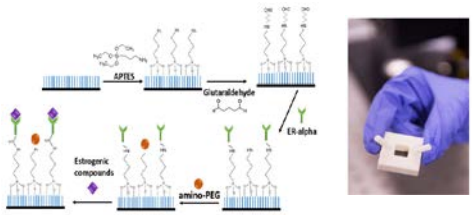
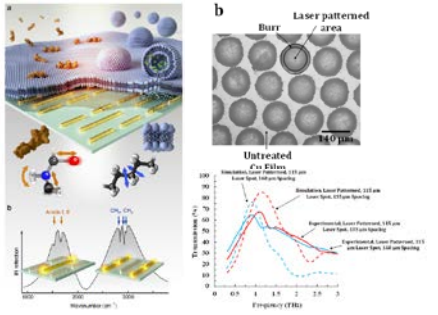
The Toor Lab Research Overview

Point-of-Care cancer biomarker detection

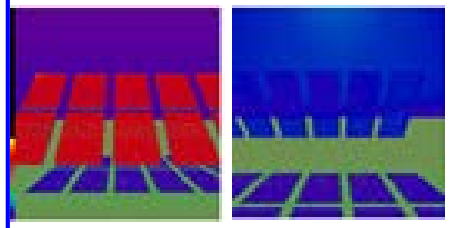


Water contaminant detection

Terahertz metasurfaces for biomolecule detection

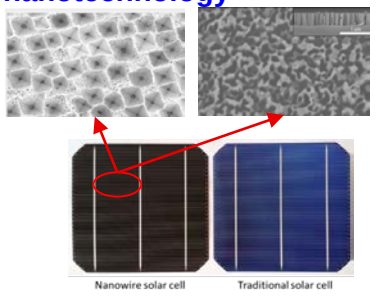


Bifacial PV system modeling



Frontside: 844 W/m^2 Backside: 80-90 W/m^2

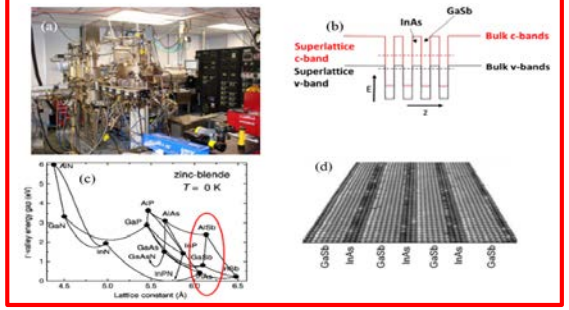
Low cost and high efficiency solar cells using scalable nanotechnology



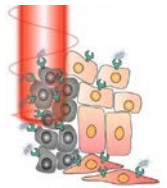
Photonics Innovation

- Biosensors
- Quantum Physics
- Midinfrared Light Emitters
- Materials Engineering
- Fundamental Science Discovery
- Electromagnetics
- Photovoltaics
- Optical Engineering

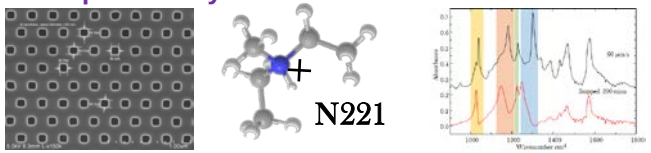
Growth, design, nanofabrication, and characterization of high performance mid-IR lasers and LEDs



