Research Council

Minutes for meeting of February 23, 2026, 4:00 p.m.
Zoom Meeting

Chair: Dr. Linda Walters, Vice-Chair: Dr. David Luna

1. Call to Order at 4:02pm

2. Roll call was replaced with noting people as they entered the Zoom meeting. In attendance were: Walters, Luna, Coathup, Huang, Miller, Major, Dykstra, Yalim, Ram, Duranceau, Johnson, Vitanov, Mansy, Kent-Walsh, Kim, Listengarten, Kinchen, Guldi, Kapucu, Banerjee, Terra, Delfyett, French, Gabrus, Devon Jensen.

3. Approval of Minutes. Minutes from 1/26/26 meeting were approved.

4. Recognition of guests. Parag Banerjee (Lead, REACT Cluster), Melanie Coathup (Lead, Biionix Cluster), Helen Huang (Lead, DAT Cluster), Tamara Gabrus (Sr. Director, Research Advancement & Strategy).

5. Announcements: Winston Schoenfeld will attend the next meeting (3/30) for Q&A, and Chad Macuszonok will disscuss the new, upcoming research-centric reporting tool (Vienna) that will soon require faculty testing and feedback.

6. Old Business. No old business was discussed.

7. New Business: The three leads of research clusters summarize their activities. See Appendix for materials presented at the meeting.

REACT (Renewable Energy and Chemical Transformations) cluster. Includes 20+ faculty divided into two groups: Physics and Testing. 30+ graduate students and post-docs. 40+ publications annually.The cluster recently developed a strategic roadmap, including a mission/vision statement, objectivess, funding strategy, and metrics. Characterized by a high degree of interdisciplinarity.

DAT (Disabilities, Aging, and Technology) cluster. Three primary impact thrusts: education, research, and community engagement (the latter in the form of community events like the Science Café, where research is shared). 30 Faculty, 7 Colleges, 11 Departments. Funding from government and private sources.

Biionix cluster. Focusing on bionic implants, materials, and interfaces. 22 Faculty. 38 Graduate students. 5 post-doc fellows. 39 undergraduates. The cluster focuses on clinically informed research questions and technology development. Members work with hospital and medical centers, to innovate and advance clinical technology like smart

materials, nanotech, etc. The cluster receives funding from a variety of federal agencies and revolves around themes like tissuue repair and disease, materials and innovation. They have a variety of labs: wet labs, microbiology, histology,… and produce 50+ papers a year plus books and patents. The cluster holds an annual symposium with research presentations from members, including students.

Q&A:

Dykstra: How can faculty join a cluster?

> Gabrus: Faculty interested in joining should contact the cluster lead, identify areas of research overlap. Typically, they will make a presentation and the members will vote. The objective of clusters is to work across disciplines in specific research problems. Benefits include collaboration with like-minded individuals with complementary skillsets, additional support for funding opportunities, and access to cluster research infrastructure.

Walters: has any cluster developed a degree program?

> Gabrus: Not yet, but they have created several certificates and an online masters program.

8. Other Business: No other business was discussed.

9. Adjournment at 4:51pm.

APPENDIX: CLUSTER PRESENTATION MATERIALS

Research Council Meeting
R.E.A.C.T. FCI Cluster

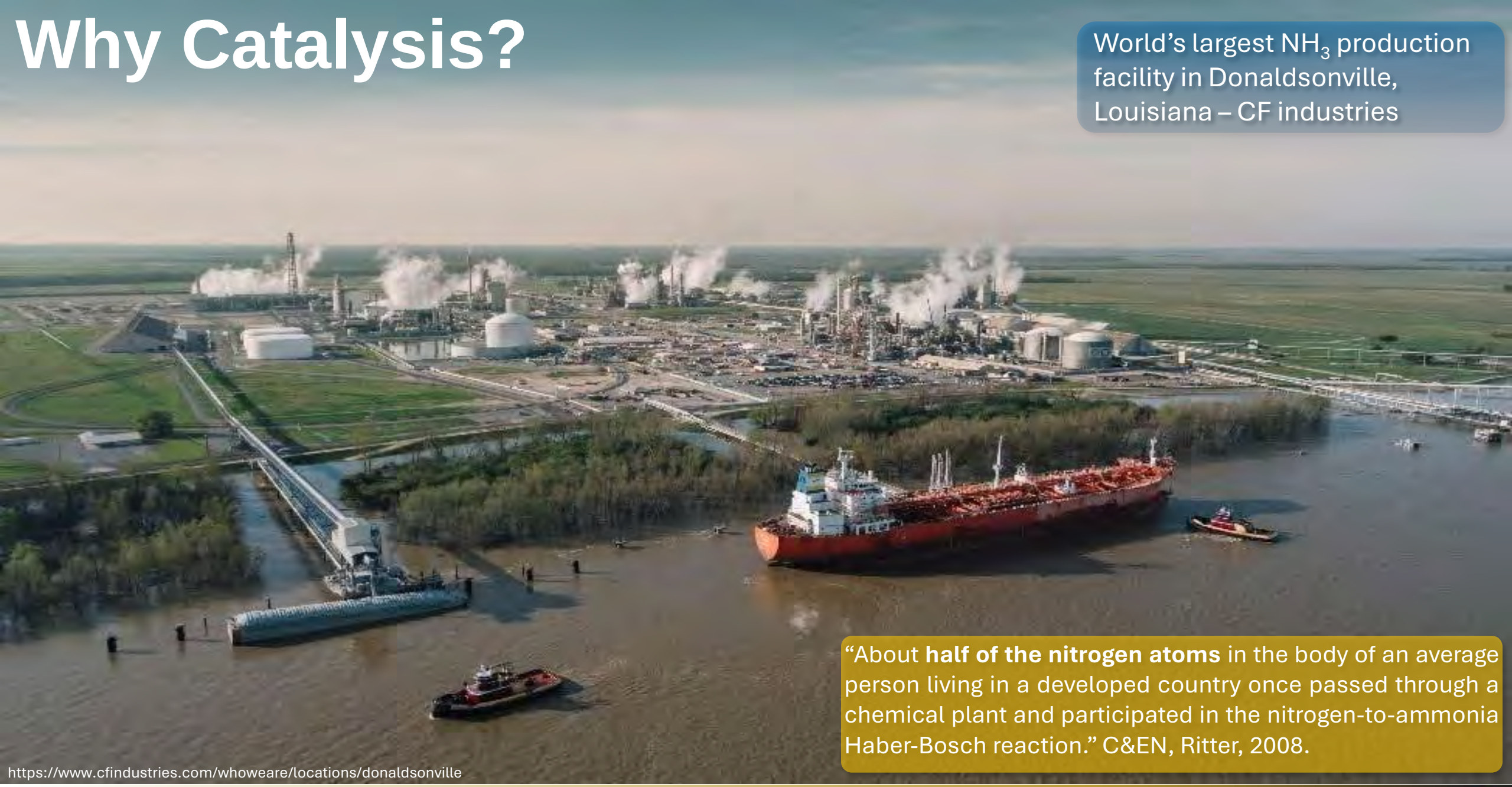
Parag Banerjee
parag.banerjee@ucf.edu
Professor, Materials Science and Engineering
Lead, Renewable Energy and Chemical Transformations (R.E.A.C.T.)
Faculty Cluster Initiative (FCI)
University of Central Florida (UCF), Orlando, FL 32816-0120
Instagram®: **banerjeelab_UCF** **@banerjeelab.bsky.social**

REACT

UCF

Why Catalysis?

World's largest NH_3 production facility in Donaldsonville, Louisiana – CF industries



"About **half of the nitrogen atoms** in the body of an average person living in a developed country once passed through a chemical plant and participated in the nitrogen-to-ammonia Haber-Bosch reaction." C&EN, Ritter, 2008.

https://www.cfindustries.com/whoweare/locations/donaldsonville

UCF

REACT - UCF's Faculty Cluster Initiative in Catalysis

Talat Rahman
Physics

Duy Le
Physics

THEORY, SURFACE SCIENCE

Mihai Vaida
Physics

William Kaden
Physics

Renewable Energy & Chemical Transformations (REACT Cluster)

- Physics, Chemistry, MSE
- Theory, td-DFT, DFT, KMC
- UHV Surface Science: *in situ & operando*
- Synthesis: Nanomaterials, powders, electrodes
- Heterogeneous Catalysis: Electro; Photo; Thermal

