LANNS: Laboratory for Advanced Nuclear Nonproliferation and Safety

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(Courtesy Appointment)
Sam Nunn School of International Affairs
(Courtesy Appointment)

Georgia Tech College of Engineering
George W. Woodruff School of Mechanical Engineering

LANNS: Laboratory for Advanced Nuclear Nonproliferation and Safety

Snapshot of Experience

BS, Nuclear Engineering, Oregon State U.
Visiting scientist and intern, Argonne National Lab

Intern, Lawrence Livermore National Lab

Leader of the Program in Multimodal Imaging (DHS)
US Frontiers of Engineering Symposium, National Academy of Engineering

Assistant Professor, Nuclear and Radiological Engineering, Georgia Tech

Director of the Consortium for Enabling Technologies and Innovation, a $25M award by DOE NNSA
2019 ANS Mary Jane Oestmann Professional Women's Achievement Award

Member, External Advisory Board of Nuclear Technology Journal

06 08 10 12 14 16 18 20 22

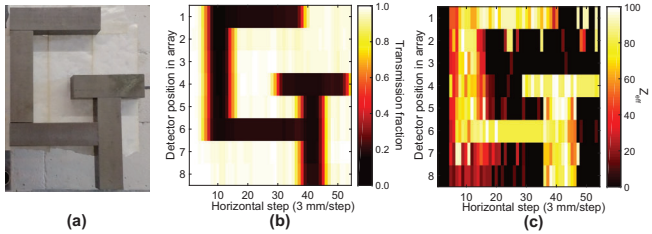
SM, NSE @ MIT
NNSA Stewardship Science Graduate Fellow
NSE ANS President

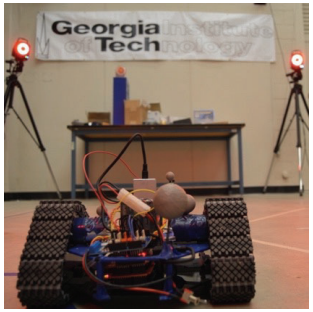
PhD, NSE @ MIT
Postdoctoral researcher, Lawrence Livermore National Lab

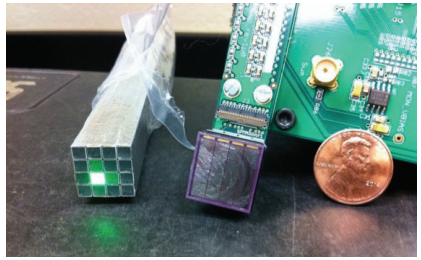
Founder and leader of LANNS laboratory, Georgia Tech

Associate Professor with tenure
Active Interrogation in Nuclear Security: Science, Technology, and Systems

Member, Board of Directors of the American Nuclear Society
Member-at-large, IEEE Radiation Instrumentation Steering Committee (RISC)







Select Experience at GT

Institute

- Provost's Emerging Leaders Program (2020—2021)
- Executive Vice President for Research Commission on Research Next, member (2021)
- iMat Director Search Committee member (2020)
- Radiation Safety Committee, Georgia Tech (2015—2020)

College

- School of Mechanical Engineering Chair search Committee, (2017—2018, 2021)
- COE RPT I (2021—2022)

School

- Research Council, Co-Chair (2019—present)
- Assistant Director - Financial Ops in ME search committee (2022)
- Future of Work in ME committee, member (2022—present)
- Nuclear and Radiological Engineering Program Chair search Committee, 2016
- Faculty Development and Mentoring Committee (2015—2017)
- Graduate Student Development Committee (2015—2017)

Select Experience Outside of GT

Shaping calls for proposals:

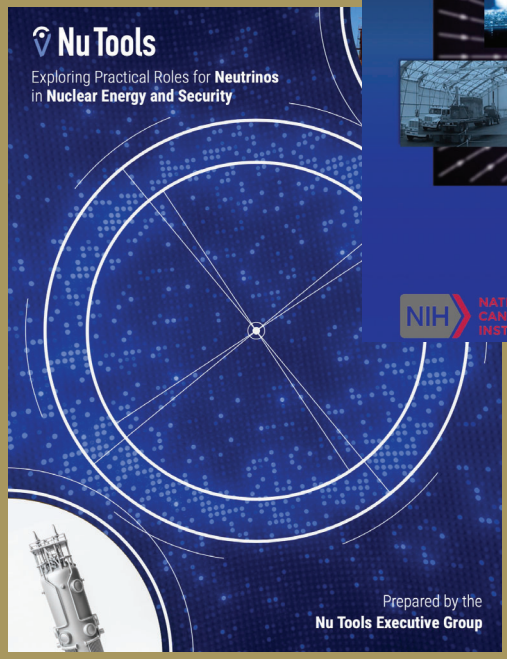
- DOE HEP BRN Workshop on Compact Accelerators for Security and Medicine (2019)
- DOE NNSA DNN R&D Workshop and report on Exploring Practical Roles for Neutrinos in Nuclear Energy and Security (2021)

