering innovation, and the academic and foundation communities have been called to take an active role in building this emerging field. We therefore strongly encourage investigators to address regulatory science in areas of the FDA’s strategic priorities including product manufacturing & quality, and food safety & applied nutrition. Deadline: March 15, 2017. <http://www.bwfund.org/grant-programs/regulatory-science/innovation-regulatory-science>

### NATIONAL INSTITUTES OF HEALTH

Systems Biology: The Next Generation for Infectious Diseases (U19): This opportunity applications to

establish Systems Biology Centers that use systems biology approaches to build predictive models for infectious diseases. The models will be derived from hypotheses related to systems-level host/pathogen molecular interactions during infection or treatment using integrated datasets generated from a combination of high-throughput experimental approaches, including omics technologies and computational approaches. Importantly, Centers must integrate experimental approaches and computational modeling to test and validate hypotheses of significance to the infectious diseases field.

This effort will include support for the development of novel and/or enhanced bioinformatics, analytical, computational, and statistical tools. Centers will be expected to develop or improve innovative experimental methods, technologies, bioinformatics and computational tools, machine learning software, and statistical inference methods that can be used by the Centers and the broad infectious diseases community for systems level data analysis.

The result of this program is expected to be: 1) integrated data sets, maps of molecular networks of host-pathogen interactions, and computational predictive models of infectious diseases; 2) new and enhanced computational algorithms, methods and tools; and 3) protocols for state-of-the-art HTP technologies.

Deadlines: Letter of Intent: Feb. 15, 2017; Application: March 15, 2017.

<http://grants.nih.gov/grants/guide/rfa-files/RFA-AI-16-080.html>

Team-Research BRAIN Circuit Programs-TEAM BCP (U19): This opportunity will support integrated, interdisciplinary research teams from prior BRAIN technology or integrated approaches teams, or new projects from the research community that focus on examining circuit functions related to behavior. The goal will be to support programs with a team science approach that can realize meaningful outcomes within 5+ years. Awards will be made for 5 years, with a possibility of one competing renewal. Applications should address overarching principles of circuit function in the context of specific neural systems underlying sensation, perception, emotion, motivation, cognition, decision-making, motor control, communication, or homeostasis. Applications should incorporate theory-/model-driven experimental design and should offer predictive models as deliverables. Applications should seek to understand circuits of the central nervous system by systematically controlling stimuli and/or behavior while actively recording and/or manipulating relevant dynamic patterns of neural activity and by measuring the resulting behaviors and/or perceptions. Applications are expected to employ approaches guided by specified

theoretical constructs, and are encouraged to employ quantitative, mechanistic models where appropriate. Applications will be required to manage their data and analysis methods in a prototype framework that will be developed and used in the proposed U19 project and exchanged with other U19 awardees for further refinement and development. Model systems, including the possibility of multiple species ranging from invertebrates to humans, can be employed. Deadline: March 08, 2017.

<http://grants.nih.gov/grants/guide/rfa-files/RFA-NS-17-018.html>

PDX Development & Trial Centers-PDTCs (U54): This opportunity (FOA) solicits applications for PDX (patient-derived xenografts) Development and Trial Centers (PDTCs) to serve as the laboratory research units of the PDX Development and Trial Centers Research Network (PDXNet). The PDXNet is a NCI program established to coordinate collaborative, large-scale development and pre-clinical testing of targeted therapeutic agents in patient-derived models to advance the vision of cancer precision medicine. The main goals for PDTCs include: 1) Development of new PDX models and methods for preclinical testing of single agents and drug combinations; and 2) Conducting studies of response of PDX models to novel therapeutic strategies using the newly established models as well as other existing well-characterized PDX models.

PDXNet research outcomes will be particularly important for the prioritization of combinations of agents in the portfolio of NCI Investigational New Drugs, which are evaluated clinically in the NCI's Experimental Therapeutic Clinical Trials Network. PDXNet will encompass four PDTCs and a single PDX Data Commons and Coordinating Center (supported by RFA-CA-17-004). In addition, collaboration between PDXNet and the NCI Patient-Derived Models Repository (PDMR) at the Frederick National Laboratory for Cancer Research is required. PDTCs will be expected to collaborate with PDMR in several areas related to the goals of the program, including the development of optimized standardized procedures, and in sharing of PDX models. Deadlines: Letter of Intent (optional): February 01, 2017; Application: March 03, 2017. <https://grants.nih.gov/grants/guide/rfa-files/RFA-CA-17-003.html>

## **NATIONAL SCIENCE FOUNDATION**

Energy-Efficient Computing: Devices to Architectures (E2CDA): The NSF and the Semiconductor Research Corporation recognize that future computing performance improvements are severely limited by the amount of energy it takes to manipulate, store, and critically, transport data. While the limits and

tradeoffs for this performance-energy crisis vary across the full range of application platforms, they have all reached a point at which evolutionary approaches to addressing this challenge are no longer adequate.