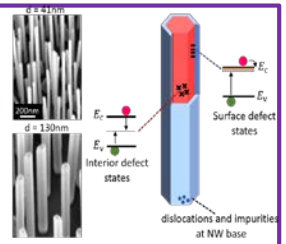
Laser-based cancer therapeutics



Ionic liquids study at nanoscale confinement



III-V nanowire growth and characterization at the atomic scale

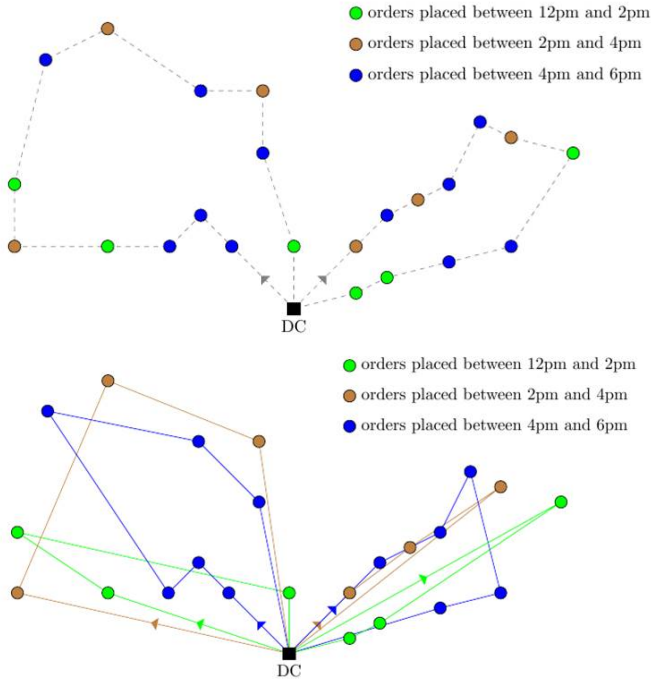


Contact:
Email: fatima-toor@uiowa.edu
Website: https://ftoor.lab.uiowa.edu/

THE UNIVERSITY OF IOWA

Alejandro Toriello

Associate Professor, ISyE, Georgia Tech



- **Supply chains, logistics, transportation**
  - **Same-day delivery**
  - **E-commerce, last mile logistics**
  - **Package delivery**
  - **Inventory management & allocation**
  - **Cooperation/coordination in supply chai**
- **Mathematical optimization**
  - **Integer programming**
  - **Dynamic programming**
- **Other applications**
  - **Cloud computing**
  - **Online advertisement**
  - **Workforce management**

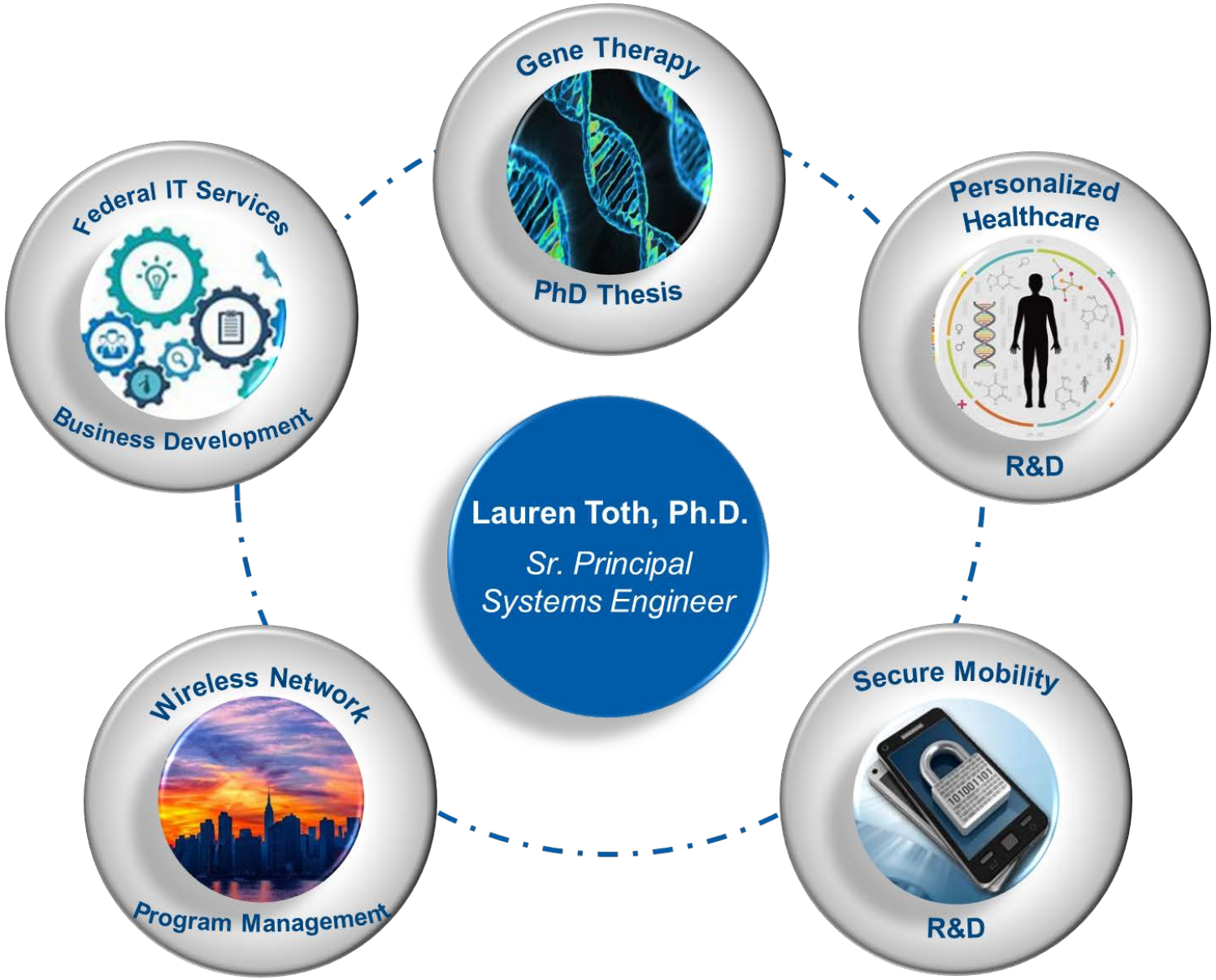
Northrop Grumman – Lauren Toth, Ph.D. – Sr. Principal Systems Engineer

