

# Science, Security and Foreign Interference: Threats to America's Scientific and Academic Enterprise

*William Evanina, Director  
National Counterintelligence and Security Center*



American Council on Education's 101st Annual Meeting

11 March 2019



OFFICE OF THE DIRECTOR OF NATIONAL INTELLIGENCE



## China's Technology Innovation Ambitions

*Statements by China's President, Xi Jinping*



"In today's world S&T innovation has become a critical support for increasing the comprehensive national strength...**whoever holds the key to S&T innovation makes an offensive move in the chess game of S&T innovation and will be able to preempt the rivals and win the advantages**..." 9 June 2014

"**Artificial intelligence is a vital driving force** for a new round of technological revolution and industrial transformation. **China must control artificial intelligence** and ensure it is securely **kept in our own hands**." 31 October 2018



# High Priority Technologies Identified in China's Five Year Plan

## CLEAN ENERGY

- CLEAN COAL TECHNOLOGY
- GREEN LOW CARBON PRODUCTS AND TECHNIQUES
- HIGH EFFICIENCY ENERGY STORAGE SYSTEMS
- HYDRO TURBINE TECHNOLOGY
- NEW ENERGY VEHICLES
- NUCLEAR TECHNOLOGY
- SMART GRID TECHNOLOGY

## BIOTECHNOLOGY

- AGRICULTURE EQUIPMENT
- BRAIN SCIENCE
- GEONOMICS
- GM SEED TECHNOLOGY
- PRECISION MEDICINE
- PHARMACEUTICAL TECHNOLOGY
- REGENERATIVE MEDICINE
- SYNTHETIC BIOLOGY

## AEROSPACE/DEEP SEA

- DEEP SEA EXPLORATION TECHNOLOGY
- NAVIGATION TECHNOLOGY
- NEXT GENERATION AVIATION EQUIPMENT
- SATELLITE TECHNOLOGY
- SPACE AND POLE EXPLORATION

## INFORMATION TECHNOLOGY

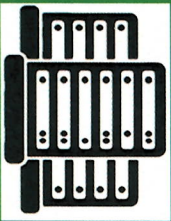
- AI
- CLOUD COMPUTING
- INFORMATION SECURITY
- INTERNET OF THINGS INFRASTRUCTURE
- QUANTUM COMPUTING
- ROBOTICS
- SEMICONDUCTOR TECHNOLOGY
- TELECOMMUNICATIONS AND 5G TECHNOLOGY
- ADDITIVE MANUFACTURING
- ADVANCED MANUFACTURING
- GREEN/SUSTAINABLE MANUFACTURING
- NEW MATERIALS
- SMART MANUFACTURING

## MANUFACTURING

# China's Tools For Acquiring Technology



- Intelligence Services
- Non-Traditional Collectors
- S&T Investments
- Talent Recruitment Programs
- Academic Collaboration
- Research Partnerships
- Joint Ventures
- Front Companies
- Mergers & Acquisitions
- Legal and Regulatory



# China's Quest for High Performance Computing

- ▶ One of top 10 key areas identified in "Made in China 2025" Plan
- ▶ 13th Five-Year Strategic Emerging Industries Development Plan



**MADE IN CHINA  
2025 TARGETS**

China sets targets for domestic and international market share that should be held by domestic technology and production