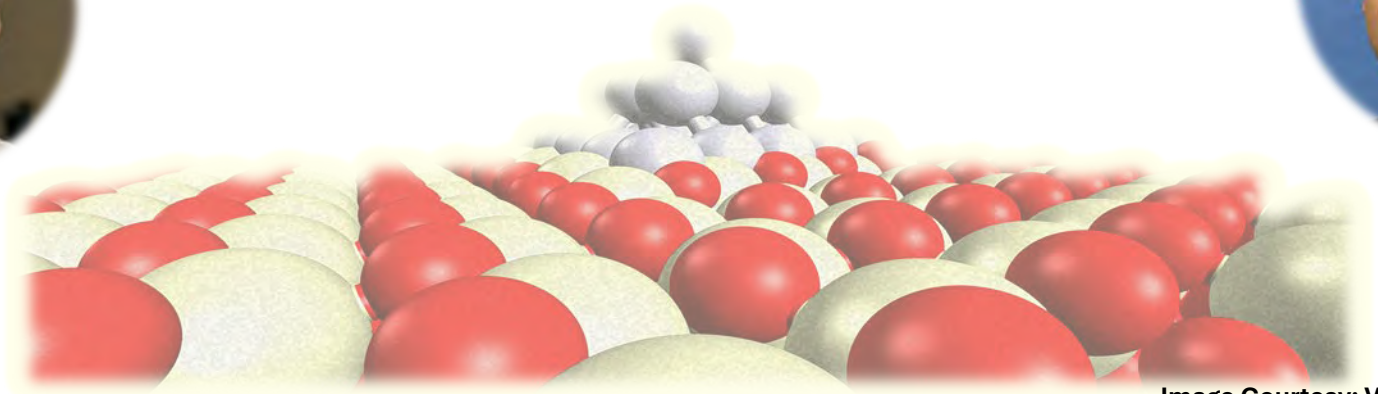


Image Courtesy: Vaida Lab

Titel Jurca
Chemistry

Xiaofeng Feng
Physics

CATALYST SYNTHESIS, TESTING

Parag Banerjee
MS&E

Fernando U-Romo
Chemistry

Our cluster - A HUMAN ENDEAVOR

R.E.A.C.T. BY THE NUMBERS

20+

Total cluster faculty

30+

Graduate students, post docs

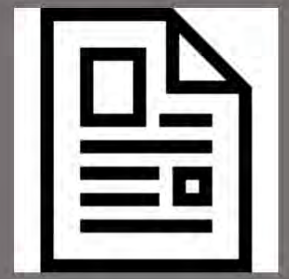
15+

Catalysis relevant & active federal grants till date

$1M+

Average annual funding

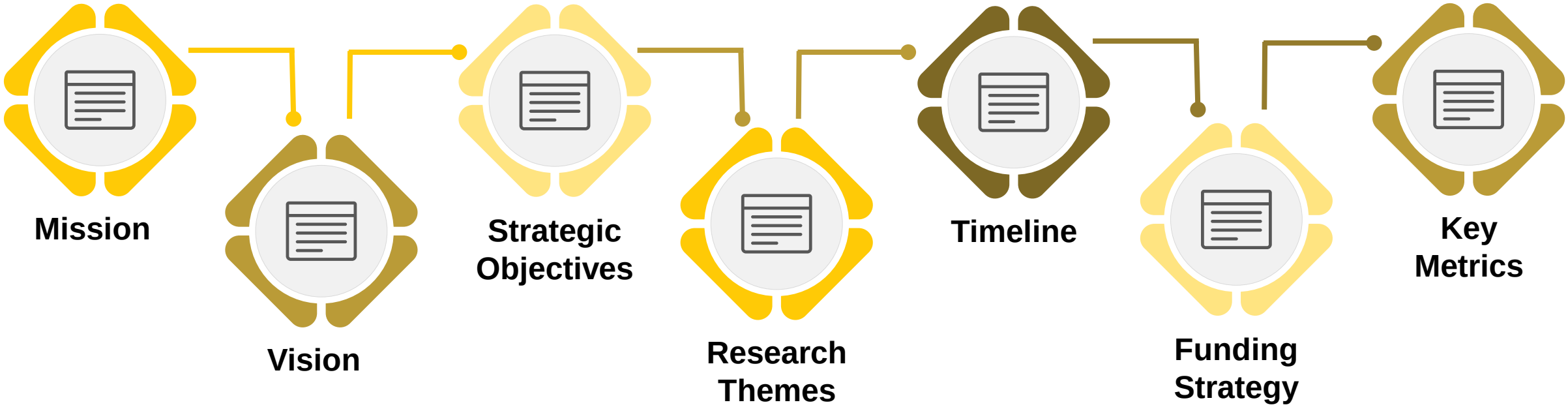
40+



Average annual publications

From Jan 2025

Development of a REACT Roadmap



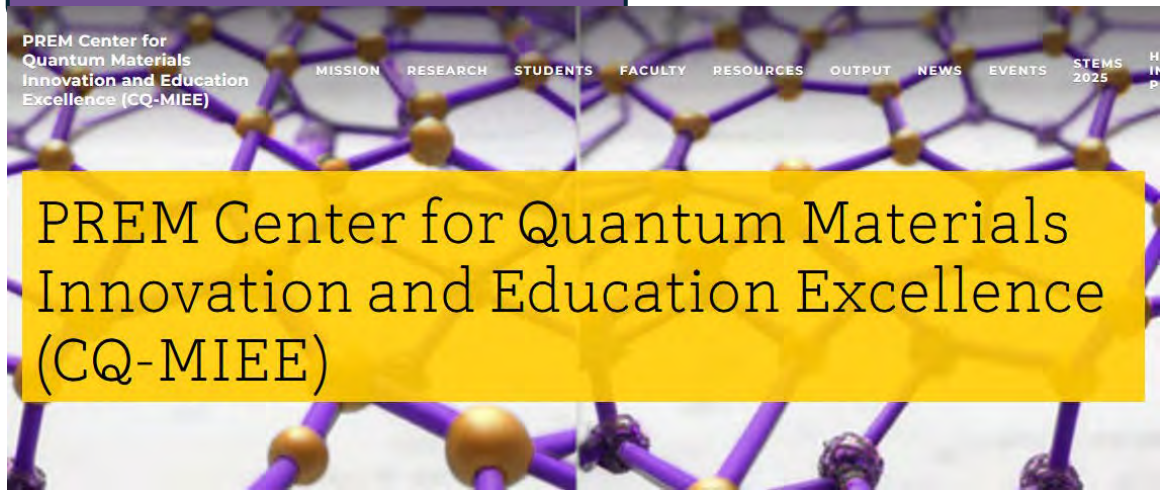
- A cohesive 4-page document with a 5-year time horizon
- Reviewed every semester by cluster members

Questions / comments / thoughts?

NSF REU ’24-26

NSF PREM SEED grant ‘21-’24

NSF PREM Center ‘24-’30



UCF

REACT
Strategic Research Roadmap
2025–2030

Prepared by and agreed upon: 09/04/2025

Professor Parag Banerjee (Lead, MS&E)
Professor Titel Jurca (Core, Chemistry)
Professor Mihai Vaida (Core, Physics)
Professor Xiaofeng Feng (Core, Physics)
Professor William Kaden (SJA, Physics)
Professor Fernando Uribe-Romo (SJA, Chemistry)
Professor Akihiro Kushima (SJA, MS&E)

1 Vision, Mission, Strategic Context

1.1 Vision

REACT's vision is to be a discovery-focused center dedicated to the holistic understanding of complex problems in renewable energy and catalysis using a combination of theory, surface science, atomistic design, molecular and materials synthesis, testing and characterization.

1.2 Mission

REACT's human mission is to build a collaborative community of multidisciplinary teams that harness the collective intellectual prowess of experts for solving complex problems in renewable energy and catalysis. REACT's educational mission is to advance catalysis science through high impact publications and student training, culminating in their strategic placement across the university-industry-lab ecosystem.

1.3 Research Context and Rationale

Nearly 80% of all chemical products and 36% of the U.S. GDP rely on chemical catalysis, yet federal support for advancing this critical industry is steadily shrinking. Small and mid-sized companies in value-added chemicals, renewable energy, and fuels are particularly vulnerable, as they require cutting-edge R&D and specialized consulting that often lie beyond their in-house capabilities. At the same time, pressing local needs remain unaddressed—especially in Florida, where unique environmental challenges and technological demands call for targeted innovation. Establishing a one-stop shop for renewable energy and catalysis would directly address these gaps, providing industry and community stakeholders with accessible, top-tier expertise and positioning UCF as a leader in sustainable chemical technologies.

1.4 Strategic Objectives

Objective	Description
O1: Fundamental	Theory-driven and theory-supported catalytic reactions using *in situ* and *operando* spectroscopy and microscopy on model and catalyst surfaces.
O2: Applied	Discover and develop atomically engineered catalytic materials with optimal metrics such as turnover frequency, selectivity and stability.
O3: Educational	Certificate program in Catalysis Science and Engineering
O4: Outreach	Single-day, topical workshops (2x/AY), invited talks from collaborators and experts.

2 Research Themes, Infrastructure & Milestones

2.1 Priority Research Themes

Reactions: N_2 activation, nitrate reduction, $C_1 \rightarrow C_n$ valorization, fine molecule synthesis, organic molecule synthesis, CO_2 reduction.

Materials: Ultra-high ($\geq$100 m^2/gm) surface area MOFs, COFs, hierarchical catalyst design, supported catalysts, atomic layer deposition (ALD) enabled catalysts, non-precious metal / earth-abundant catalysts, PVD.

***In situ* and *Operando* Techniques**: femtosecond pump-probe laser spectroscopy, MS-TPD, STM, Auger, LEED, XPS, ambient pressure XPS, IPES, *in situ* TEM, LEIS, XRD, gas adsorption and electrochemical techniques.