Future Technical Leaders Rotational Program

- **Year 1: Personalized Healthcare R&D**
  Predictive health analytics & machine learning
- **Year 2: Secure Mobility R&D**
  Classified mobile communications platform
- **Year 3: Wireless Network Program Support**
  Program & proposal management support

Final Placement Position – Brooklyn, NY

- **Wireless network program management support**
- **Business development**
- **Solution architecture**
- **Proposal management**



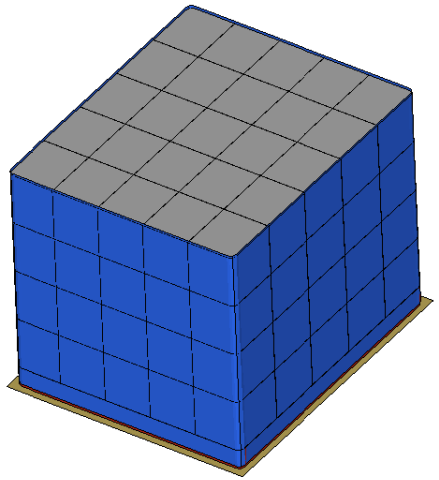
- High Performance Alloys
- Composites
- Advanced Coatings
- Clearance & Tribological Materials
- Non-Destructive Evaluation
- Materials Characterization
- Production and Field Investigation Support

PAVAN VALAVALA

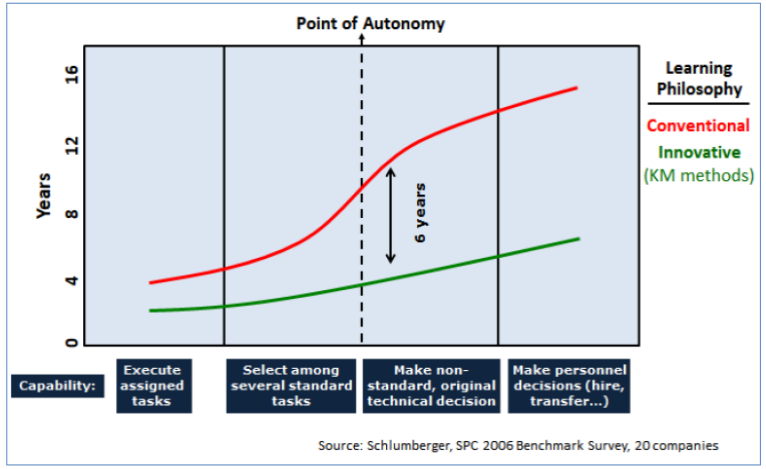
Computational Modeling

Structure-property-performance relationship

- **Approx. $10 trillion worth of goods are shipped globally**
- **$8 billion of PE films are used for pallet unitization**



Knowledge Management



Data shows that "the knowledge worker spends about 2.5 hours per day, or roughly 30% of the workday, searching for information" Source: Information: The Lifeblood of the Enterprise

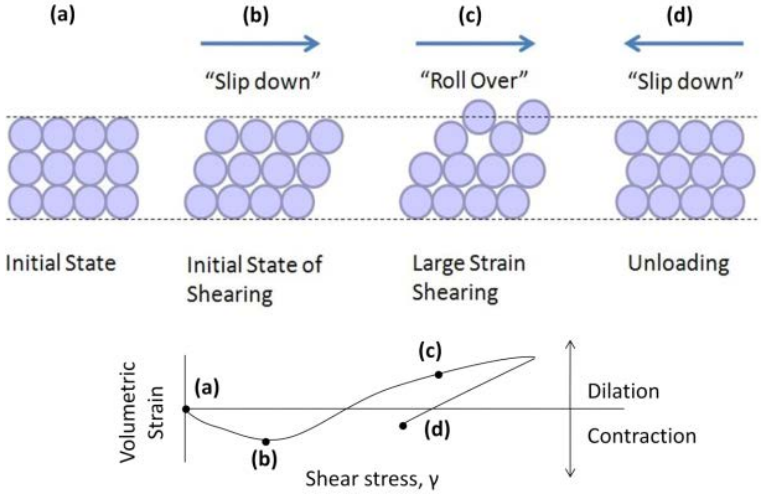
Digital Preservation of Institutional Knowledge

