

## 2019 Jump ARCHES Grant Recipients Announced

(Peoria, IL) April 16, 2019—Eleven research projects are sharing nearly \$810,600 in funding through the Jump ARCHES research and development program. The Jump Applied Research for Community Health through Engineering and Simulation (Jump ARCHES), is a partnership between OSF HealthCare and the University of Illinois College of Engineering in Champaign-Urbana.

The ARCHES program supports research involving clinicians and engineers to develop technologies and devices that could revolutionize medical training and health care delivery. Faculty at the U of I College of Medicine at Peoria (UICOMP) also participate. Since its inception in 2014, the Jump ARCHES initiative has directed more than \$2.7 million for 35 projects, some of which have gone on to receive national funding from the National Science Foundation and the Carver Charitable Trust. Below are the most recent winners of the grants.

The eleven (11) new awards for 2019, range from \$50,000 to \$125,000, and include:

### ***Using Simulation to Evaluate and Improve Team Cognition in Handoffs***

**Collaborators:** Abigail Wooldridge, Illinois/Industrial and Enterprise Systems Engineering and Paul Jezioreczak, OSF

This project is the continuation of earlier research. It attempts to better measure the impact of improvements made to the process of handoffs which are important to provide opportunities to detect and correct errors. Recent work has conceptualized handoffs as team cognition, measured using human factor techniques outside of health care. Researchers believe team cognition theory can be applied to improve handoffs with education and technology-based interventions.

### ***Lung Cancer Radiomics and Radiogenomics***

**Collaborators:** Minh N. Do, Illinois/ Coordinated Science Laboratory and Joseph R. Evans, OSF/UICOMP

In an attempt to reduce the leading cause of cancer deaths in the United States, this project would combine imaging and genomic features to develop a radiogenomics risk signature, offering valuable information about the aggressiveness of the newly diagnosed lung cancer. Furthermore, this project takes advantage of and extends the OSF lung cancer screening program by establishing IRB-approved imaging and pathology repositories.

### ***Mixed-Reality Based Visualization and Simulation of Nerve Conduction Study***

**Collaborators:** Vahid Tohidi, OSF and Pramod Chembrammel, Illinois/Health Care Engineering Systems Center

This proposal attempts to use a mixed-reality technology platform to train medical students, technicians, neurology residents and fellows how to better recognize pathological patterns in results of nerve conduction studies. Researchers believe this type of education will shorten the learning curve for accurate and effective application of NCS data in diagnosis of peripheral nerve disorders which can be debilitating for those impacted.

## ***Surgical Planning Via Preoperative Surgical Repair of Next-Generation 3D, Patient-Specific, Cardiac Mimic***

**Collaborators:** Hyunjoon Kong, Illinois/Bioengineering and Mark D. Plunkett, OSF

This project aims to 3D print realistic physical organs and tissues to help surgeons better plan for specific operations and train new surgeons. This team has developed a 3D printing approach, using materials that mimic the softness and toughness of anatomy. This work is expected to advance the field of clinical simulation to the next level.

## ***i-AREA-p: An Intelligent Mobility-Based Augmented Reality Simulation Application for Pediatric Resuscitation Training***

**Collaborators:** Trina Croland, OSF/UICOMP and Abigail Wooldridge, Illinois/Industrial & Enterprise Systems Engineering

Jump Simulation created an augmented reality-based Pediatric Code Cart app that allows medical students and professionals to easily learn about the contents of the cart, how it works, and how to use it in the event of a pediatric emergency. This team will work to expand this platform to include additional adult resuscitation modules as well as procedural skills elements related to pediatric resuscitation.

## ***Robotic Arm Neurological Exam Training Simulator for Abnormal Muscle Tone***

**Collaborators:** Elizabeth Hsiao-Weckler, Illinois/Mechanical Science and Engineering and Christopher Zallek, OSF/UICOMP

This group of individuals is expanding work to create multiple robotic arm simulators that mimic abnormal muscle behaviors. These training devices are expected to help medical students, interns, residents, nurses and physical/occupational therapists understand the difference between spasticity and rigidity in patients to correctly diagnose neurological conditions.

## ***Pediatric Sepsis Guidance System***

**Collaborators:** Lui Raymond Sha, Illinois/Computer Science and Richard Pearl, OSF/UICOMP

In an effort to help clinicians diagnose sepsis in pediatric patients sooner, this team is creating a computerized pediatric sepsis best practice guidance system. This software will allow for early detection, diagnosis and treatment of sepsis in children. The goal is to improve patient care and reduce medical errors. It will first be tested in a simulation setting.

