

# **College of Engineering and Computer Science (CECS)**

L3Harris Engineering Center

## **Operational Excellence Funds Update**

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**October 22, 2022**



**UCF**

**College of Engineering  
and Computer Science**

UNIVERSITY OF CENTRAL FLORIDA



**UCF**

# *Investing in Academic Excellence*

- UCF Strategic Investment Program (SIP) \$30M
  - Jump Start Fund (non-recurring)
  - Academic Excellence Fund
    - Recurring & non-recurring
  - Student Success Fund (recurring)
- Match from Colleges required

- State of Florida Operational Excellence (OE) Funds \$20M
  - Recurring
- Research in line with the areas identified in the UCF's Strategic Plan, *Unleashing Potential*

# *SIP Funding: Jump Start (CECS participation)*

| Research Areas                           | Lead           | Central Funds |
|--|----------------|---------------|
| Cyber security and privacy               | Paul Gazillo   | \$100K        |
| MS in Cyber security and privacy         | David Mohaisen | \$140K        |
| Photolithography system                  | Reza Abdolvand | \$430K        |
| ALD for powder coating                   | Parag Banerjee | \$50K         |
| Nanomaterials for solar cell eff         | Kris Davis     | \$206K        |
| High speed flow facility for hypersonics | Kareem Ahmed   | \$500K        |
| Spray drying for nanomanufacturing       | Sudipta Seal   | \$105K        |

# *SIP Funding: Academic Excellence (CECS Participation)*

| Research Areas                        | College(s) & Lead(s)        | Central Funds |        |
|---------------------------------------|-----------------------------|---------------|--------|
|                                       |                             | R             | NR     |
| Artificial Intelligence               | CECS; Mubarak Shah          | \$1M          | \$3M   |
| Zero carbon energy                    | CECS; Jay Kapat & Zhihua Qu | \$1M          | \$5M   |
| Next generation Computing Hardware    | CREOL; Sasan Fathpour       | \$1M          | \$3.3M |
| Digital Twin                          | IST; Grace Bochenek         | \$1M          | \$2.5M |
| Infectious Diseases and Travel Health | Rosen; Robertico Croes      | \$1.5M        | \$3M   |
| Space Education and Industrialization | FSI; Julie Brisset          | \$1.5M        | \$3M   |

# *UCF Power Up*

## *Overall Purpose of the Plan for the State of Florida Operational Excellence Funds*

- State of Florida Operational Excellence (OE) Funds \$20M

- **Recurring**

- Research in line with the areas identified in the UCF's Strategic Plan, *Unleashing Potential*

- UCF's research enterprise and graduates are key drivers of Florida's high-tech economy.
- Build on existing faculty strengths and expertise
- Target emerging interdisciplinary solutions to common, multi-business sector regional and national needs.