+

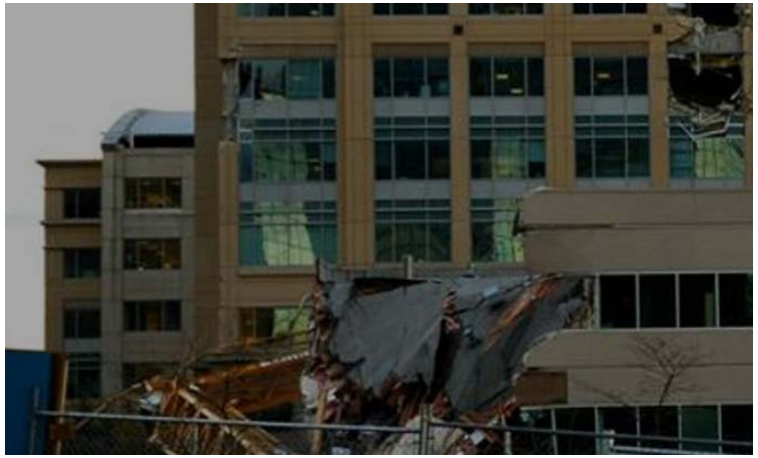
Digitalization

Knowledge Management

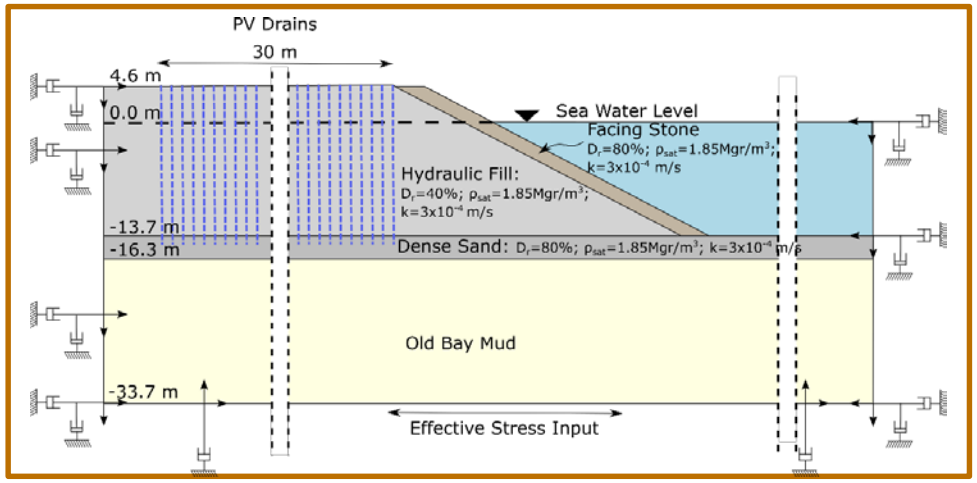
Geomechanics



Failure Analysis



Seismic Risk Mitigation



Oil and Gas Risk Assessment

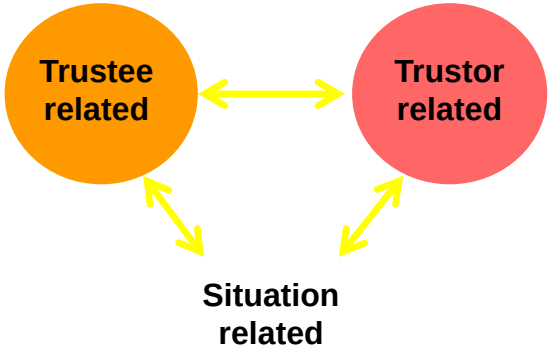
Saving Lives with Emergency Evacution Robots

Alan R. Wagner · Assistant Professor · Depart. of Aerospace Engineering

Autonomous systems for Emergency Evacuation:

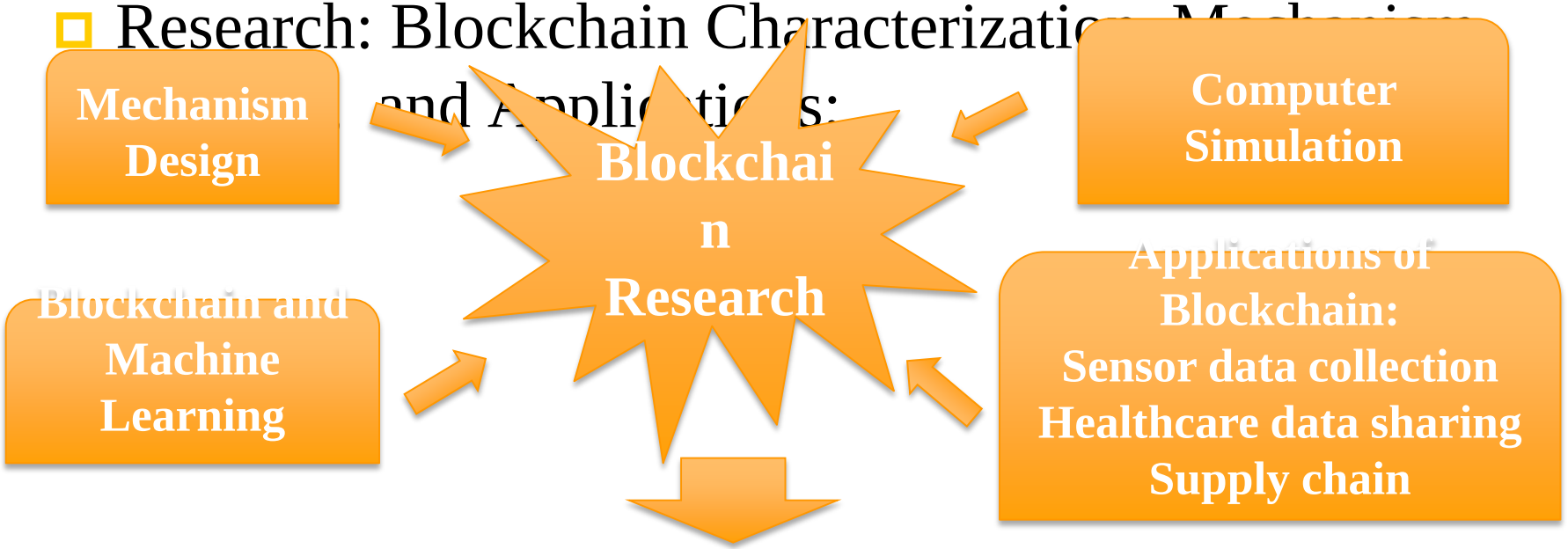
Human-Robot Trust, compliance with Robots: Create robots that encourage compliance, correct trust calibration. Prevent overtrust, use explainations, emotive language to communicate directions to diverse evacuees

Ethical Principles for Evacuation Robotics:



PennState

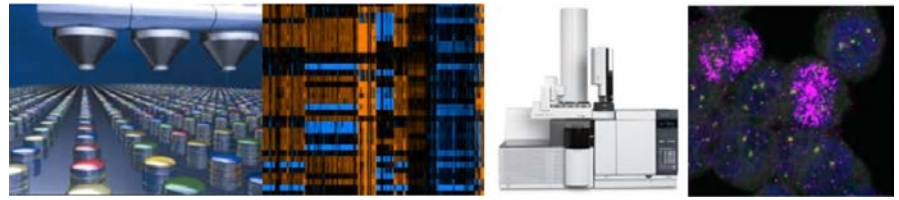
- Hong Wan, Associate Prof at NC State ISE department
- Research: Blockchain Characterizatio[illegible]



How to characterize and evaluate a blockchain system
Should blockchain be used? *If so, what's the best design?*
How well (or not) would a designed blockchain system work?