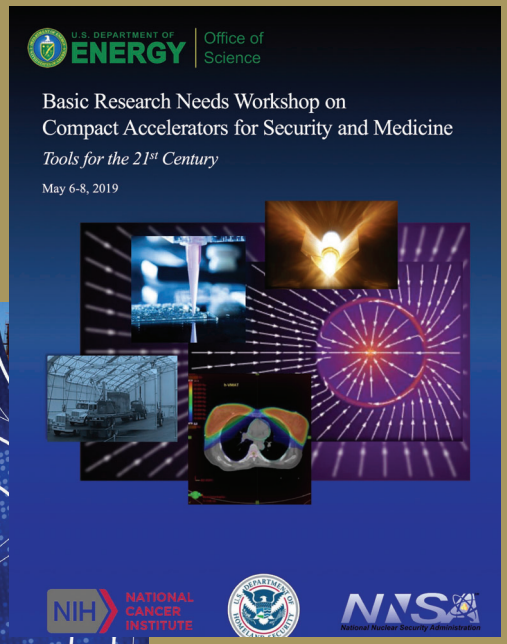
National Laboratory R&D reviewer:

- DOE NNSA DNN R&D portfolio:
  12 reviews in the past few years

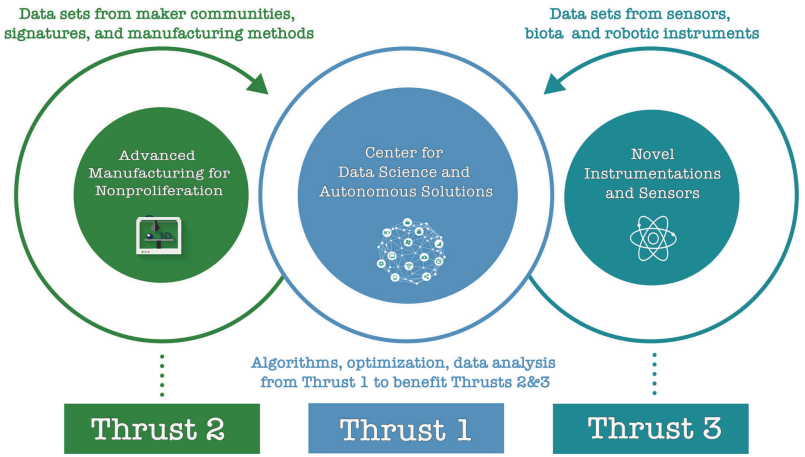
Workshops and Conferences

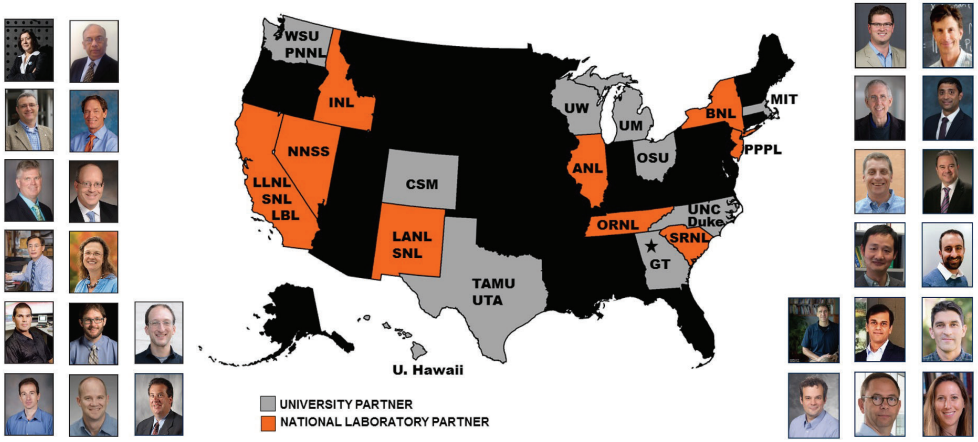
- Conference Chair, International Conference on Applications of Nuclear Techniques, Crete, Greece (2015—present)
- Topic Convener and Session Chair
  IEEE Nuclear Science Symposium
  (2014, 2017, 2020, 2021)