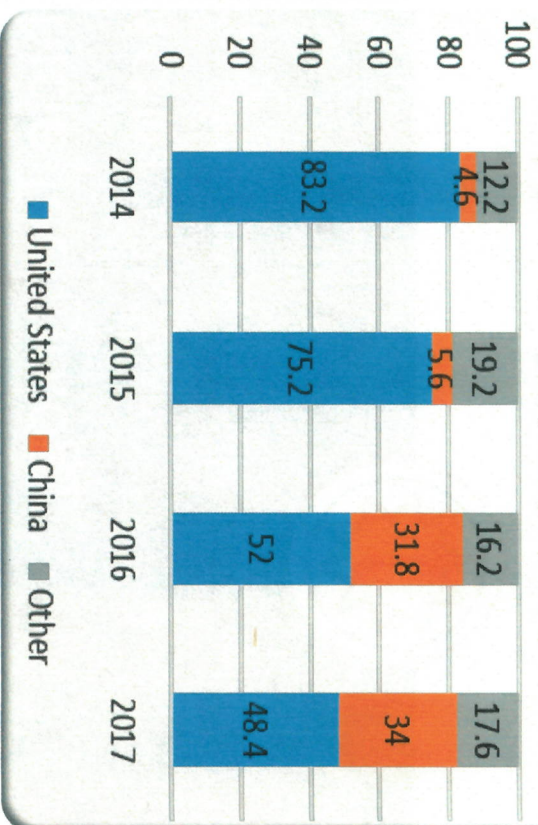


**2016**

Chinese computer manufacturer Lenovo acquired IBM's HPC business, increasing Lenovo's share of the HPC domestic market.



US, China HPC Vendors' Market Share of Top 500 Supercomputers, 2014-2017







# China's Quest for Solar Technology

- ▶ China's goal: Clean energy to meet 20% of China's energy needs by 2030
- ▶ Chinese government is investing \$367 billion in renewable power
- ▶ Chinese companies account for FIVE of the top 10 solar energy companies in the world



**Jinko:** started in 2006, now world's largest solar panel manufacturer, pursues **US-China based partnerships**



**JA Solar:** Subsidized by Chinese government, accused of **stealing trade secrets** from American company Solar World

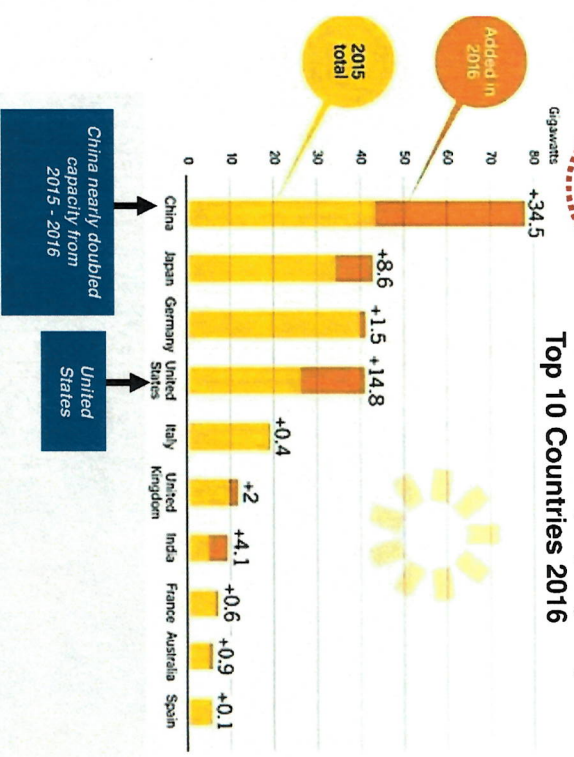


**GCL:** Sued by California solar module developer Solaria in 2016 for **stealing trade secrets**

**Shunfeng:** **Bought a majority stake** in U.S. solar company Suniva in 2015



Solar Photovoltaic (PV) Capacity  
Top 10 Countries 2016





# China's Quest for Innovation and Technology Research

- ▶ China's National Plan for Medium and Long-Term Education Reform and Development (2010-2020)
- ▶ "Study Abroad to Serve the Country" President Xi publicly addressed students, urging them to adopt this mantra