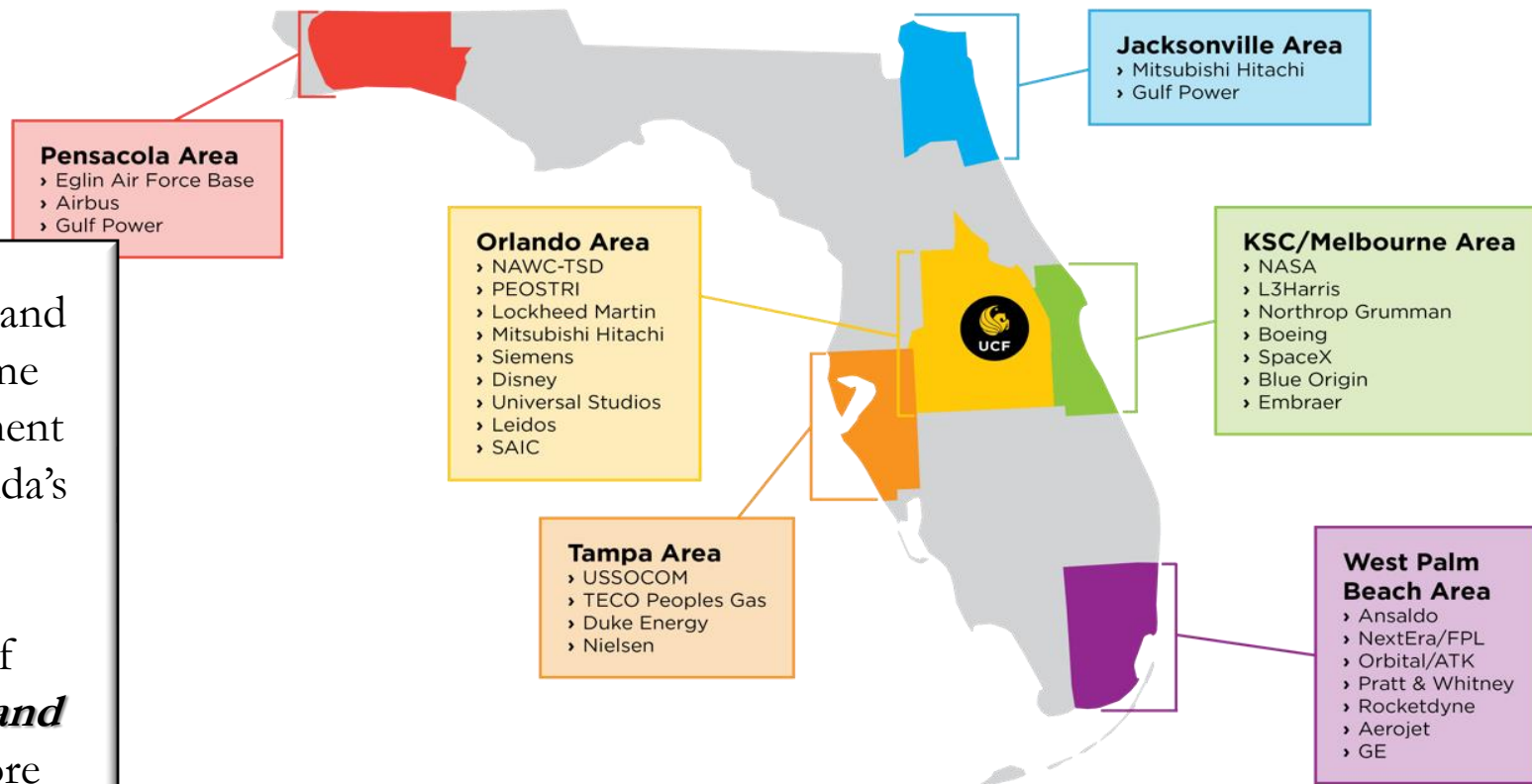
# *History of Legislative Requests from CECS*

- Applications to Legislature for 4 years in a row in various forms [e.g., LBR (University of Distinction), Operational Excellence]. The final attempt succeeded as Operational Excellence.
- Proposal Writers:
  - **Michael Georgiopoulos, Dean, CECS**
  - **Ranganathan Kumar, Assoc Dean, CECS**
  - **Paige Borden, Chief Analytics Officer, UCF**
  - **Janet Owen, VP, Govt & Community Relations**

*with input from several CECS faculty, Assoc Deans, Center directors and support from DAB members*