NNSA DNN ETI: Consortium for Enabling Technologies and Innovation Awarded in 2019, currently in Year 4





GEORGIA TECH RESEARCH HORIZONS

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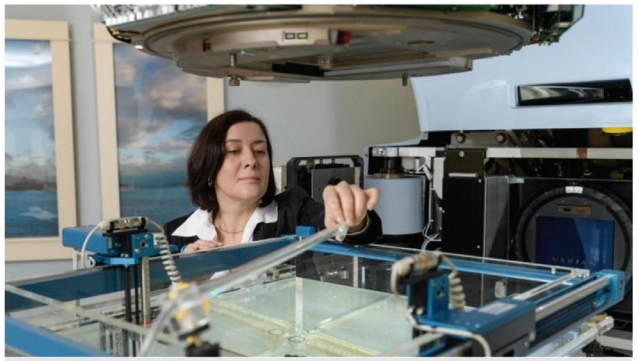
GT Home › Home › $25 Million Award Will Support Nuclear Nonproliferation R&D, Education

$25 Million Award Will Support Nuclear Nonproliferation R&D, Education



+DETAILS DOWNLOAD IMAGE +MORE PHOTOS

Posted February 6, 2019 • Atlanta, GA

A consortium of 12 universities and 10 national laboratories led by the Georgia Institute of Technology has been awarded $25 million from the U.S. Department of Energy's National Nuclear Security Administration (NNSA) to develop new technologies and educational programs to support the agency's nuclear science, security and nonproliferation goals.

Consortium for
ENABLING TECHNOLOGIES & INNOVATION

School
eering

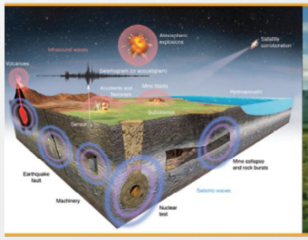
What is DNN's Role?

INNOVATE. COLLABORATE. DELIVER.

DNN FOCUS AND CAPABILITIES

The **Office of Defense Nuclear Nonproliferation** strengthens U.S. security by reducing global dangers posed by nuclear weapons, material, and technology.

DNN is organized to be flexible and responsive to an enduring and dynamic threat environment.



Detect Proliferation and Verify Compliance

- Nuclear Explosions
- Materials and Warheads
- Material Production
- Weapons Development
- Pu/U Verification teams

Eliminate/Minimize Nuclear and Radiological Materials No Longer In Use

- Convert
- Remove
- Dispose

Control Further Spread of Nuclear Materials/ Technology/Expertise

- Export Controls
- Counter Nuclear Smuggling
- Treaties, Agreements, Policy

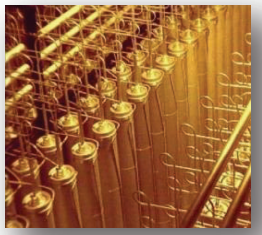
Safeguard Nuclear Materials and Secure Nuclear Facilities and Radiological Materials In Use

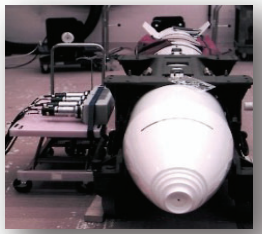
- Safeguards tools/training/expertise
- Secure sites/materials

DNN R&D At a Glance

Our Purpose

DNN R&D is the leading USG organization for the development of advanced technology in support of the USG's nuclear nonproliferation and nuclear security goals



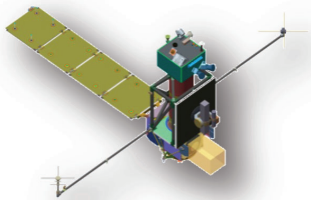


Applications in cooperative and non-cooperative environments that address horizontal and vertical proliferation