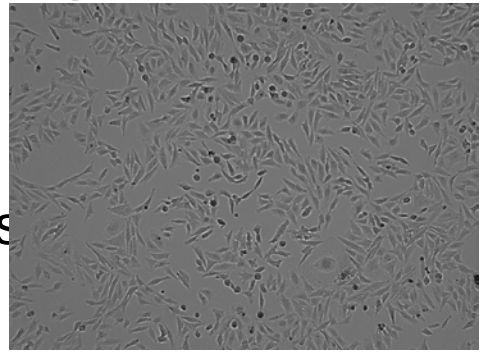
Agilent Research Laboratories

Computational Biology and Informatics Group

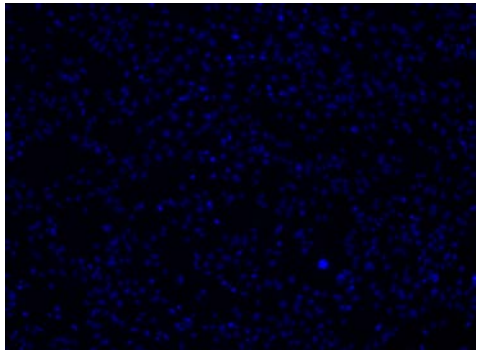


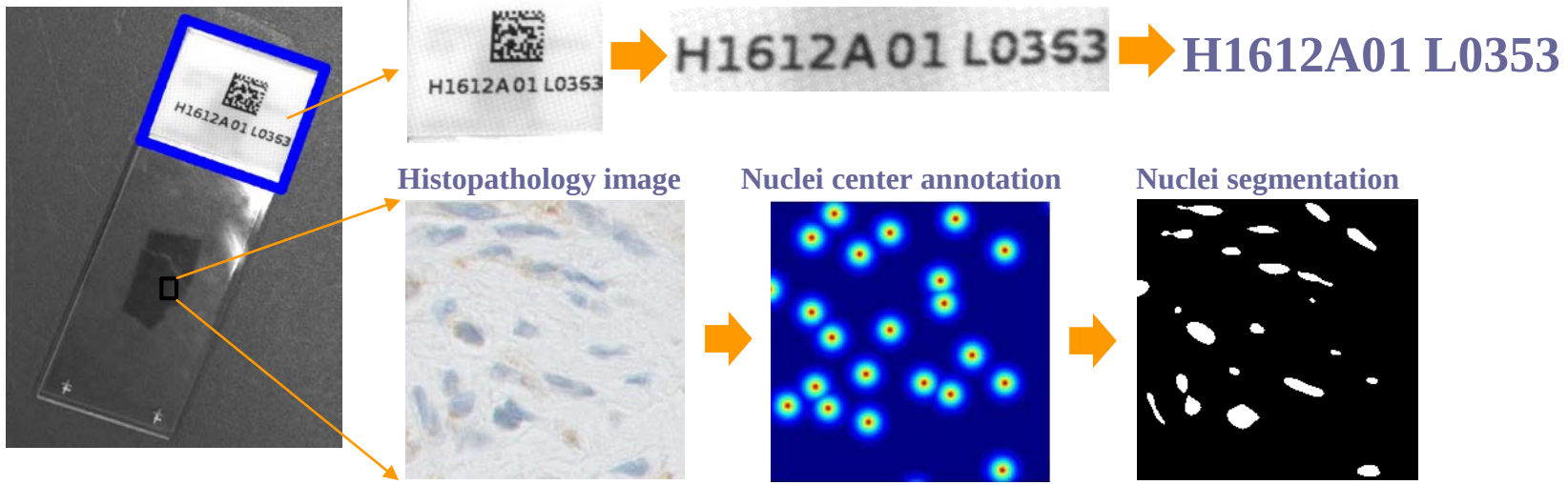
- Analytical image processing and machine learning/AI algorithms for digital pathology and lab automation focused on:
- - Object detection
- - Tissue image analysis
- - Cellular image analysis

Bright-field



Fluorescence



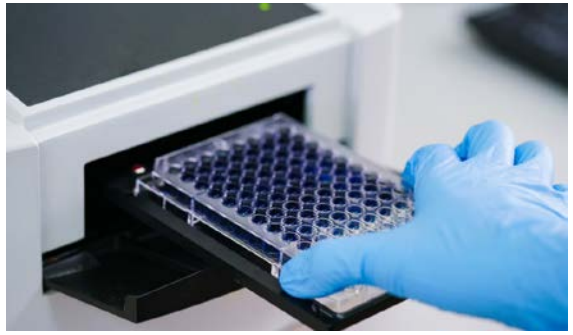


Histopathology image

Nuclei center annotation

Nuclei segmentation

Cellular and Molecular



Companion diagnostics

H&E, IHC, and FISH

Qingyu Wang, Ph.D., Research Scientist, qingyu.wang@agilent.com

NC STATE UNIVERSITY

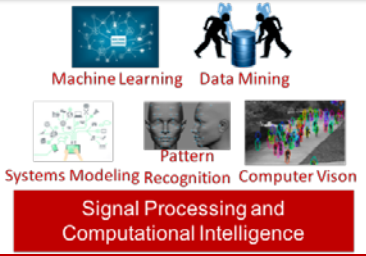
EnBiSys Lab

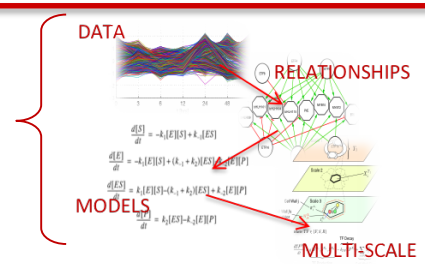
NC STATE UNIVERSITY

ENgineering Computational and Analytical Methodologies for Multi-Hierarchical Biological SYStems

Name: Dr. Cranos Williams
Title: Associate Professor
Affiliation: Electrical & Computer Eng.
North Carolina State University
https://enbisys.ece.ncsu.edu/

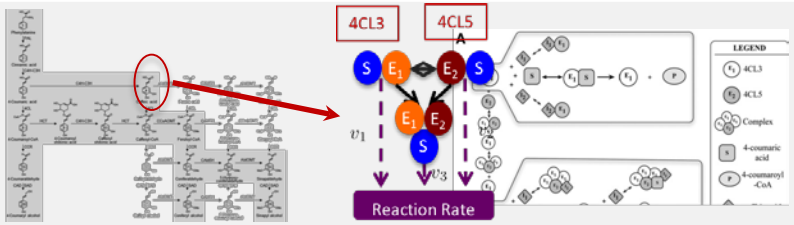
Lab Mission: Advance the comprehensive understanding of emergent properties in biomolecular pathways associated with plant growth, development, and adaptation using multiscale systems modeling