# Goal A: Enhance Research, Educational Excellence and Industry Partnerships

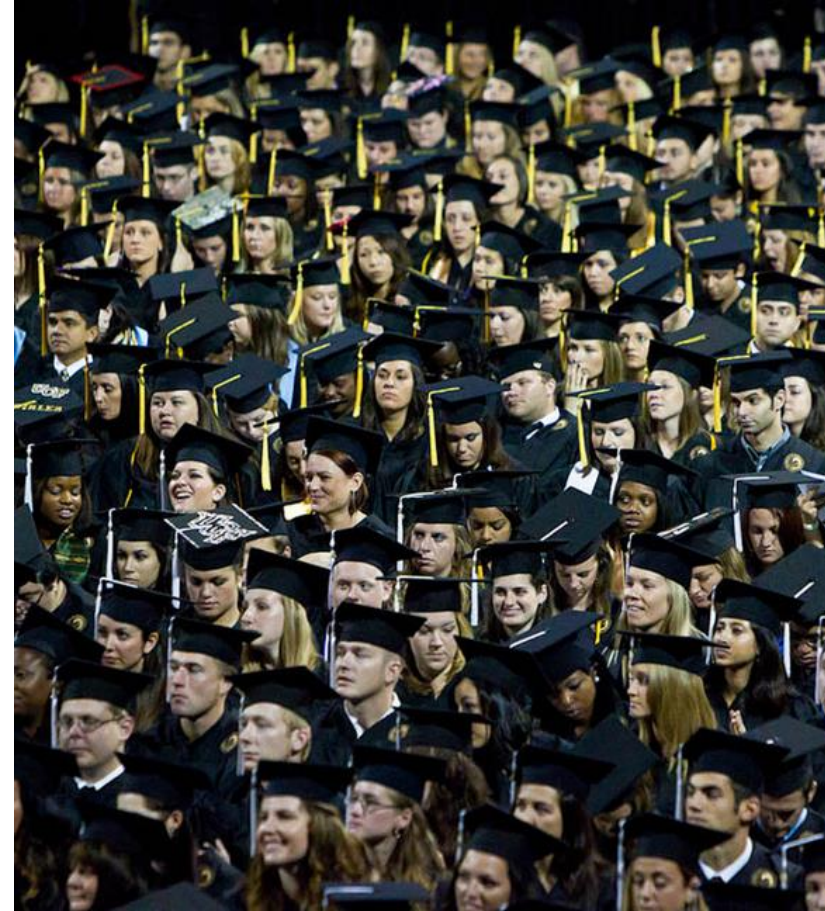
- Strengthening the university's partnerships in the areas that impact industries



UCF will enhance and expand existing strengths to become the research and development partner of choice for Florida's high-tech sector through strengthening UCF's partnerships in the areas of **aviation, space, energy and entertainment** that are core business foci of thriving industry sectors in Florida

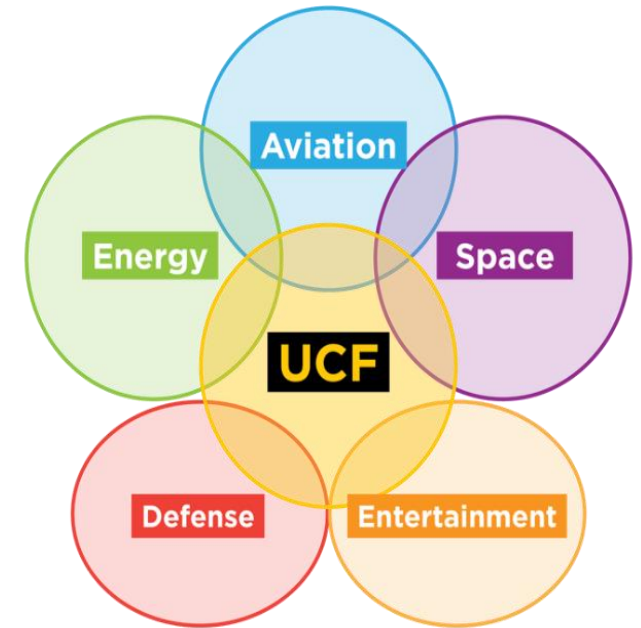
## *Goal B: Enhance Student Success*

- Industries require a greater number of skilled and creative talent to expand the workforce in the STEM sector
- UCF will increase the quantity, quality and diversity of engineers and computer scientists with experience in working collaboratively in teams and across disciplines.