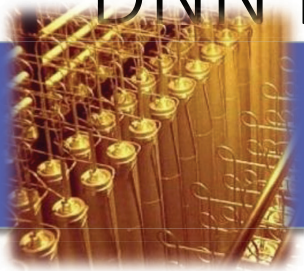
Our Environment

Our Mission

Develop technical capability resident at the DOE National Labs, to be leveraged by mission partners for specific applications

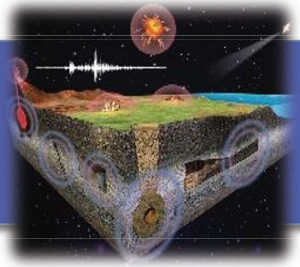


DNN R&D Goals

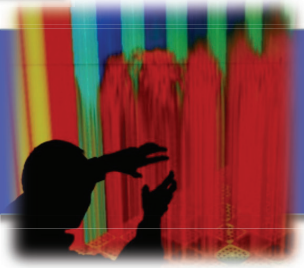


1. Detect Foreign Weapons Activities
Detect, locate & characterize foreign nuclear weapons development activities

2. Increase Nuclear Security
Detect presence, movement & diversion of SNM, including for interdiction, emergency response, safeguard; nuclear forensics; monitor and verify nuclear arms control treaties



3. Detect Nuclear Explosions
Detect and characterize underground, atmospheric, and space-based nuclear detonations



4. Sustain Nonproliferation Capabilities
Enabling infrastructure, S&T, and expert workforce to meet future nonproliferation challenges

Office of Proliferation Detection (PD)

Develop U.S. technical capabilities to detect, prevent, counter, and respond to nuclear security threats by investing in research and development at the DOE National Laboratories

Collaboration with Interagency

Collaboration with Small Business

Collaboration with Integrated University Program

- *Uranium Production Detection*
- *Plutonium Production Detection*
- *Weapons Development Detection*
- *Other Nuclear Processes*

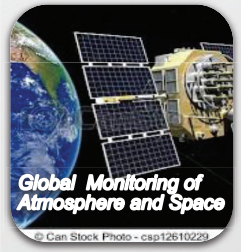
- *International Safeguards*
- *Emergency Response*
- *Warhead Verification and Monitoring*
- *Near-field Detection*
- *Radiological Source Replacement*

- *Remote Detection*
- *Data Science/Artificial Intelligence*
- *Innovation*
- *Laboratory Enhancement*
- *Nuclear Data*

Office of Nuclear Detonation Detection (NDD)

INNOVATE. COLLABORATE. DELIVER.

Advance U.S. technical capabilities by delivering nuclear detonation detection sensors to the USAF for global monitoring and by improving the means to detect, identify, locate, and characterize any nuclear test or explosion



Space-based Nuclear Detonation Detection

Nuclear Forensics

Ground-based Nuclear Detonation Detection

Nuclear Test Detection Testbeds

Collaboration with Interagency

Collaboration with Small Business

Defense Nuclear Nonproliferation R&D

Georgia Tech: preparing next generation of leaders, thinkers and achievers

2016:
- Chris Stewart: U. Berkeley (postdoc)
- Jessica Saunders: US Navy (physicist)

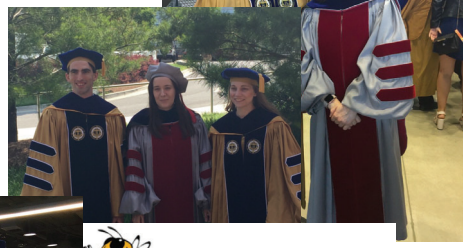
2017:
- Paul Rose: ORNL staff scientist – multiple awards by Sam Nunn/ARCS
- Evan Redd: US DoD
- Abdalla Abou Jaoude: INL (first de Boisblanc distinguished postdoctoral appointee), currently staff scientist

2018:
- Joseph Harms: U. Alabama (Assistant Professor)

2019:
- Andrew Conant: ORNL (postdoc)

2020:
- Luke Maloney: U. Florida (resident)
- Wesley Gillis: U. Massachusetts Amherst (postdoc)

2021:
- Arith Rajapakse: GT (postdoc till June 2022), MIT (resident, starting in July 2022)



Woodruff Weekly Digest

NRE Graduate Student Awarded Distinguished Postdoctoral Appointment

The Christian Science Monitor

How a new imaging technique could make detecting nukes easier

Christian Science Monitor, 19 Apr 2016

A new imaging technique that relies on neutrons and high-energy photons can detect the presence of "special nuclear materials...