2.2 Infrastructure and Future Needs

Currently, the REACT cluster possesses the resources and expertise to carry out the full spectrum of catalyst discovery and evaluation. Complex theoretical calculations are supported through access to campus-based clusters, high-performance workstations, and national computational facilities. On the experimental side, members of the cluster are equipped to design and synthesize catalysts at the atomic scale, including the fabrication of model surfaces, electrodes, and powders. Advanced characterization capabilities enable in situ and operando measurements using femtosecond spectroscopy and ambient-pressure x-ray photoelectron spectroscopy, providing direct insight into catalytic mechanisms under working conditions. Catalyst performance can be rigorously tested for efficiency and selectivity through both thermal and electrochemical protocols. In addition, aberration-corrected transmission electron microscopy (AC-TEM), complemented with in situ holders for heating, biasing, and mechanical loading, allows for real-time structural studies of catalyst surfaces at the highest spatial resolution.

A complete database of REACT capabilities is being currently developed.

A joint REACT Lab for catalyst testing and evaluation is under the planning stage.

2.3 Timeline of Key Milestones

Year	Milestone
2025	• Develop ≥ 5 key white papers with ≥ 2 PIs. • Develop marketing materials / pamphlets to hand to OR. • Maintain weekly REACT faculty meetings. • Maintain REACT faculty + Student meetings. • Submit joint research proposals • Submit the proposal for Certificate Program in Catalysis.
2026	All of the above, and • Establish Catalysis centered Workshops • Approval of Certificate Program
2027	All of the above, • At least a “few” joint proposals funded
2028	Consolidate, stabilize and grow. Develop Center-of-Excellence proposals.
2029	Consolidate, stabilize and grow. Develop Center-of-Excellence proposals.
2030	Consolidate, stabilize and grow. Develop Center-of-Excellence proposals.

3 Collaborations, Funding, and Success Metrics

REACTs strategic areas will focus on i) energy and food security, ii) value added chemicals discovery and ii) energy sustainability of chemical processes.

3.1 Strategic Collaborations

REACT will seek collaboration across a broad network of stakeholders who bring complementary expertise and resources. These are defined as follows:

1. Within UCF, key collaborators include the CATER program and the Florida Solar Energy Center (FSEC), and NSF-funded Partnerships in Research and Education in Materials (PREM), all of which provide strong foundations in catalysis, renewable energy, and applied research.
2. Externally, partnerships will be pursued with industry involvement, with particular emphasis on Florida-based companies that stand to benefit directly from advanced catalysis and renewable energy solutions.
3. It is recognized that external university / lab collaborations are minimal, and steps will be taken to address this shortcoming by leveraging individual REACT member networks and holding single-day workshops as platforms for increasing collaborative opportunities.
4. To ensure relevance, accountability, and strategic direction, an Advisory Board composed of academic, lab and industry will provide guidance.

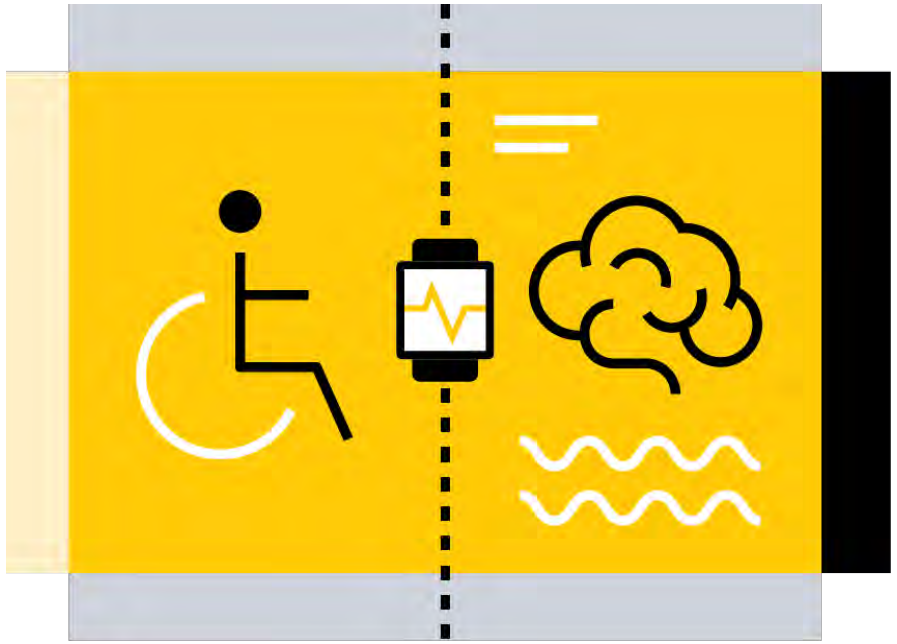
3.2 Funding Strategy

Source	**Strategy**
Federal Grants	We need to migrate from 2-PI to multi-PI grants. Discuss a strategy.
Industry	Work with OR on this – getting a database ready for FL based tech companies (small / medium). Start tours – need help from other C/SJA members. Industry day / training day / workshops. Work closely with MCF.
Internal	3-5 seed grant submission / year.

3.3 Metrics for Success

Area	**Key Indicators**
Collaborative Research	Each C /SJA member should demonstrate ≥ 2 papers with their REACT Cluster colleague/s per year, over a 3-year period.
Collaborative Funding	Each C/SJA member should submit ≥ 2 proposals with their REACT Cluster colleague/s per year, over a 3-year period.
Collaborative Training & Mentorship	Each C/SJA member should have ≥ 1 co-mentored** graduate student with their REACT colleague in a given 3 year running average.
Impact	Every C/SJA should go for invited talks – (either at Conferences or Universities) ≥ 1 / year.

*C = Core
*SJA = Secondary Joint Appointment
**co-mentoring includes but not limited to co-advising, co-chairing the dissertation committee.

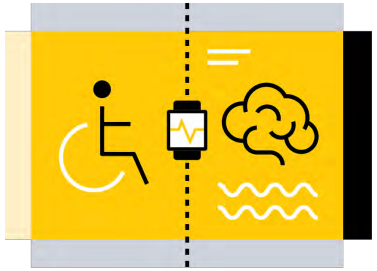


Disability, Aging, and Technology Cluster

DAT

Helen J. Huang
Associate Professor, MAE
Disability, Aging, and Technology Cluster Lead

Research Council meeting
02/23/26



DAT

Mission: to help people with disabilities and older adults lead healthier and stronger lives by informing policy and innovating technologies to help them move better and smarter.

Tagline: Technology serving humanity

Our strategic goals for the next 3-5 years address 3 primary impact thrusts: Education, Research, and Community.

EDUCATION: To increase the number of students/and graduates ready to practice and conduct research focused on people with disabilities and older adults.

RESEARCH: To increase resources that directly support DAT research and to increase visibility of DAT research

COMMUNITY: To increase a sense of community among DAT faculty and between DAT and Central Florida affinity groups for people with disabilities and older adults

Date from Fall 2023

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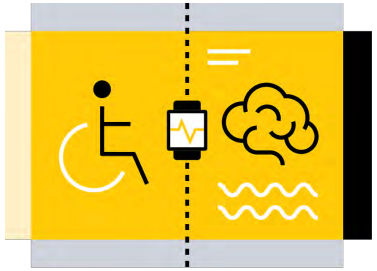
UNIVERSITY OF CENTRAL FLORIDA



DAT

7 Colleges
11 Departments
30 Faculty

Hiring search on-going

* = FCI-paid

College of Engineering and Computer Science (CECS) - 8

Mechanical and Aerospace Engineering (MAE) - 3
Helen Huang (Lead)
Yue Wen*
Qiushi Fu

Electrical and Computer Engineering (ECE) - 2
Mohsen Rakhshan*
Aman Behal

Computer Science (CS) - 3
Charlie Hughes - retired
Gita Sukthankar
Joseph LaViola
Ladislau Boloni

College of Community Innovation and Education (CCIE) - 3

School of Global Health Management and Informatics (SGHMI) - 3
Samuel Towne*
Latarsha Chisholm
Reid Oetjen

College of Health Professions and Sciences (CHPS) - 6

School of Kinesiology and Rehabilitation Sciences - 6
Abigail Anderson
Grant Norte
Jeff Stout
Matt Stock
Meredith Chaput
Nicole Dawson

College of Sciences (COS) - 5

Psychology - 2
Daniel Paulson
Nichole Lighthall

Sociology - 1
Elzbieta Sikorska-Simmons

Statistics and Data Science - 1
Edgard Maboudou
Rui Xie

Rosen College of Hospitality Management - 1

Yun Ying (Susan) Zhong*

College of Nursing (CON) - 5

Boon Ng*
Dawn Turnage
Ladda Thiamwong
Norma Conner
Victoria Loerzel

College of Medicine (COM) - 2

Internal Medicine - 2
Adam Golden
Melanie Coathup

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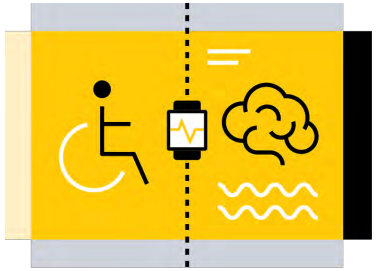
Need to update



DAT

7 Colleges
12 Programs

Estimated:
85 UG
54 Grad
8 Postdocs

College	Programs	UG	Grad	Postdoc
CCIE	SGHMI	5	3	1
CECS	MAE (which includes BME)	59	23	2
	CS	3	4	
	M&S		2	
	ECE	17	4	
CHPS	KRS		10	
COM	Internal Medicine		3	
CON	Nursing	1	3	5
Rosen	Hospitality		2	
COS	Psychology			
	Sociology			
	Statistics and Data Science			

Data based on request to update database. Not everyone responded so there are missing data. This excludes the 20 INTREPID students as they may already be included in some counts.