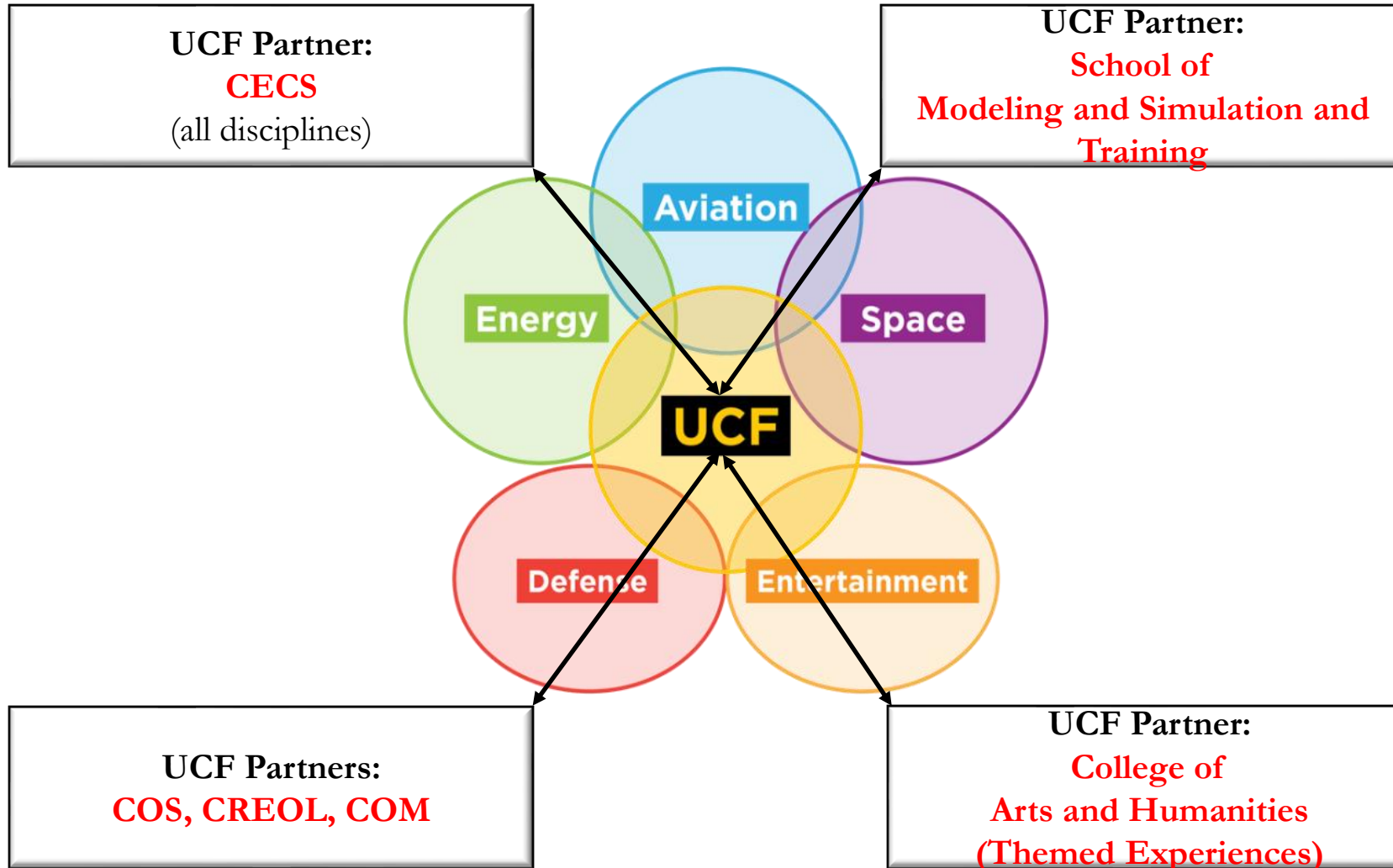


# *Florida's Core Businesses*

- A. Florida companies have core businesses in Aviation, Space, Defense, Energy and Entertainment
- B. Building upon university's research excellence in enabling technologies that drive technological advances.
- C. Faculty resources would be allocated to the all the enabling areas of focus (CECS, COS, CREOL, SMST, CAH):
- Semiconductors/Nanomaterials
  - Space Engineering and Sciences
  - Energy/Hypersonics
  - AI/ML, AR/VR
  - Cyber Security
  - Digital Twin/Modeling and Simulation
  - Themed Experiences