Academic Collaborations



Research Partnerships

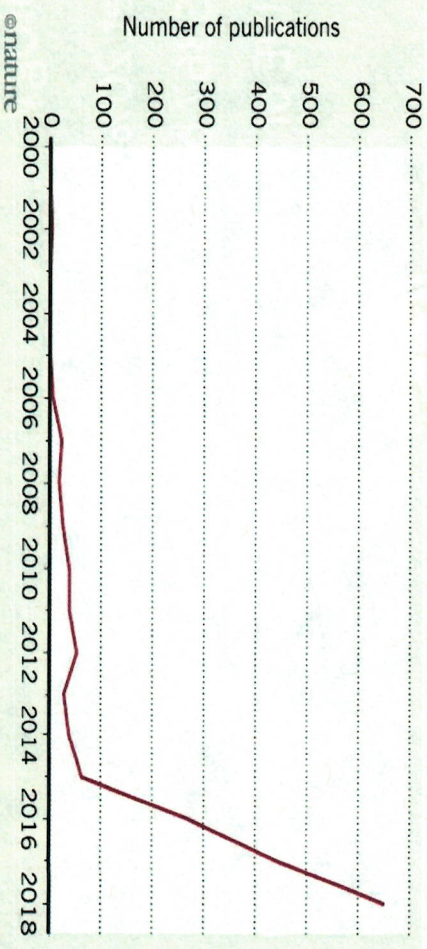
**2007-2018:** A Chinese student studied under Duke University scientist who invented 'metamaterials' – a technology on China's wish list. The student took sensitive details on the technology secretly back to China to refabricate the design worth \$6 billion.

**2018:** A major U.S. IT company signed an agreement with Tsinghua University for big data research, resulting in 200 million shared academic papers and authors.



## HUAWEI-FUNDED RESEARCH

Scholarly articles and conference papers acknowledging the Chinese firm Huawei as a funding source shot up in 2016.







National Counterintelligence and Security Center

# FORBES GLOBAL 2000 LIST: WORLD'S LARGEST COMPANIES 2004-2018

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1															
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## It's Not Just China: Iran

- In March 2018, the U.S. Justice Department indicted nine Iranians and accused them of breaking into the computer systems of 144 U.S. universities and 176 foreign universities in 21 countries. The hackers worked at the Mabna Institute, an Iranian government-sponsored body set up in 2013.
- Value of the pilfered research to U.S. universities estimated at \$3.4 billion. In all, the hackers stole 31.5 terabytes—about 35 billion pages—of academic data.
- To help Iranian universities, scientific organizations, and research groups steal access to non-Iranian scientific resources. Between 2013 and 2017, the hackers waged a phishing campaign targeting succeeded in compromising the accounts of about 8,000 professors to steal research and other academic data, such as journals, theses, dissertations, and electronic books.

The screenshot shows a navigation bar for the Chemical & Engineering News (C&EN) website. The navigation bar includes links for 'TOPICS', 'MAGAZINE', 'COLLECTIONS', 'VIDEOS', and 'JOBS', along with a search icon. Below the navigation bar, the article title 'Acknowledging the spies on campus' is displayed in a large, bold font. The article is categorized under 'INTELLECTUAL PROPERTY'. A sub-headline reads: 'As universities embrace rapid communications and international students, they are learning that the free exchange of ideas comes with risks'. The author is identified as 'by Marc S. Rolisch'. The publication date and issue information are 'JUNE 27, 2018 | APPEARED IN VOLUME 96, ISSUE 27'.



## What does this mean for our Colleges and Universities?

### Recent Examples of China Targeting University Students and Research

- China Uses Grad Student In Chicago to Gather Data on U.S. Aerospace Engineers for Possible Recruitment
- China Obtains Genetic Data From Yale Scientist And Builds DNA Surveillance Database on Uighurs
- Chinese Hackers Target 27 Universities to Steal Maritime Research