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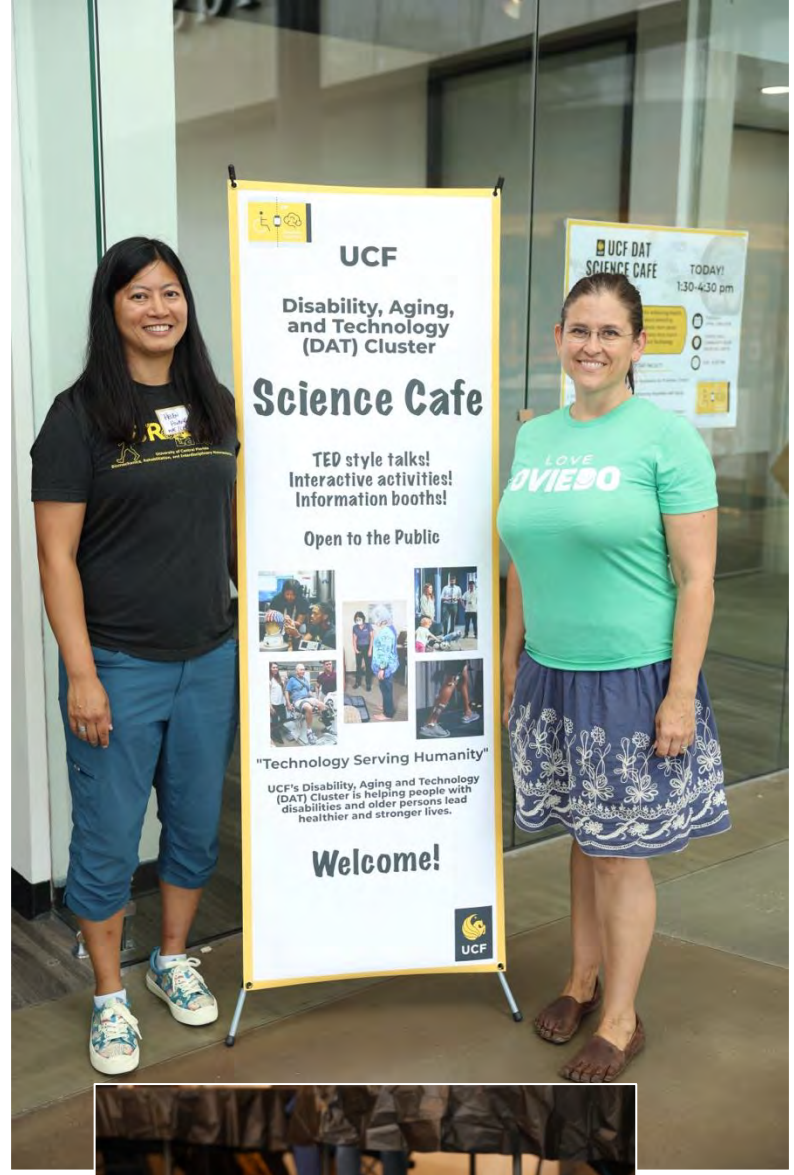
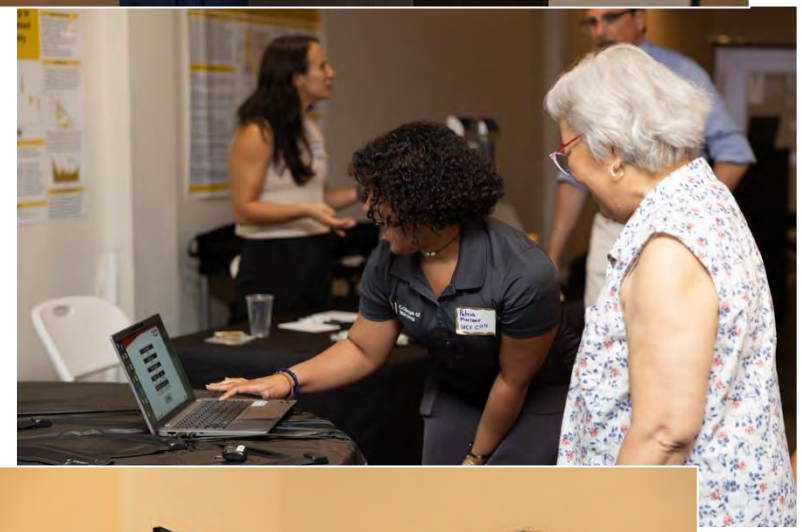

UCF
Disability, Aging, and Technology (DAT) Cluster
Science Cafe
TED style talks!
Interactive activities!
Information booths!
Open to the Public
"Technology Serving Humanity"
UCF's Disability, Aging and Technology (DAT) Cluster is helping people with disabilities and older persons lead healthier and stronger lives.
Welcome!
UCF
UCF DAT SCIENCE CAFE
TODAY!
1:30-4:30 pm