## ***Multi-modal Skin Lesion Identification & Education Simulator: Augmented Reality Interactive Skin Lesion App***

**Collaborators:** Scott Barrows, OSF/Jump and Steve Boppart, Illinois/Bioengineering

This project expands on an augmented reality-based mobile app developed last year to train medical students in the identification, diagnosis and treatment of skin lesions, masses and other abnormalities. The second phase aims to give learners the ability to see beneath the skin to view skin lesions and their pathologies that cannot be seen on the surface.

### ***Integrating Soft Actuators in a Heart Simulator to Mimic Force Feedback in Cardiac Trans-Septal Puncture***

**Collaborators:** Girish Krishnan, Illinois/Industrial Systems Engineering and Abraham Kocheril, OSF

This team is creating a realistic soft heart simulator that allows learners to feel what it's like to poke and prod cardiac tissues to make crucial operating decisions. While this simulation device targets a specific surgical process for the heart, the idea is to create more soft structures for other surgical procedures.

### ***Virtual Heart Patch for Determining Complex Shapes for Surgical Patching***

**Collaborators:** Arif Masud, Illinois/Civil and Environmental Engineering and Matthew Bramlet, OSF/UICOMP

This group is developing a software module that allows surgeons to simulate the creation of complexly-shaped 2D heart patches in a virtual reality environment. Surgeons would use this simulation to determine the size and shape of a patch that needs cut from a 2D sheet of flexible cloth-like material that can be used in a real heart patch surgery.

### ***Automated and adaptive whole-body segmentation for visualization of anatomy, lesions, and intervention pathways for medical training***

**Collaborators:** Brad Sutton, Illinois/Bioengineering and Matthew Bramlet, OSF/UICOMP

This project expands on a previous effort to develop an automated segmentation program to create congenital heart defects in 3D, viewable in a variety of digital formats. The current proposal seeks to develop another automated segmentation platform for the creation of 3D content of the whole body for medical training in virtual reality.

**OSF HealthCare**, headquartered in Peoria, is owned and operated by [The Sisters of the Third Order of St. Francis](#), and consists of nearly 21,000 employees in 126 locations, including 13 hospitals, 11 Centers for Health and 15 OSF PromptCares throughout Illinois and Michigan. OSF Innovation, ranked among the top 10 innovation centers in the country, is located in Jump Trading Simulation & Education Center. Launched in 2016, OSF Innovation is a multidisciplinary innovation center focused on internal and external innovation to solve the largest health care challenges. More at [www.osfinnovation.org](http://www.osfinnovation.org) and [www.osfhealthcare.org](http://www.osfhealthcare.org).

**Jump Simulation**, a part of [OSF Innovation](#), is a collaboration between University of Illinois College of Medicine at Peoria and OSF HealthCare. The center replicates a variety of patient care settings to ensure novice and seasoned clinicians can practice handling medical situations in a life-like environment. Boasting six floors and 168,000 square feet, the center is one of the largest of its kind and provides space for conferences, anatomic training, virtual reality and innovation. For more information, visit [www.jumpsimulation.org](http://www.jumpsimulation.org).

**University of Illinois College of Engineering:** As one of the world's top ranked engineering programs, their students, faculty, and alumni set the standard for excellence. The College is focused on driving the economy, reimagining engineering education, and bringing revolutionary ideas to the world. They work to solve the world's greatest challenges and look toward the future to find ways to make it a reality. Learn more about the College of Engineering at <https://engineering.illinois.edu/>.

**The Health Care Engineering Systems Center (HCESC) of the U of I College of Engineering** provides clinical immersion and fosters collaboration between engineers and physicians. The goal is to use our expertise in the broad areas of simulation technologies, smart health systems, data analytics, human factors, and medical robotics to design and develop collaborative solutions that improve health care outcomes. HCESC partners with Jump Simulation of OSF HealthCare at Peoria, Illinois, in this innovative relationship of Applied Research for Community Health through Engineering and Simulation (ARCHES). Learn more about HCESC at <https://healtheng.illinois.edu/>

**The University of Illinois College of Medicine Peoria (UICOMP)** educates 244 medical students and nearly 300 physician residents annually. The College of Medicine is home to the Cancer Research Center, the Center for Outcomes Research, and a collaborator in Jump Simulation. Learn more about UICOMP at <http://peoria.medicine.uic.edu>.