### Positive Actions Taken by Universities

### Mitigating Foreign Influence: The Way Forward



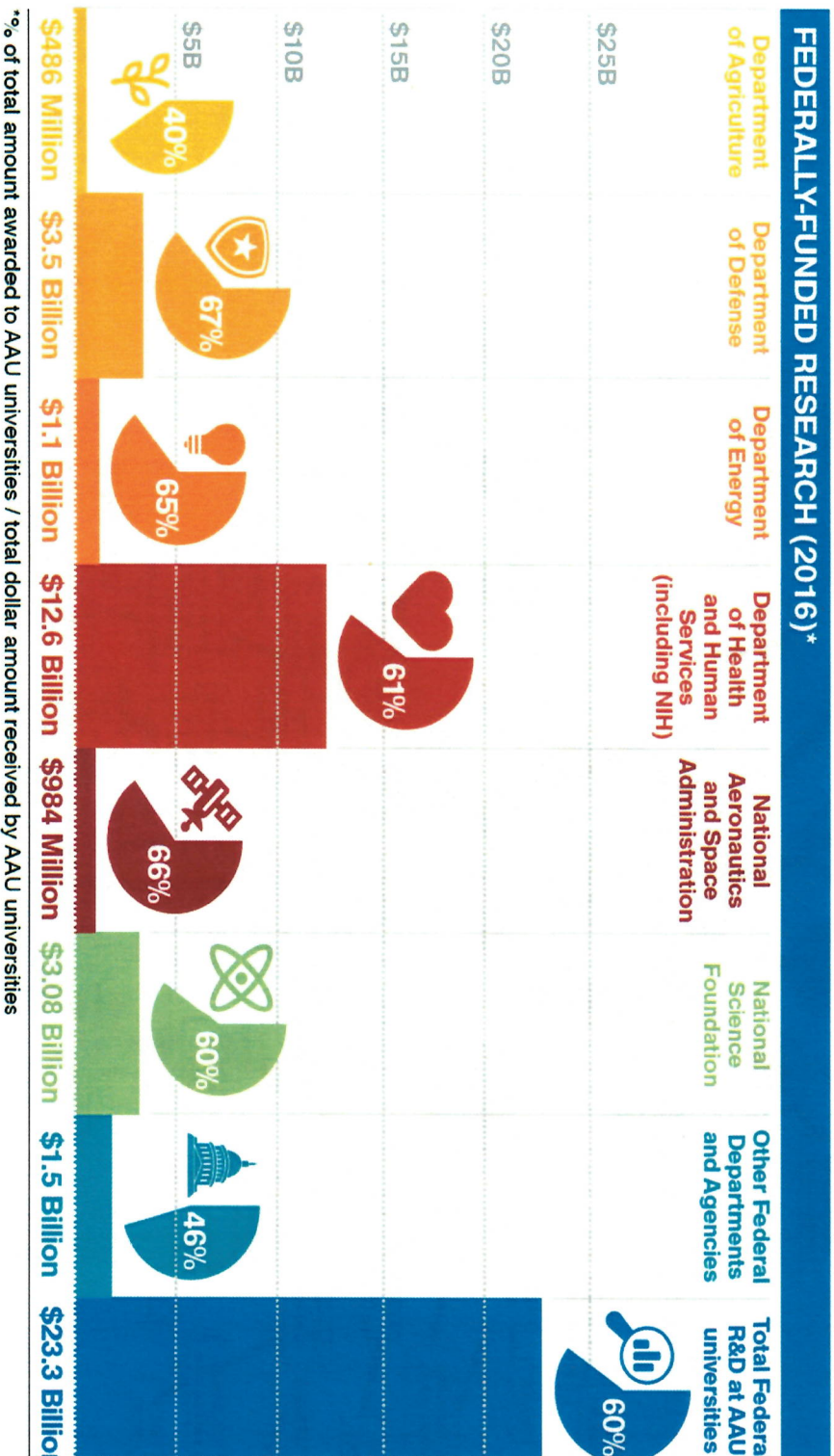
## Positive Actions by Universities

- **University of Wisconsin-Madison Issued a Memorandum** (February 2019)  
Prohibits any New Sponsored research projects, other contracts or gifts from Huawei or its subsidiaries.
- **UC Berkeley bans new research funding from Huawei** (January 2019)  
Moratorium comes after the US justice department charged the Chinese company with stealing trade secrets.
- **Cornell Cuts Ties With Chinese School** (October 2018)  
Cornell University cut ties with a leading Chinese university after reports that it Cornell students campaigning for workers' rights in China were being intimidated and harassed by Chinese officials.
- **Association of University Professors** (June 2014)  
Published a statement warning that Confucius Institutes function as an arm of the Chinese state.