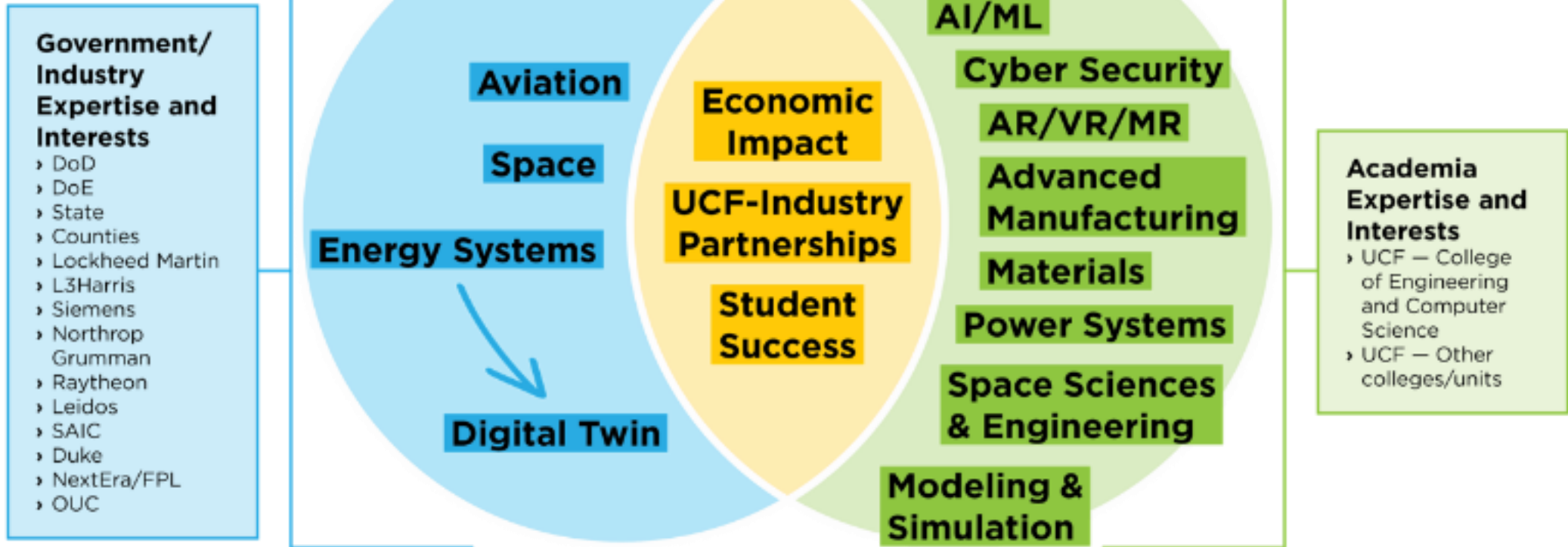


# *Cross-Cutting Business Sectors that UCF will Serve through this OE*



## Application Areas

## Enabling Technologies



# *UCF Partnership with FL Industry*

- UCF partners with 30+ core FL aviation, space and energy businesses
- More than *two-thirds* of UCF engineering grads are employed in FL
- 500+ UCF STEM students intern at LM annually
- About *a third* of KSC employees are UCF graduates
- \$6B Central Florida Modeling and Simulation and Training hub anchored by UCF

# ***CECS Notable Facts in Enabling Technologies***

- **Fact 1:** Aviation Week ranked UCF the *No.1 provider of workforce talent* for Aerospace and Defense (6 years in a row), *No. 2* in quality of graduates' technical skills
- **Fact 2:** Last three 3-year average research awards at **\$48M-\$50M**, reaching >\$320K/faculty
- **Fact 3:** 18 **NSF-CAREER** awards in last 3 years
- **Fact 4:** 9 publications per faculty CECS in FY22
- **Fact 5:** BS/MS/PhD graduations over 2500/450/130