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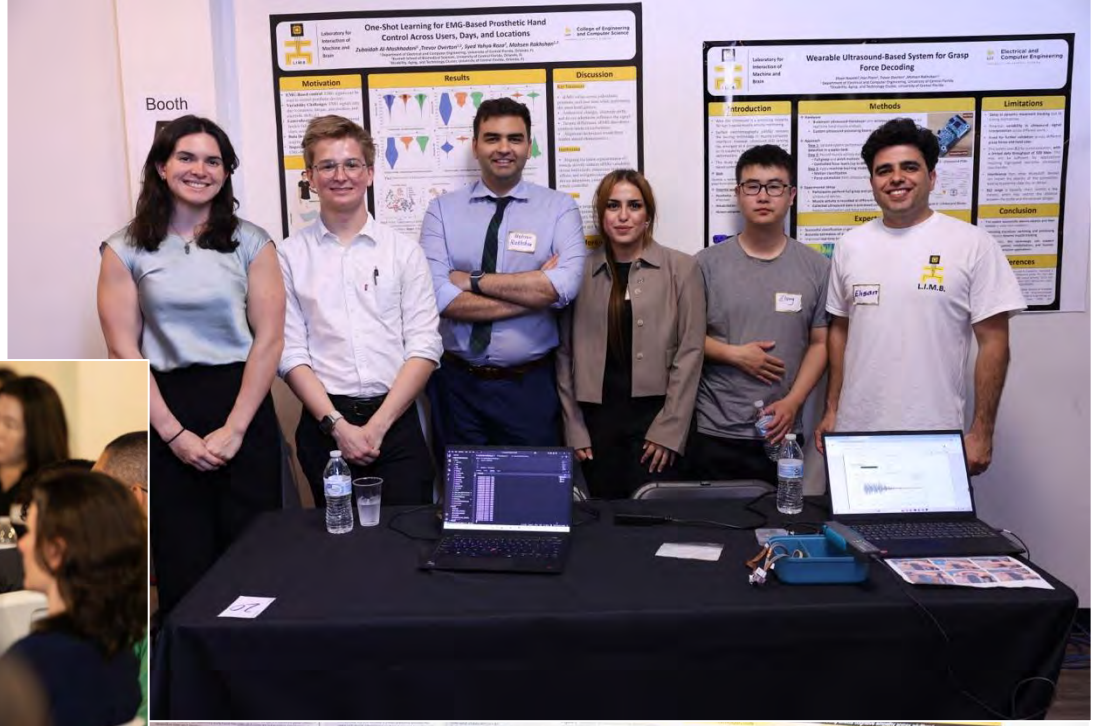
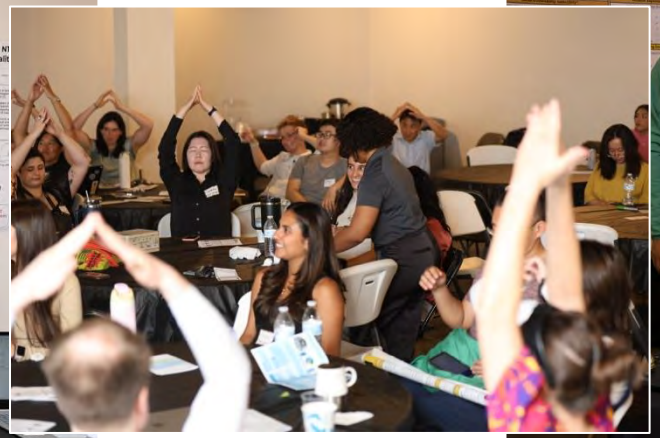
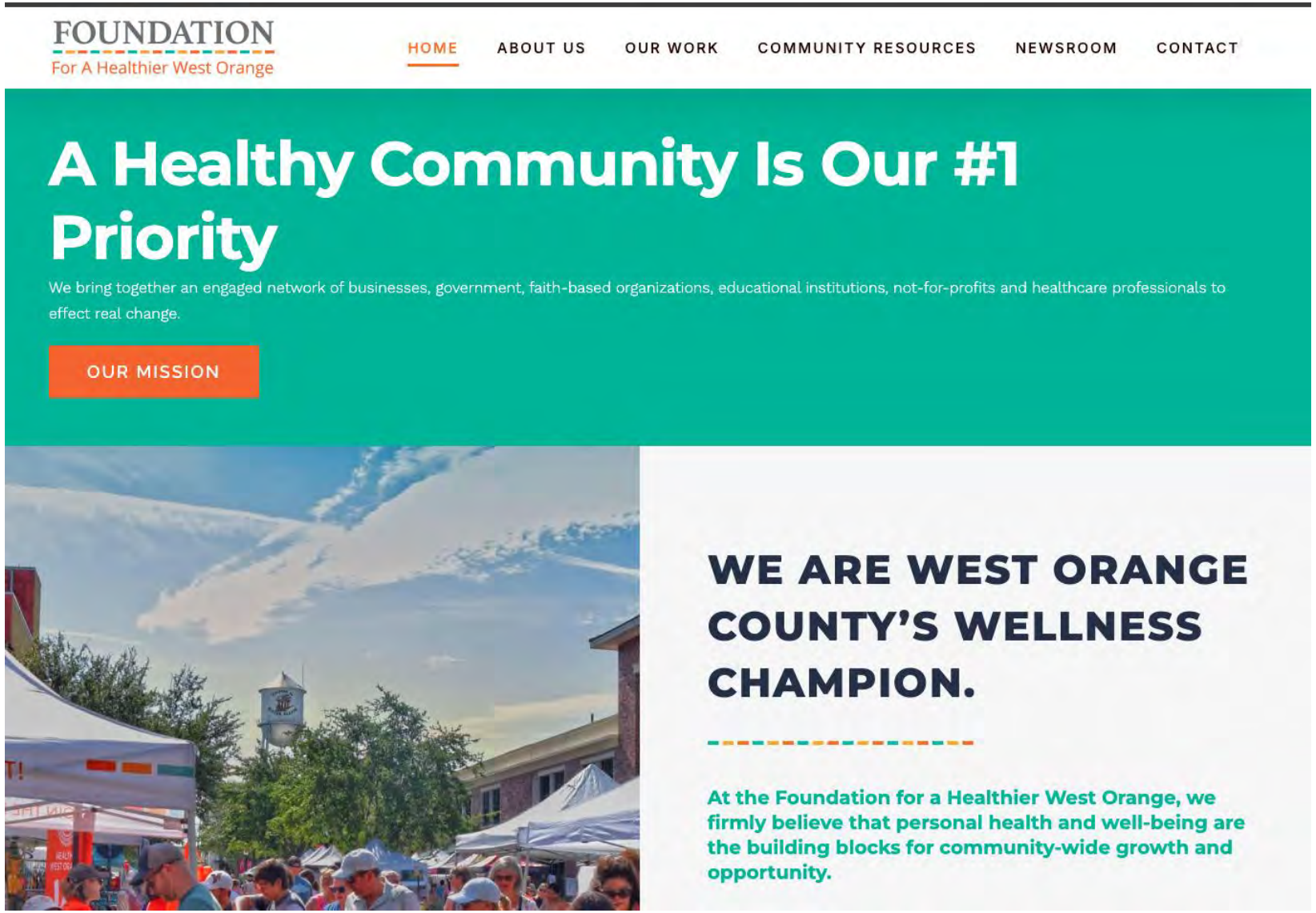

Booth
One-Shot Learning for EMG-Based Prosthetic Hand Control Across Users, Days, and Locations
Wearable Ultrasound-Based System for Grasp Force Decoding
Motivation
Results
Discussion
Introduction
Methods
Limitations
Conclusion


Booth
Corticomuscular Coherence Screening for Clinical Applications




ADULT DEVELOPMENT
& DECISION LAB

DAT Science Café 2026 – May 5, 2026 at FHWO



UCF & Legacy Pointe

present the 1st annual

Health Research Fair

Drop In Open House

Sept 22 from 9a - 12p

Legacy Pointe Ballroom

College of Nursing

Nano Technology

Global Health Management and Analytics

Opportunity to participate in research

be prepared for flu season!

Free Immunity Health Screening

Biomedical Engineering

Kinesiology and Exercise Science

Hospitality Management

Psychology and Human Factors

Computer Vision

Potential health learning opportunities:

- Assess fall risk level using BTracks Balance System
- CD STEADI Toolkit including Vitamin D testing
- Learn about the Otego Exercise program
- Body composition Assessment
- Watch a video on Dementia and the goals of care and advance planning
- Enhance your understanding of cybersecurity threats and improve your literacy in detecting these threats

Organized by Dr. Ladda Thiamwong's EMBRACE Lab

What type of research do we do in the community?

- We have a mobile unit (i.e. a bus)! We go to them!
    - This bus is being outfitted to collect data such as balance, hand strength, timed up and go, etc. specifically for understanding fall risk and frailty (led by Dr. Ladda Thiamwong).
    - Other DAT faculty will use the bus to introduce neurotechnologies to these communities and collect data on brain and muscle function.
    - We want to help inform older adults of their current fall risk, gait function, and neuromuscular control.

NIH grants

- NIH R01: Integrating Artificial Intelligence and Smart Health Systems for Personalized Fall Prevention and Health Management in Older Adults: A Pilot Study. (PI: Ladda Thiamwong)
- NIH R01: Optimizing a technology-based body and mind intervention to prevent falls and reduce health disparities in low-income populations. (PI: Ladda Thiamwong)
- NIH R01: Sensorimotor control of common-goal bimanual coordination (PI: Qiushi Fu)
- NIH R01: Adaptation of brain and body responses to perturbations during gait in young and older adults (PI: Helen Huang)
- NIH 15: Effect of force-based motor repetition on the control and learning of dexterous manipulation (PI: Qiushi Fu)
- NIH R03: Technology-based fall risk assessments for older adults in low-income settings (PI: Ladda Thiamwong)
- NIH R01: Characterizing and modulating neurocognitive processes of learning to trust and distrust in aging (PI: Nichole Lighthall)
- NIH R24: Research Network on Decision Neuroscience and Aging (PI: Nichole Lighthall)

Recent grants

- Long-Term EMG-based Interaction Facilitation Using Manifold Alignment and Kalman-Filter-Based Symbiosis (PI: Mohsen Rakhshan; Sponsor Meta Platforms)
- NSF EAGER: SENSE: National Security Evaluation of Neurotechnology Systems and Emerging tools (PI: Mohsen Rakhshan)
- NSF SaTC 2.0: EDU: Experiential Learning of Dark Patterns for Cybersecurity and Privacy (Co-PI: YunYing ‘Susan’ Zhong, DAT; PI: Xueqiang Wang, Cyber; Co-PI: Yao Li, Cyber)

Cluster grants

- NIH R25: Investigators from Novices a Transdisciplinary Research Education Program to Increase Diversity (INTREPID) in Aging Research (MPI: Norma Conner, Helen Huang. Terminated due to changes in funding priorities)
- **Current proposals being developed for submission**
    - **Rehabilitation Engineering Research Centers (RERC) Program: RERC on AI-Driven Assistive and Rehabilitation Technologies. (PM says will be published this year)**
    - **NIH T32, Institutional Training Grant: “goal of this program is to prepare qualified predoctoral and/or postdoctoral trainees for careers that have a significant impact on the health-related research needs of the Nation.” (due May 25)**

ACADEMICS

UCF Team Places in Top 10 at Global Machine Learning Competition

Team Marque, led by Institute of Artificial Intelligence Director Mubarak Shah, beat 8,400 teams in a global challenge to predict behavioral responses from brain data, allowing them to contribute to future advancement of EEG research.

By Marisa Ramiccio '11 | December 15, 2025

UCF researchers Mubarak Shah, Yue Wen, Abhilash Durgam, Qiushi Fu, Helen Huang and Jerry Fu at the Center for Research in Computer Vision.

A team of UCF researchers placed eighth in the 2025 EEG Challenge, a global machine learning competition that asks participants to predict behavioral responses from brain data. The Knights, who call themselves Team Marque, bested 8,400 submissions, including those from research labs and tech companies like Meta and Emotiv.

DAT members:
Yue Wen
Qiushi Fu
Helen Huang
Jerry Fu

IAI members:
Mubarak Shah
Abhilash Durgam

UCF TODAY UCF NEWS | STORIES OF IMPACT + INNOVATION | ORLANDO, FL SECTIONS

SCIENCE & TECHNOLOGY

UCF Team Awarded $2.3M Grant for Innovative Intervention to Prevent Falls

Through interdisciplinary collaboration and a community partnership, UCF researchers are seeking to address falling, which is the leading cause of injury and hospitalization among older adults.

