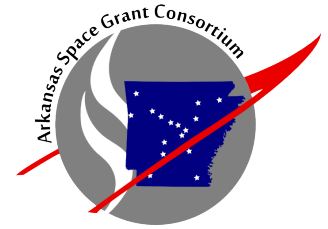


# ARKANSAS

## NASA EPSCoR

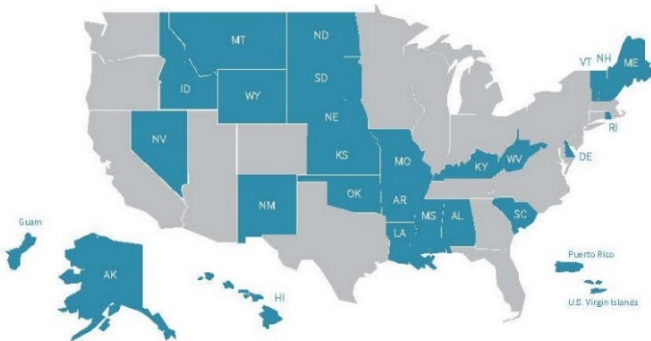


### NASA EPSCoR RESEARCH

The Experimental Program to Stimulate Competitive Research (EPSCoR) establishes partnerships with government, higher education and industry to improve a state's or region's research and development (R&D) infrastructure and capacity and national competitiveness. In addition to the research and technology development, EPSCoR awards enable faculty development and higher education student support.

NASA is one of five federal agencies administering EPSCoR programs. The goal of NASA's EPSCoR is to provide seed funding that will enable Arkansas and other states to develop academic research directed toward long-term, self-sustaining, nationally competitive capabilities in aerospace and aerospace-related research.

*Currently, NASA operates EPSCoR programs in 28 states and U.S. territories.*



### ARKANSAS NASA EPSCoR ACHIEVEMENTS

**1993:** \$7,520,202

Four Cluster Groups:

Hybrid Rocket Motor Characteristics: Dr. Keith Hudson, UALR

Photovoltaic Devices: Dr. Hameed Naseem, UAF

Water Soluble Conductive Polymers: Dr. Jerry Darcey, UALR

Atmospheric Chemistry: Dr. David Chittenden, A-State

**2000-2006:** \$459,316

Instrumentation for Diagnosis of Chemical Rocket Motors:  
Dr. Andrew Wright, UALR

**2007:** \$750,000

Noninvasive Prospecting for Lunar Ores & Minerals:  
Dr. Haydar Al-Shukri, UALR

**2008:** \$750,000

A Census of Supermassive Black Holes in the Universe:  
Dr. Daniel Kennefick, UAF

**2009:** \$750,000

Mobile Surveying for Atmospheric and Near-Surface Gases of Biological Origin: Dr. Gary Anderson, UALR

**2009:** \$750,000

Photoconductive and Photovoltaic Arrays of Inorganic Semi-conductor Nanostructures: Dr. Tansel Karabacak, UAMS

**2011:** \$750,000

Functionalization of Nanomaterials for Photovoltaic Devices:  
Dr. Omar Manasreh, UAF

### NASA EPSCoR RESEARCH: DR. FISHER YU, UAF

Led by Dr. Fisher Yu at the University of Arkansas, four researchers from three Arkansas institutions supported by experts from three NASA research centers and four industry partners are working on a design of more efficient solar cells in an effort to develop the next generation of photovoltaic devices to be used in NASA space missions, including the International Space Station. Made of silicon-germanium-tin (SiGeSn), the new devices are more efficient in collecting energy than traditional solar cells, use much less silicon, are more cost-efficient, and their unique lattice design improves flexibility.



The research plan includes the device design and simulation, SiGeSn material growth and characterization, optical characterization of SiGeSn materials, development of a SiGeSn photo-conductor, and the development of SiGeSn P-N junctions.

## NASA EPSCoR RESEARCH: DR. CANG YE, UALR

Arkansas Research Alliance fellow Dr. Cang Ye is conducting research to devise new computer vision methods based on a 3D camera. The research will support autonomous robotic operation in future NASA missions. Currently, mobile robotics plays an important role in NASA's space exploration. In spite of the great success of the Mars Exploration Rovers, the current robotic rover requires excess human oversight because the rover's stereovision based navigation method is not reliable for fully autonomous operation. The need of human intervention may negatively impact the system's operation and make robotic surface tasks in deep space impossible. Dr. Ye's methods are based on a new class of 3D imaging sensors, which allow for a robot pose estimation algorithm and a 3D data segmentation method that tracks the robot's pose using VR-Odometry output as the robot's motion model. The VRO may provide more accurate estimation in changes of the robot's poses by simultaneously processing the sensor's intensity and range images. The VRO will allow the robot to navigate areas without human interaction and can be used for such areas as terrain mapping and path planning.



## NASA EPSCoR Research Infrastructure Development

The NASA EPSCoR Research Infrastructure Development (RID) program enables the State of Arkansas to build and strengthen relationships with NASA Researchers. The two components in this program are research and travel.

### Current RID travel awardees:

- Ed Wilson, HU: Ames Research Center
- Charles Wu, HU: Marshall Space Flight Center
- Adam Huang, UAF: NASA Johnson Space Center
- Rahul Mehta, UCA: Ames Research Center
- Brent Hill, UCA: Ames Research Center
- Parimal Chowdhury, UAMS: Ames Research Center

### Current RID research awardees are:

**Effect of Microgravity and GT3 on Proton-Induced Genomic Instability in Endothelial Cells:** Rupak Pathak (UAMS), Abdel Bachri (SAU), Marjan Boema (UAMS), Martin Hauer-Jensen (UAMS), Greg Nelson (LLU)

**Novel Heteroatom Doped Carbon Nanostructures for use in Fuel Cells, Supercapacitors, and Solar Light-Mediated Hydrogen Production:** Tito Viswanathan (UALR), Brian Berry (UALR), Rajesh Sharma (A-State)

**Nano-Structure Assisted Photoelectrochemical Water and Carbon Dioxide Splitting for Hydrogen and Oxygen Production:** Wei Zhao (UALR), Tar-pin Chen (UALR), Grant Wanglia (UAPB)

**Collaborative Research: Spaceborne InSAR Monitoring of Geohazards in Arkansas:** Mohamed Aly (UAF), Haydar Al-Shukri (UALR)



*Research is being done through EPSCoR to determine the rates of seismic risk in Arkansas based on earthquake activity in the New Madrid Fault Zone.*

### LEAD INSTITUTION

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Program Coordinator: Missy Hill