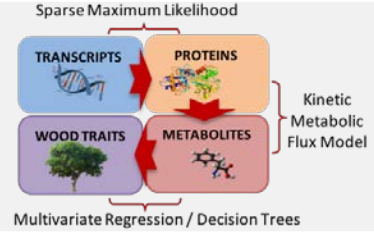




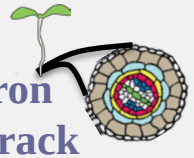
Current Research Program and Projects

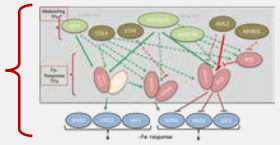
Understanding Plant Cell Wall: Build predictive model of the regulation and biosynthesis of lignin; Predict impact of lignin specific transgenic modifications on wood traits (NSF DBI-0922392)



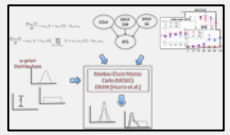


Root Growth and Development: Dynamic modeling of uncharacterized regulatory components that influence iron homeostasis in A. thaliana roots (NSF MCB-1247427); Track stress related changes in root cell morphology over space and time using Lightsheet microscopy

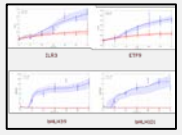




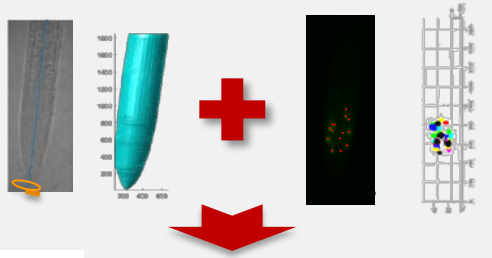
Fe- Response in A. thaliana



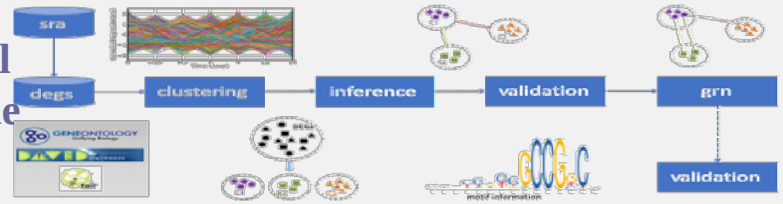
Parameter Estimation

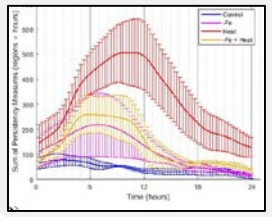


Simulated Results



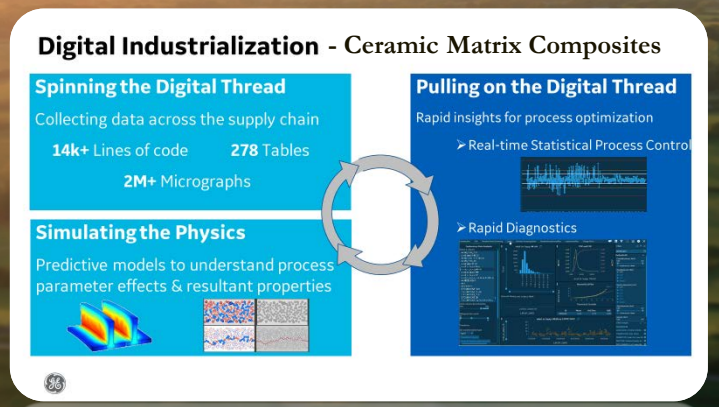
Modeling ethylene and auxin stress: Model interactions that control transcriptional and translational regulation associated with ethylene and auxin stress in A. thaliana and tomato (NSF IOS-1444561)





GE Aviation
GregoryScott.Wilson@ge.com

Digital Thread



Digital Twin

- Couple physics models to digital thread data
- Drive in-process decisions
- Reduce Inspections, Testing, and Cycle Time
- Faster issue detection and

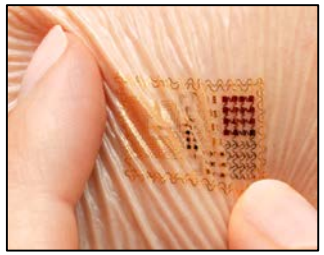
Digital Team

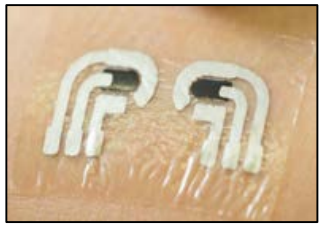
- Materials organization digital transformation
- Empowering domain experts with data, tools, and mind-set
- Use-case-driven model development
- Teaming and cross-organizational best practices