By Julie Harper '01 | March 28, 2023

The fall prevention research team includes, from back (L-R), Jeffrey Stout, Joon-Hyuk Park and Rui Xie, and from front (L-R), Nichole Lighthall, Ladda Thiamwong and Vicki Loerzel.

Falls — and the fear of falling — are the leading cause of injury, disability and hospitalization among low-income older adults, according to the U.S. Centers for Disease Control and Prevention.

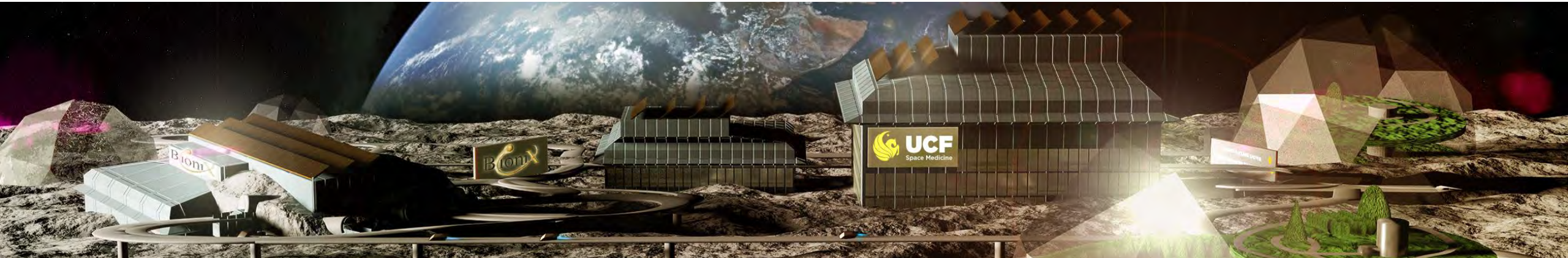
To help address this critical issue and reduce disparities, a team of University of Central Florida researchers is partnering with the City of Orlando on a $2.3 million project funded by the National Institutes of Health (NIH), National Institute on Minority Health and Health Disparities.

DAT members:
Ladda Thiamwong (PI)
Jeff Stout
Nichole Lighthall
Joon-Park
Rui Xie

Melanie Coathup

Professor of Medicine and Lead, Biionix Cluster,
Department of Medicine
Department of Mechanical and Aerospace Engineering
The Stephen W. Hawking Center for Microgravity Research & Education
Florida Space Institute

College of Medicine, University of Central Florida, Orlando, FL, USA.



Coathup Research

Pre-UCF

- Design and Follow-up of Orthopaedic Implants
- Improving Implant Integration
  - New Materials (e.g., PEEK)
  - Surface Coatings
  - 3D Printed Implants

- Enhancing Bone Regeneration
  - Stem Cell Therapy
  - Bone Scaffold Materials
  - Pharmacological Modulation

UCF Research

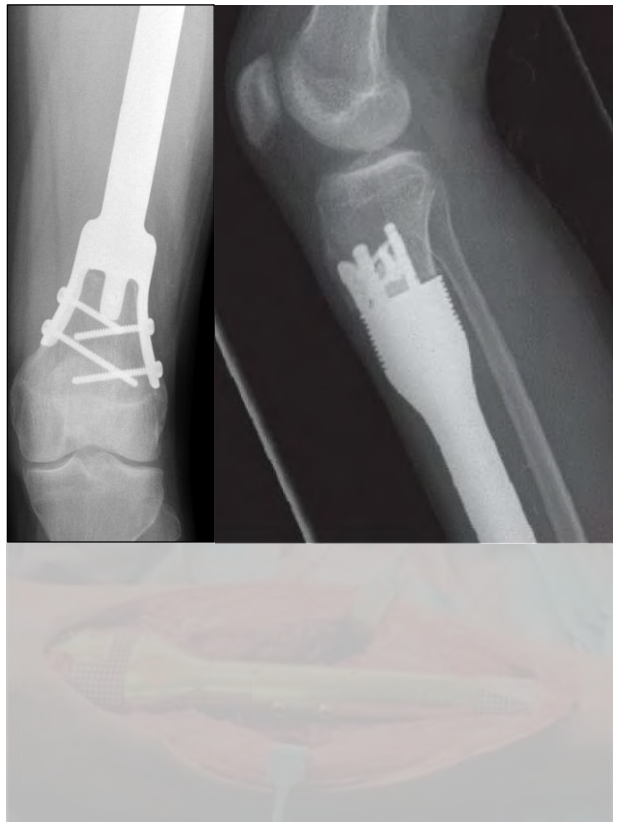
Enhancing bone regeneration & repair under complex physiological conditions:

- **Aging**
- **Radio Medical Countermeasures**
- **Space and Microgravity**

£330m (2010)

FDA Approval (2020)

Actifuse/Inductigraft
>400,000 patients in 30 countries (in 2019)



Joint-Sparing Endoprosthesis
>200 Patients Globally

stryker

~£55m (2015)

"Hailed as one of the most important feats of British engineering in the last 50 years".

UCF

Interdisciplinary Focused Research

Biology

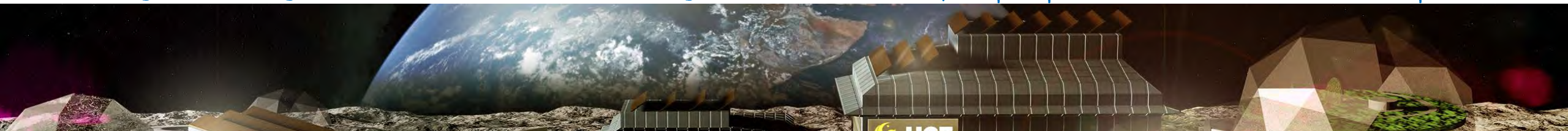
Engineering

Targeted Clinical Delivery

Medicine

Materials Science

Engineering solutions and making science work for people on Earth and in Space



Bionic Implants, Materials & Interfaces

Mission Statement

(1) To understand the problems of disease, trauma, pain, and aging and develop innovative therapies to deliver an increasingly technology-driven standard of care.

(2) To develop innovative technologies that monitor, maintain, and augment health and wellbeing.

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UCF

UCF Departments

College of Medicine

Materials Science & Engineering

Mechanical & Aerospace Engineering

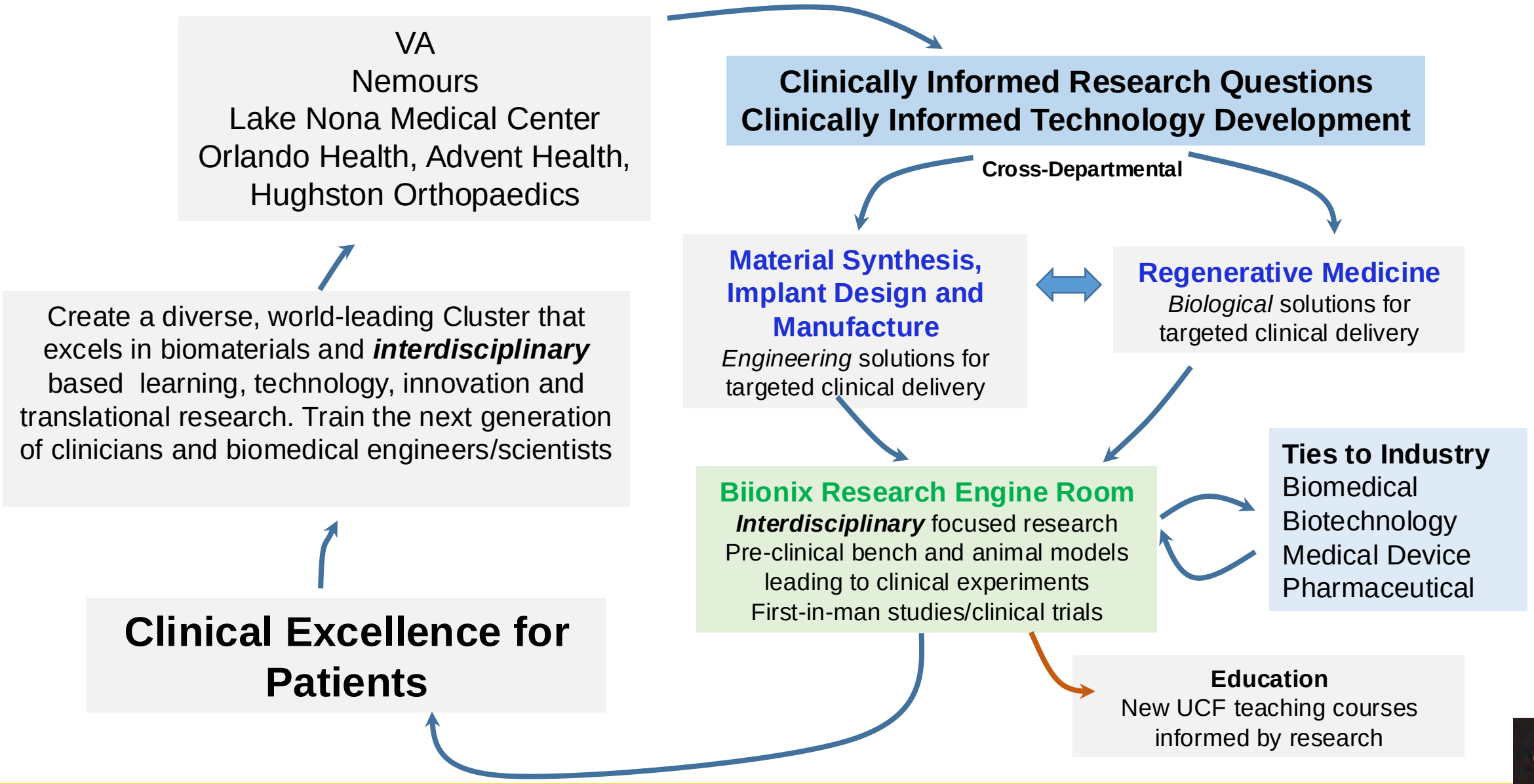
Department of Chemistry

Limbitless Solutions

Nicholson School of Communications & Media

- 22 Faculty *(7 Core & 15 Joint)*
- 39 Undergraduate Students
- 38 Graduate & Medical Students
- 5 Post-Doctoral Fellows