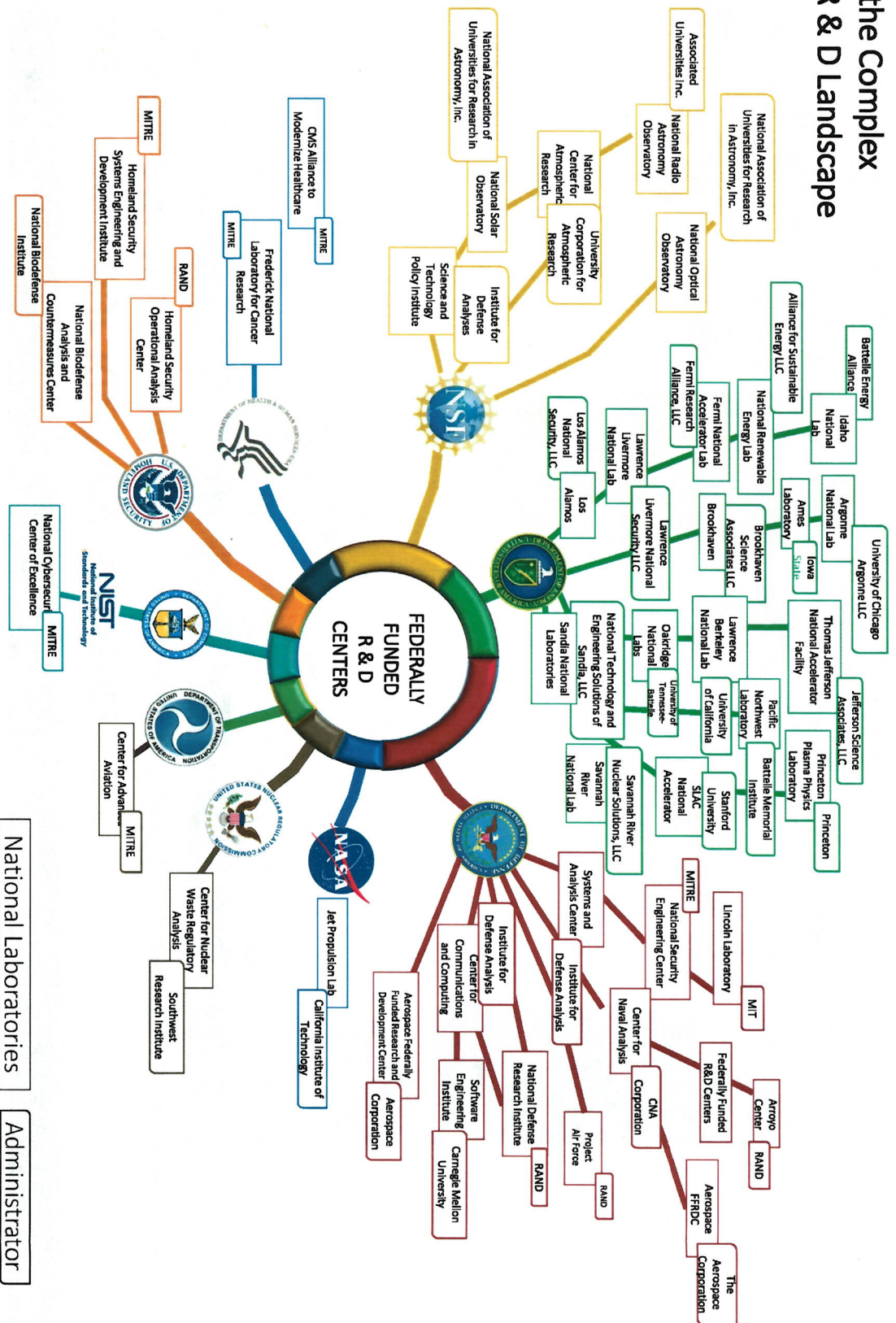
# How do We Protect our R&D Investment?