Therefore, a comprehensive and collaborative approach must be used to successfully identify and implement revolutionary solutions to break through the bottleneck of energy-constrained computational performance. Programmers, system architects, circuit designers, chip processing engineers, material scientists, and computational chemists must all explore these new paths together to co-design a solution path. □

Disruptive breakthroughs are required from all segments of the technology stack for creating new, sustainable computing platforms. This partnership will specifically support new research to minimize the energy impacts of processing, storing, and moving data within future computing systems along with other aspects of the energy-constrained computing performance issue. Deadline: March 07, 2017

[https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505212](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505212)

CISE Research Infrastructure (CRI): The CRI program drives discovery and learning in the core CISE disciplines of the three participating CISE divisions by supporting the creation and enhancement of world-class research infrastructure that will support focused research agendas in computer and information science and engineering. This infrastructure will enable CISE researchers to advance the frontiers of CISE research. Further, through the CRI program CISE seeks to ensure that individuals from a diverse range of academic institutions, including minority-serving and predominantly undergraduate institutions, have access to such infrastructure.

The program supports two classes of awards: 1) Institutional Infrastructure (II) awards support the creation of new CISE research infrastructure or the enhancement (II-EN) of existing CISE research infrastructure to enable world-class CISE research opportunities at the awardee and collaborating institutions; and 2) Community Infrastructure (CI) awards support the planning for new CISE community research infrastructure, the creation of new CISE research infrastructure, the enhancement of existing CISE infrastructure, or the sustainment of existing CISE community infrastructure to enable world-class CISE research opportunities for broad-based communities of CISE researchers that extend well beyond

the awardee institutions. Each CI award may support the operation of such infrastructure, ensuring that the awardee institutions are well positioned to provide a high quality of service to CISE community researchers expected to use the infrastructure to realize their research goals. Deadline: November 07, 2017. [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12810&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12810&org=NSF&sel_org=NSF&from=fund)

Cybersecurity Innovation for Cyberinfrastructure (CICI): Advancements in data-driven scientific research depend on trustworthy and reliable cyberinfrastructure. Researchers rely on a variety of networked technologies and software tools to achieve their scientific goals. These may include local or remote instruments, wireless sensors, software programs, operating systems, database servers, high-performance computing, large-scale storage, and other critical infrastructure connected by high-speed networking. This complex, distributed, interconnected global cyberinfrastructure ecosystem presents unique cybersecurity challenges. NSF-funded scientific instruments, sensors and equipment are specialized, highly-visible assets that present attractive targets for both unintentional errors and malicious activity; untrustworthy software or a loss of integrity of the data collected by a scientific instrument may mean corrupt, skewed or incomplete results. Furthermore, often data-driven research, e.g., in the medical field or in the social sciences, requires access to private information, and exposure of such data may cause financial, reputational and/or other damage. Therefore, an increasing area of focus for NSF is the development and deployment of hardware and software technologies and techniques to protect research cyberinfrastructure across every stage of the scientific workflow. Deadline: March 01, 2017.

[https://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505159](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505159)

#### **U.S. DEPT. OF DEFENSE**

Neural Engineering System Design (NESD): The NESD program seeks innovative research proposals to design, build, demonstrate, and validate in animal and human subjects a neural interface system capable of recording from more than one million neurons, stimulating more than one hundred thousand neurons, and performing continuous, simultaneous full-duplex (read and write) interaction with at least one thousand neurons in regions of the human sensory cortex. In addition to achieving substantial advances in scale of interface (independent channel count), proposed systems must also demonstrate simultaneous high-precision in neural activity detection, transduction, and encoding, with single-neuron spike-train precision for each independent channel.

While NESD will initially focus on proposer-selected areas of the human sensory cortex (e.g., primary visual or auditory cortex) that are physically accessible and have a solid scientific foundation on which to build, the fundamental objective of the program is to develop a modular and scalable interface system with the capability to serve a multiplicity of applications to monitor and modulate large-scale activity in the central nervous system. NESD hardware components and algorithms must be modular in design with clear, well defined hardware interconnect and software Application Programming Interfaces (APIs) that can easily accommodate upgrades to componentry, new neural signal transduction modalities, and/or algorithms to enable their use as foundational engineering platforms for future research and development. DARPA expects that subsequent to this program, there will be a variety of uses for the NESD system beyond these initial proposer-defined applications. Deadline: April 14, 2017.

[https://www.fbo.gov/index?](https://www.fbo.gov/index?s=opportunity&mode=form&id=d6357be260091fd05c950d159e3e9473&tab=core&_cview=0)

[s=opportunity&mode=form&id=d6357be260091fd05c950d159e3e9473&tab=core&\\_cview=0](https://www.fbo.gov/index?s=opportunity&mode=form&id=d6357be260091fd05c950d159e3e9473&tab=core&_cview=0)

NOTE: All faculty, researchers, and scientists on continuing contracts at IU interested in applying for Department of Defense funding are eligible for assistance by the consulting firm--Cornerstone Government Affairs--arranged by the Vice President for Research. Those interested in securing assistance from Cornerstone must submit a 2 page summary of their research project and a CV or biosketch to the VP for Research Office at [vpr@iu.edu](mailto:vpr@iu.edu). Prior to submission, the IUPUI Office of the Vice Chancellor for Research is offering assistance with the 2 page summaries. For more information, contact Steven Chin [schin@iupui.edu](mailto:schin@iupui.edu)

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