Biionix Cluster Strategy



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To Innovate & Advance:

1) **Smart Materials**

e.g., materials synthesis, biostimulative, bioresponsive materials, adhesives, functional polymers, antimicrobials.

2) **Implantable & Wearable Devices**

e.g., computational modeling, flexible biosensors, medical devices, 3D printing.

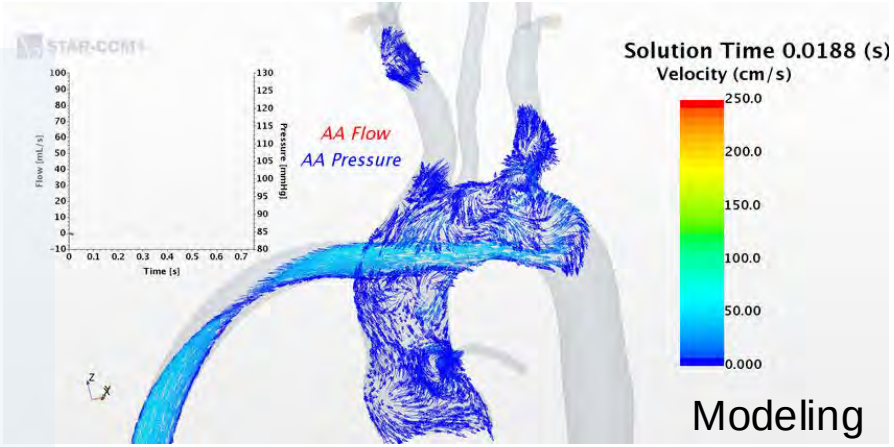
3) **Strategies for Tissue Repair & Implant Integration**

(Normogravity & Microgravity)

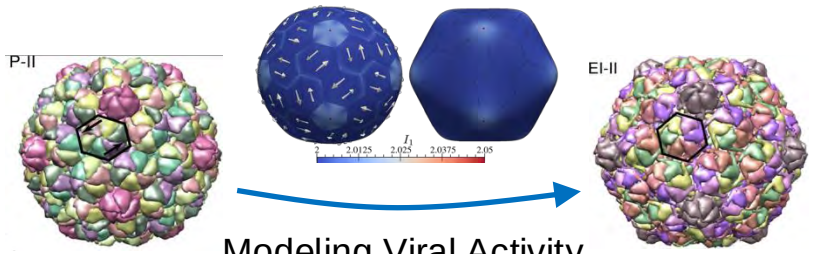
e.g., drug delivery, disease modeling, nanomedicine, 3D bioprinting, artificial tissues.

4) **Intelligent Rehabilitation and Assistive Devices**

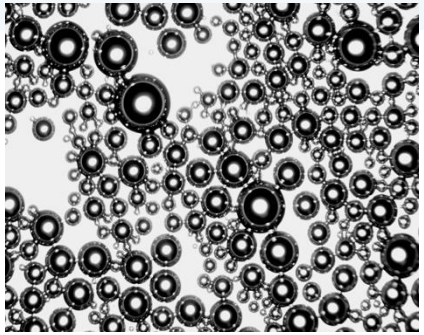
e.g., neural & brain interfaces, robotics, haptics, muscle modeling, orthoses, gait analysis.

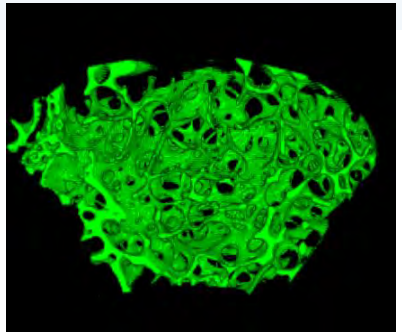


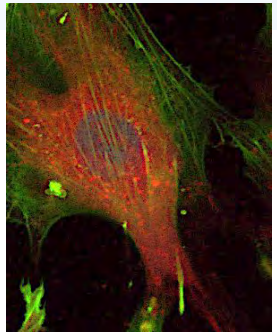
Modeling Blood Flow

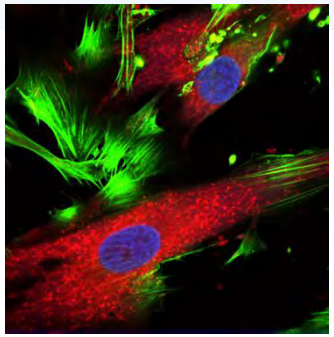


Modeling Viral Activity



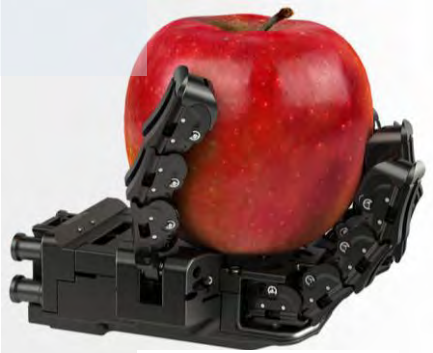






siRNA Nanobubbles for Osteoporosis

Cellular Analysis (Bone & Cartilage Repair)



Movement & Robotics

Implants & Orthopaedics

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UCF

Federal Funding Breakdown

Core Members

(1) Tissue Repair & Disease

- Osteoarthritis
- ACL Repair & Reconstruction
- Segmental bone defects
- Osteoporosis
- Nanomedicine, Bioprinting
- Ovarian & Breast Cancer
- Genomics/ Mass Spectroscopy
- Mass Spectroscopy/Sequencing

(2) Robotics

- Upper limb amputees
- Movement

(3) Rehabilitation

- Exoskeleton
- Lower Limb Amputee Gait Analysis
- Biosensor Development
- Orthoses

(4) Materials & Innovation

- Medical Device Design
- 3D printing
- Materials Synthesis
- Resorbable Metals
- Computational Modeling
- Nanobubbles
- Biostimulative materials
- Polymeric Nanoscale Systems

(5) Wearables/Bioelectronics

- Functional polymers for Firefighters

(6) Infection

- Antibacterial Disinfection
- Gut Microbiome

(7) Space

- Radiation Countermeasures
- Fluid Shifts
- Mars and Lunar Regolith

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Research Strategy (Inter-Related Themes)

Focused, Efficient, Effective and Adaptable

Core & Joint Members

1. Tissue Repair & Disease

- ❖ Cell therapy, drug delivery
- ❖ Tissue injury, repair and regeneration
- ❖ Disease Modeling, cancer, aging
- ❖ Artificial tissues & bioprinting, bioinks
- ❖ Biomolecules, nanomedicine
- ❖ Lab automation
- ❖ Microfluidic chips, organ on a chip

2. Materials & Innovation

- ❖ Medical device design and integration
- ❖ 3D printing and biomaterial fabrication
- ❖ Material synthesis, mechanical testing
- ❖ Biostimulative materials/scaffolds
- ❖ Adhesives and functional polymers
- ❖ Polymeric nanoscale systems
- ❖ Surface modification and functionalization
- ❖ Computational modeling and simulation