R&D

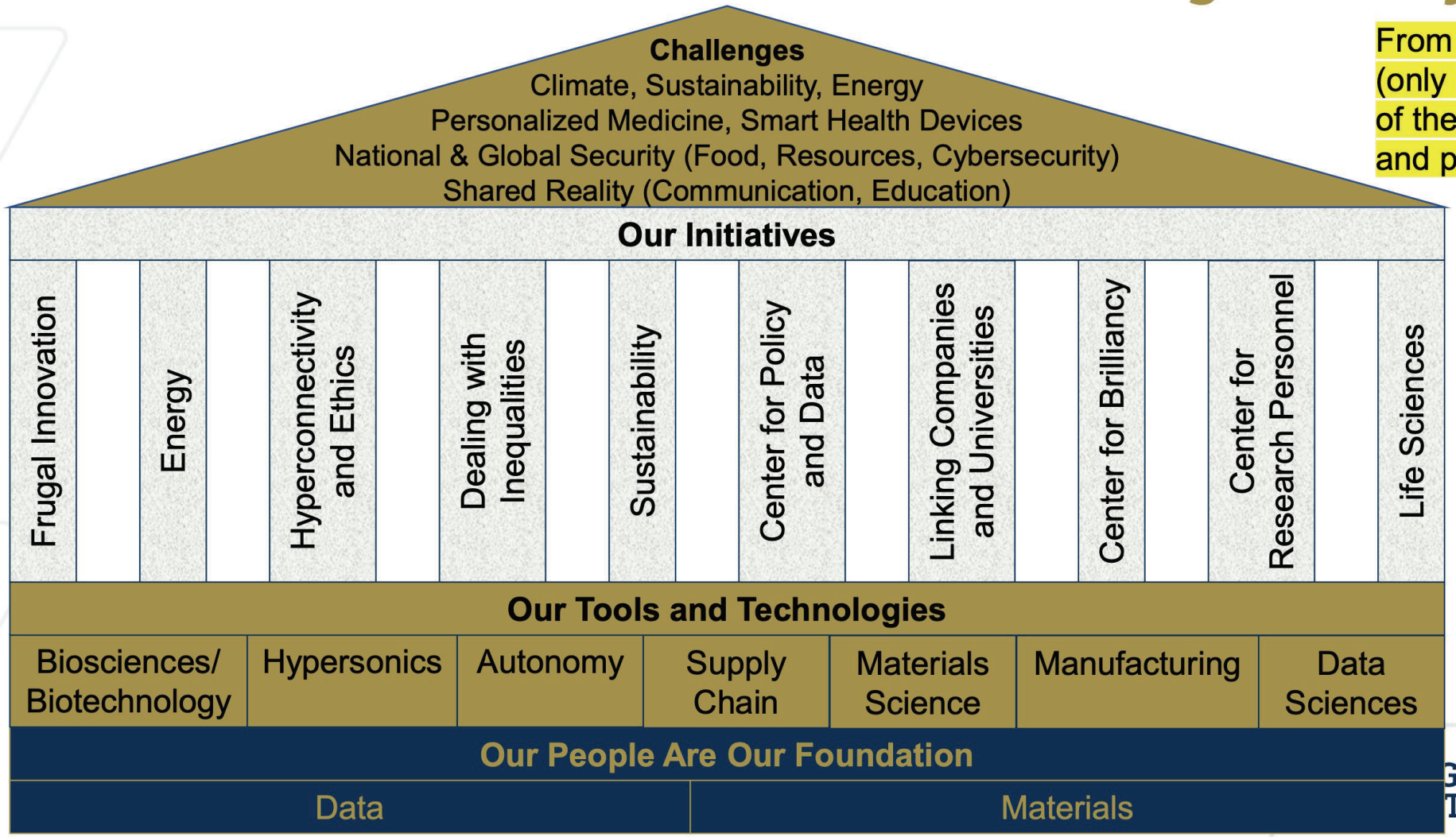
Imaging Method May Enhance Nuclear-Material Detection

R&D Mag, 18 Apr 2016

Security at U.S. ports could strengthen with a new proof-of-concept technique invented by a consortium of scientists.