## NCSC is Working with ACE, AAU, APLU To Understand the Problems from the University's Perspective



Source: AAU

# Understanding the Complex Federally Funded R & D Landscape



# NSF Industry-University Cooperative Research Centers (IUCRCs)

## Center for Identification Technology Research

Clarkson University  
University of Buffalo  
University of Arizona  
University of South Carolina  
Mississippi State University

**Center for e-Design**  
Rohrer State University  
University of Tennessee  
Mississippi State University  
Georgia State University  
Virginia Tech

**Center for Health Organization Transformation**  
Florida Atlantic University  
Texas A&M University  
The Pennsylvania State University  
University of Louisville  
University of North Carolina  
University of Wisconsin-La Crosse  
University of Alabama at Birmingham

**Center for Embedded Systems**  
Arizona State University  
Southern Illinois University Carbondale



**CAEMIL**  
Center for Advanced Electromechanics through Machine Learning  
University of Illinois at Urbana-Champaign  
University of Wisconsin-Madison  
University of Michigan



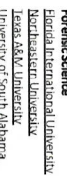
**ATOMIC**  
Center for Atomic Materials  
Texas A&M University  
University of Tennessee  
University of Wisconsin-Madison  
University of Michigan



**Advanced Electronics through Machine Learning**  
University of Illinois at Urbana-Champaign  
University of Wisconsin-Madison  
University of Michigan



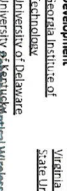
**NST-CAKE**  
Advanced Knowledge Enablement  
Florida International University  
Florida Atlantic University  
Florida International University  
University of Wyoming



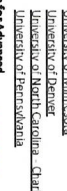
**AMERIC**  
Advanced Materials  
Biomedical Imaging  
Innovation Center (AMBIG)  
University of Wisconsin-Madison  
University of Michigan  
University of Illinois at Urbana-Champaign



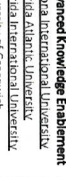
**Center for Advanced Research in Forensic Science**  
Florida International University  
Texas A&M University  
North Carolina State University  
University of South Alabama



**Center for Electromagnetic Compatibility Technology**  
Missouri University of Science & Technology  
University of Houston



**Center for Innovative Instrumentation Technology**  
University of Illinois at Urbana-Champaign  
The Pennsylvania State University



**Center for Advanced Processing and Packaging Studies**  
Ohio State University  
North Carolina State University



**Center for Biophotonic Sensors and Systems**  
Boston University  
University of California at Davis



**Center for Antiproton Management Technologies**  
University of Florida  
University of Kentucky  
Iowa State University  
University of Illinois at Urbana-Champaign



**Center for Energy, Harvesting, Materials and Systems**  
University of Virginia  
University of Michigan



**Center for Embedded Systems**  
Arizona State University  
Southern Illinois University Carbondale



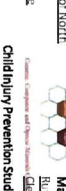
**Center for Energy, Smart Electronic Systems**  
The Georgia Institute of Technology  
University of Texas at Arlington  
University of Virginia



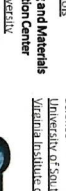
**Center for Novel High Voltage/Temperature Materials and Structures (HV/T)**  
University of Tennessee  
University of Michigan  
University of Illinois at Urbana-Champaign



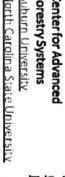
**Center for Fiber-Wireless Integration and Mobile Communications**  
University of Virginia  
Georgia Tech  
University of Maryland



**Center for Rational Catalysts Synthesis**  
University of South Carolina  
Virginia Commonwealth University  
Georgia Institute of Technology



**Center for Particle and Resilient Computing**  
Georgia Institute of Technology  
University of Virginia  
University of Michigan  
University of Pittsburgh



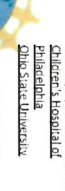
**Center for Space, High-performance, Composite into Infrastructure and Resilient Computing**  
Rohrer State University  
University of North Carolina  
University of Michigan  
University of Pittsburgh



**Center for Particulate and Surfactant Systems**  
University of Florida  
Columbia University  
University of North Carolina  
University of Michigan  
University of Alabama at Birmingham



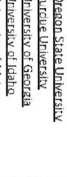
**Center for Pharmaceutical Development**  
Georgia Institute of Technology  
University of Delaware  
The Pennsylvania State University



**Center for Unmanned Aircraft Systems**  
University of Colorado Boulder  
Virginia Polytechnic Institute and State University  
State University



**Hybrid Multirole Productivity Research**  
University of California San Diego  
University of Michigan  
University of Maryland



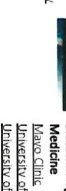
**GRAPES**  
Grid-connected Advanced Power Electronic Systems  
University of Arizona  
University of South Carolina  
University of Michigan  
University of Wisconsin-Madison