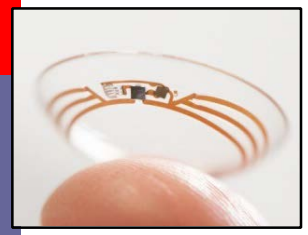
Va'Juanna Wilson
The Boeing Company
Boeing NeXt - Cargo Air Vehicle
Software Lead for Mission System

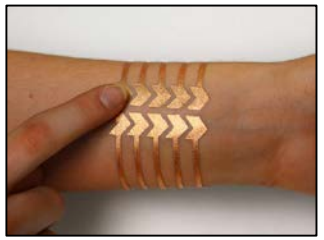
Ubiquitous and real-time health monitoring

Sheng Xu, Assistant Professor, UC San Diego









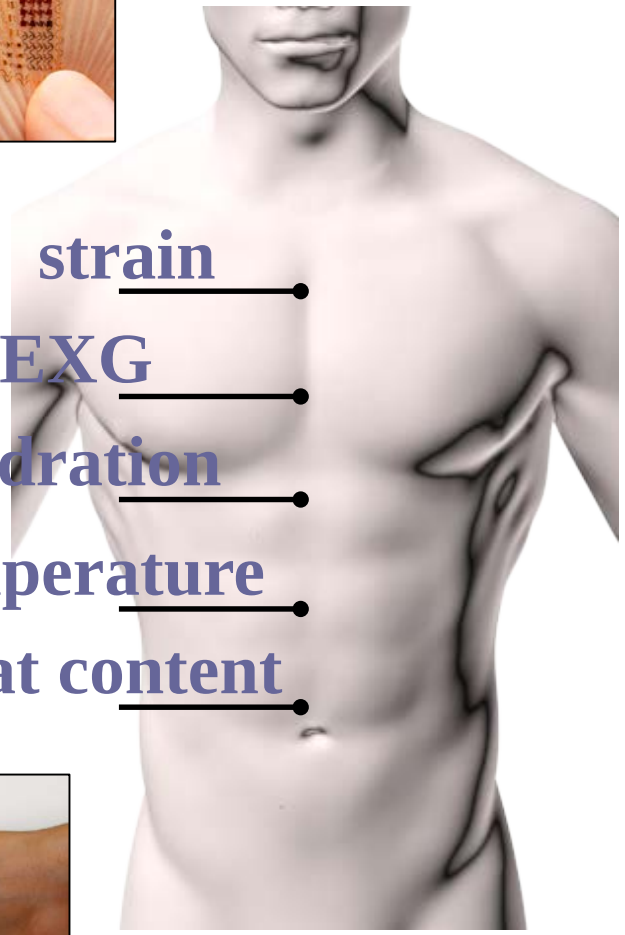
strain

EXG

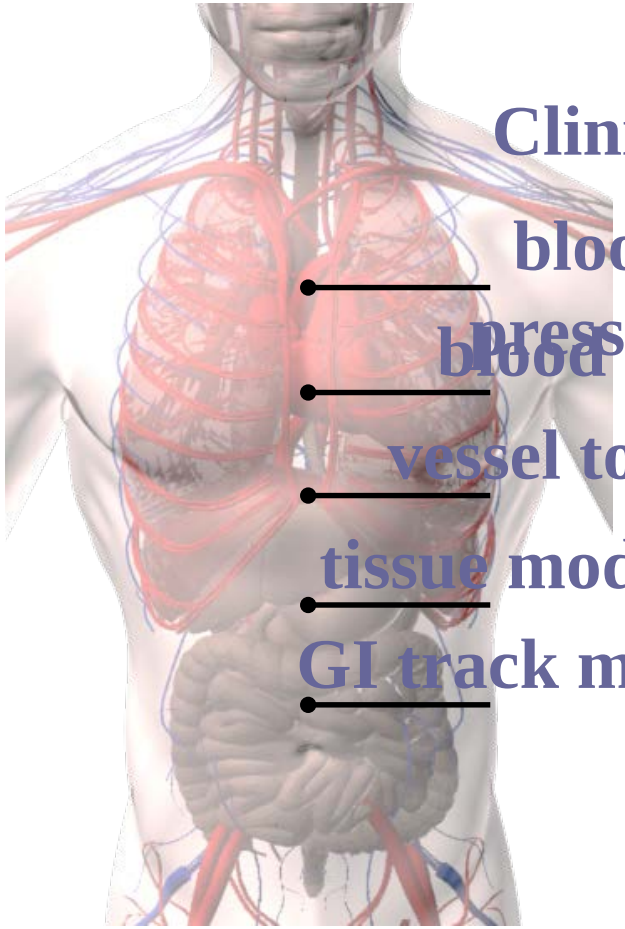
hydration

temperature

sweat content



Ultrasound



Looking for:

Transducers

Control electronics

Data analysis

Clinical relevance

blood pressure

blood flow

vessel tone

tissue modulus

GI track motion