3. Infection & Inflammation

- ❖ Prevention and treatment strategies

4. Mass Spectroscopy/Sequencing

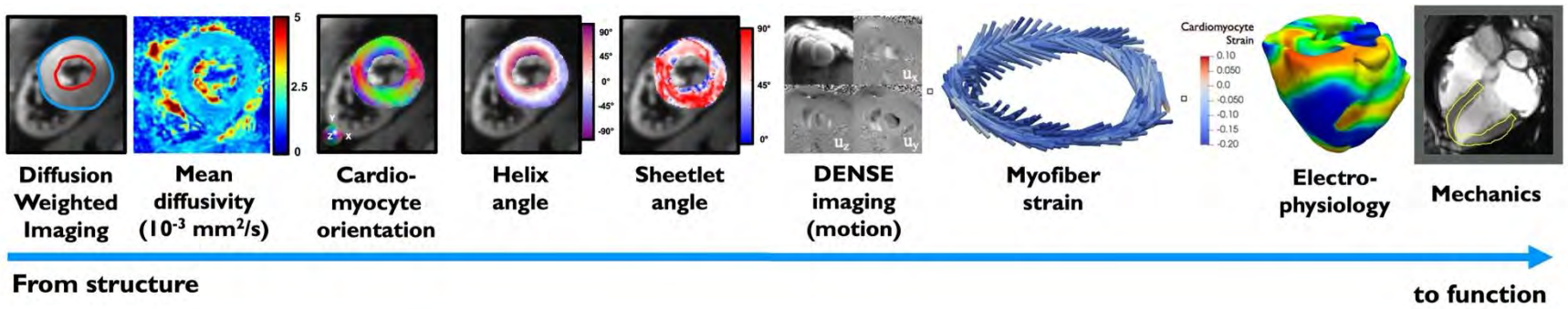
- ❖ Proteomics, transcriptomics, genomics, metabolomics

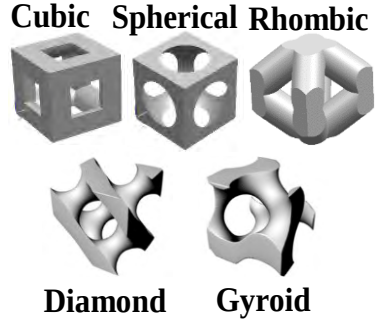
5. Robotics and Bioelectronics

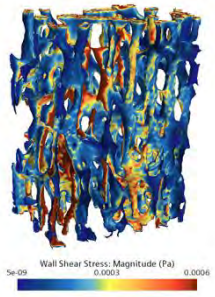
- o Neural & Brain Interfaces, control, learning
- o Robotics, haptics, human movement
- o Implantable Devices, Bioelectronic devices
- o Wearable devices, flexible sensors
- o Gait analysis, muscle modeling, proprioception
- o Orthoses and exoskeleton development

To simulate human physiological responses and bridge preclinical gaps: In vitro, in vivo, in silico, in chemico

Microstructurally anchored biomarkers of cardiac function







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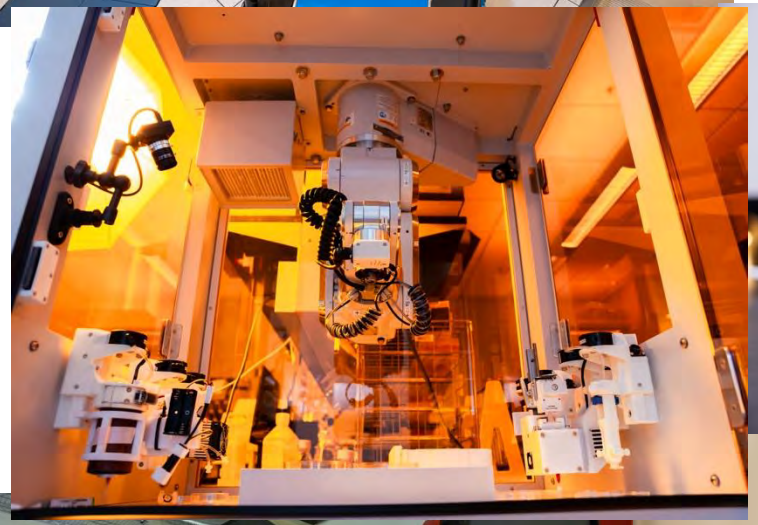
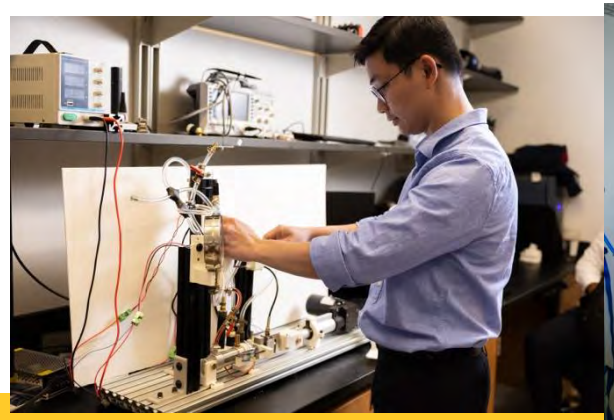
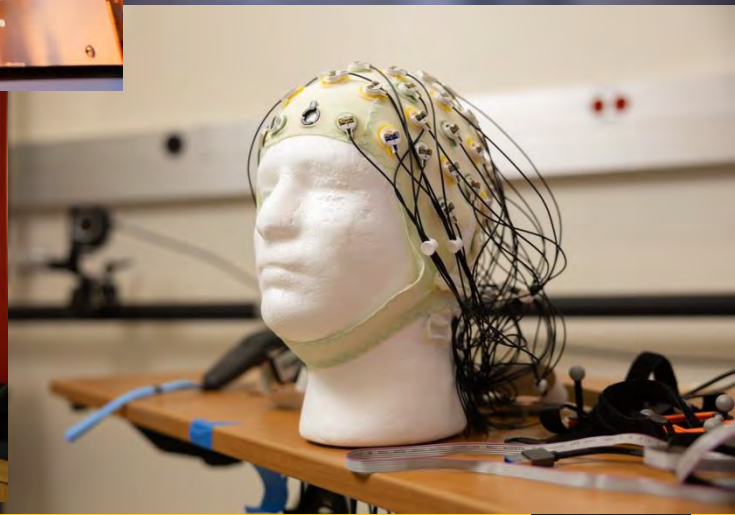
Core Laboratories (Lake Nona)

- General Wet and Cell Culture
- Microbiology
- Histology
- Therapeutic Biomaterials and Molecular Analysis
- Additive Manufacturing and Bioprinting Materials Fabrication and Testing
- Neuromechanical Systems
- Rehabilitation Engineering and Assistive Device Lab (REAL)







Outcome Metrics/yr

- 50 papers/year
- 35 student honors
- 6 patents disclosed/awarded
- Books published

Medical School Electives

- Write a Research Article
- Nanomedicine
- Orthopaedic Science and Research

Core Members:

>$7,385,000

in external funding

Clinical Collaborators

Industrial Collaborators

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Overarching Goal

To support and foster a faculty member's academic activities during the tenure-track process, as well as with their post-tenure achievements and career goals.

Primary Aims

- To foster collaboration between members when pertinent and advantageous.
- To support each other's goals and purpose in the areas of research, teaching, and service.
- Through commitment, engagement, and collaboration, to increase an individual's probability of success in each of these three areas.
- To strengthen the individual home units.

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Cluster Expectations

The expectations for core and joint cluster members are alike.

1. To engage and participate in Biionix Cluster meetings and activities. This includes the journal club, seminar series, and symposium (where we yearly discuss our mission statement, operational goals, and future plans).
2. To encourage and facilitate our post-docs, students, and team members to attend, engage, and participate in Cluster meetings and activities.
3. To include the Cluster (by name and/or logo) in our email signature and in all work-related correspondence, both internal and external to UCF.
4. To include your affiliation with the Cluster in all publications. It is expected that all core members will do this, while secondary joint members are expected to do this when the topic of the study falls within the scope of the Cluster.
5. To forward news (research/teaching/service) to the Cluster lead (for me) to share with the group and to forward for inclusion on ours, and the FCI's website. Where relevant news will also be shared with the FCI's communications team and UCF's marketing team.
6. To seek and secure multiple mentors to strengthen career guidance.
7. To report your Cluster successes within your portfolio, and to your Chair.

4th Biionix Symposium (May 15th, 2026)

25 Oral Presentations
Poster Session
Networking & Collaboration

Long-term Goals

- Establish translational teams with tech companies, universities, hospitals *etc. e.g.,* blast injuries, osteoarthritis, health and wellbeing, robotics *etc.*
- Continue with innovation and develop pipeline patent portfolio. Encourage and promote enterprise and commercialization.
- Develop innovative teaching programs based on integrating research and education.
- Recognized as a world leading group with demonstrated research impact in collaboration with internal and external partnerships.
- Develop societal, commercial, medical/personal impact research and teaching.

Members 2026

College Of Medicine:
Dr. Melanie Coathup (Lead)
Dr. Thomas Kean
Dr. Mehdi Razavi
Dr. Michelle Tall

Materials Science & Engineering:
Dr. Sudipta Seal
Dr. Needa Brown
Dr. Kaitlyn Crawford
Dr. Aleksandra Petelski-Kulik
Dr. Mohi Quadir

Mechanical and Aerospace Engineering:
Dr. Alain Kassab
Dr. Hwan Choi
Dr. Qiushi Fu
Dr. Helen Huang
Dr. Luigi Perotti
Dr. Wen Shen
Dr. Dazhong Wu

UCF Dept of Chemistry:
Dr. Xiaohu Xia

Limbitless Solutions:
Dr. Albert Manero
Dr. John Sparkman

Nicholson School of Communication and Media:
Dr. Peter Smith

AdventHealth Orlando:
Dr. Raj Sawh-Martinez

Nemours Children's Hospital Orlando:
Dr. Teerin Meckmongkol