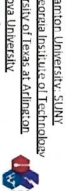
**GRAPES**  
Grid-connected Advanced Power Electronic Systems  
University of Arizona  
University of South Carolina  
University of Michigan  
University of Wisconsin-Madison



**Power Systems Engineering Research Center (Phase III)**  
Arizona State University  
Georgia Institute of Technology  
University of North Carolina  
Iowa State University  
Texas A&M University  
University of Wisconsin-Madison



**Power Systems Engineering Research Center (Phase III)**  
Arizona State University  
Georgia Institute of Technology  
University of North Carolina  
Iowa State University  
Texas A&M University  
University of Wisconsin-Madison



**Safety, Security, Rescue Research**  
University of Denver  
University of Minnesota  
University of Wisconsin-La Crosse



**Science Center for Marine Fisheries**  
University of South Florida  
University of Maryland  
University of Wisconsin-La Crosse



**Robots and Sensors for the Human Well-being**  
University of Michigan  
University of Tennessee  
University of North Carolina  
University of Pennsylvania



**Water Equipment & Policy**  
University of Wisconsin-Madison  
University of Michigan  
University of Illinois at Urbana-Champaign



**Water Equipment & Policy**  
University of Wisconsin-Madison  
University of Michigan  
University of Illinois at Urbana-Champaign



**Wheat Genetics Resource Center**  
Colorado State University  
Kansas State University  
University of Wisconsin-Madison



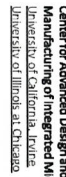
**Wheat Genetics Resource Center**  
Colorado State University  
Kansas State University  
University of Wisconsin-Madison



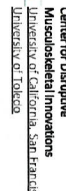
**Wind Energy: Science, Technology and Research**  
University of Wisconsin-Madison  
The University of Texas at Dallas  
The University of Texas at Austin



**Wind Energy: Science, Technology and Research**  
University of Wisconsin-Madison  
The University of Texas at Dallas  
The University of Texas at Austin



**Wood-Steel Composites Center**  
Oregon State University  
Virginia Tech



**Wood-Steel Composites Center**  
Oregon State University  
Virginia Tech



**Visual and Decision Informatics (VDI)**  
Rensselaer University  
Georgia Institute of Technology  
University of Louisiana at Lafayette  
University of North Carolina at Charlotte  
University of Virginia



**Visual and Decision Informatics (VDI)**  
Rensselaer University  
Georgia Institute of Technology  
University of Louisiana at Lafayette  
University of North Carolina at Charlotte  
University of Virginia



**Water and Environmental Technology**  
Arizona State University  
Georgia Institute of Technology  
The University of Arizona  
The University of Texas at Austin



**Water and Environmental Technology**  
Arizona State University  
Georgia Institute of Technology  
The University of Arizona  
The University of Texas at Austin



**Smart Vehicle Concept (SVC)**  
Ohio State University



**Smart Vehicle Concept (SVC)**  
Ohio State University



**Center for Advanced Subsurface Earth Resource Models**  
Non-Destructive Evaluation (Phase II)  
Iowa State University



**Center for Advanced Subsurface Earth Resource Models**  
Non-Destructive Evaluation (Phase II)  
Iowa State University



**Center for Accelerated Real Time Analytics**  
Intelligent Computing  
Center for Big Learning (CAL)  
Iowa State University



**Center for Accelerated Real Time Analytics**  
Intelligent Computing  
Center for Big Learning (CAL)  
Iowa State University



**Center for Geomechanics and Migration of Geofluids**  
University of California, San Francisco  
University of Toronto



**Center for Geomechanics and Migration of Geofluids**  
University of California, San Francisco  
University of Toronto





## **Mitigating Foreign Interference on Campus: Working Together**

- Understand Motivations and Targets of Foreign Interference
- Campus Conversation about the Risks of Foreign Interference on Campus
- Identify Vulnerabilities University-Industry-Government R&D Ecosystems
- Share Best Practices
- Focused Briefings for University Leadership
- A University-Private Sector-Government Network to Prevent, Identify, and Mitigate Foreign Interference on Campus

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