Research Next: Prioritization and Strategic Analysis

From EVPR (only a subset of the initiatives and priorities)

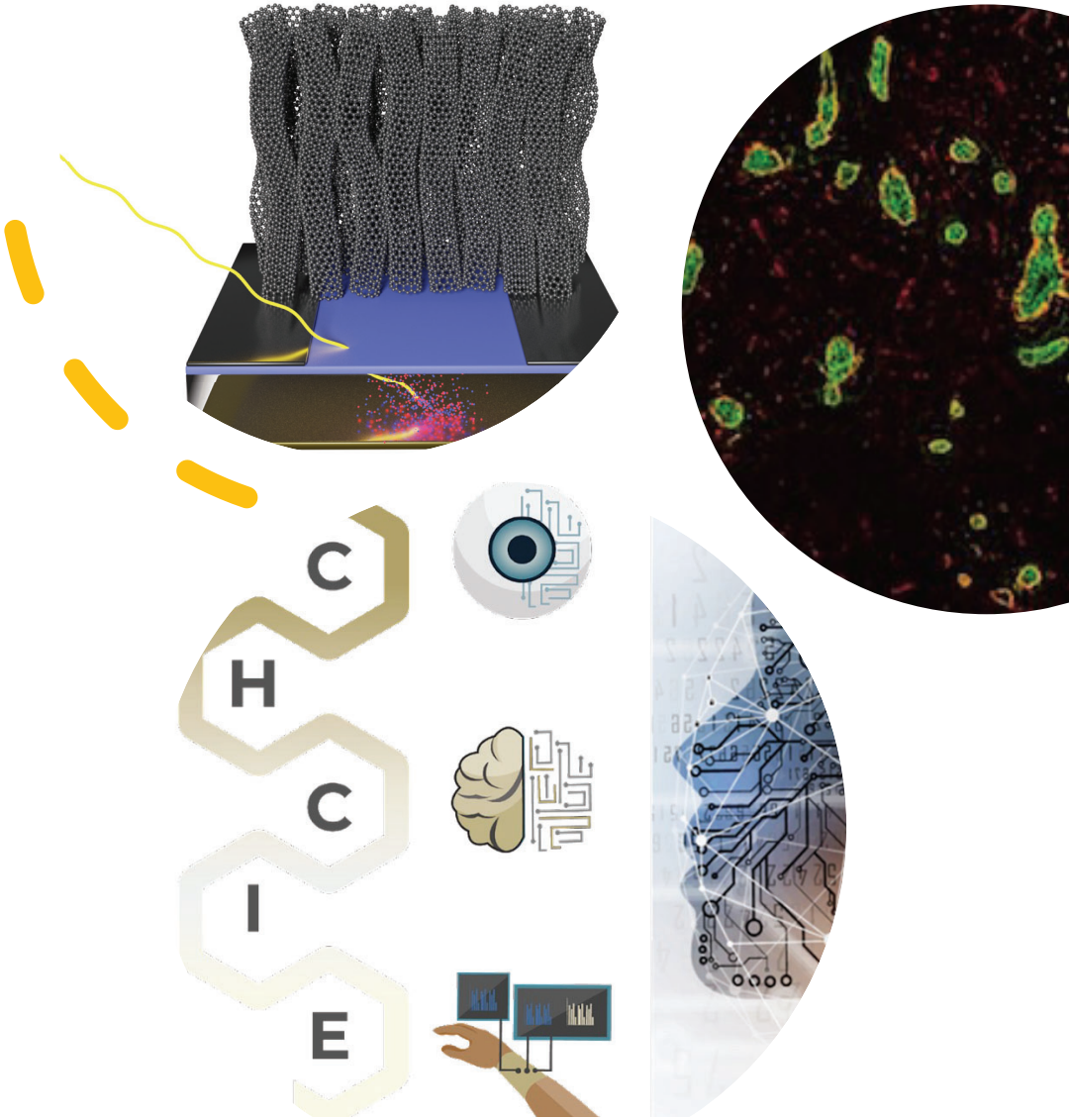


Georgia Tech

Emerging Research Areas

Collaborate across campus

- Human-centric medicine
  - Drug delivery (fluids)
  - Radiation diagnostics and treatment (MP)
  - Wearables and robotics
- Climate solutions
  - Energy, transportation, design
- Energy needs
  - Generation, storage, distribution
- Threat reduction
  - Nuclear/chem/bio, climate and migration, cyber
- Space



Thank you

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