- **Fact 6:** *CATER* faculty brought **more than \$750k research funding per faculty** in FY22
- **Fact 7:** The *RISES* center is in the top 3 in the nation (according to DOE EERE funding), with **\$18M** in research
- **Fact 8:** *Cyber faculty* received grants, in 2020-2021, exceeding **\$500k per faculty**
- **Fact 9:** *Transportation Engineering Science and Technology* area was *ranked No. 6 in the US* by ARWU
- **Fact 10:** *CRCV* is ranked *10<sup>th</sup> in computer vision nationwide*, according to [csrankings.org](http://csrankings.org)

# *CECS Graduate Program Ranking*

| <i>Program</i> | <i>All R</i> | <i>Public R</i> | <i>Florida R</i> |
|----------------|--------------|-----------------|------------------|
| Aerospace      | 55           | 36              | 3                |
| Civil          | 69           | 48              | 2                |
| Environmental  | 66           | 41              | 3                |
| Electrical     | 53           | 30              | 2                |
| Computer       | 50           | 29              | 2                |
| Industrial     | 36           | 26              | 2                |
| Materials      | 49           | 31              | 2                |
| Mechanical     | 75           | 45              | 2                |
| CS             | 69           | 40              | 2                |
| CECS           | 73           | 43              | 2                |

| <b>Tenure-track Faculty<br/>(OE Funds)</b>   |  | Total | CECS | Joint<br>CECS | COS | Joint<br>COS | COP | CAH | IST | Other |
|--|--|-------|------|---------------|-----|--------------|-----|-----|-----|-------|
| Semiconductor-related, nanomaterials; <b>Lead: Sasan Fathpoor, Reza Abdolvand</b>  |  | 13    | 6    | 2             | 2   | 1            | 2   |     |     |       |
| Space engineering & science, aerospace, hypersonics;<br><b>Leads: Jay Kapat, Kareem Ahmed</b>  |  | 9     | 5    | 1             | 2   | 1            |     |     |     |       |
| Energy; <b>Leads: Jay Kapat, Zhihua Qu</b>   |  | 10    | 6    | 1             | 2   | 1            |     |     |     |       |
| Artificial intelligence / machine learning;<br><b>Lead: Mubarak Shah</b>   |  | 12    | 6    | 3             | 1   |              |     |     |     | 2     |
| Optics & Photonics <b>Lead: David Hagan</b>  |  | 3     |      |               |     |              | 3   |     |     |       |
| Cybersecurity; <b>Lead: Yan Solihin</b>  |  | 5     | 4    |               |     |              |     |     |     | 1     |
| Digital Twin (manufacturing, automation, healthcare<br>sim, AR/VR/XR, M&S) & themed experience;<br><b>Leads: Grace Bochenek, Carolina Cruz Neira</b> |  | 10    | 4    | 2             |     |              |     | 2   | 2   |       |
| Inclusive Excellence to Support CECS, COS, COP   |  | 3     |      |               |     |              |     |     |     |       |
|  |  | 65    | 31   | 9             | 7   | 3            | 5   | 2   | 2   | 3     |

# *Return on Investment - Qualitative*

## **Student Success**

- Relevant experience
- Skills and competencies
- Networking opportunities
- Increased employability potential and competitive wages

## **CECS**

- Research funding
- Pre-Eminence metrics
- National Ranking
- Increased employability potential and competitive wages

## **Industry**

- Creates talent pipeline
- Sustained long-term partnership with UCF
- Top notch student employees
- Immediate project efforts/IRAD

# *Return on Investment - Quantitative*

|         | Metrics                  | Current   | 2025    |
|---------|--------------------------|-----------|---------|
| Faculty | #T/TE Faculty            | 160+      | 210-220 |
|         | External Research Awards | \$50M     | \$65M   |
|         | Large grants (>\$1M)     | 10        | 15      |
|         | Post-docs                | 45        | 60      |
|         | Publications per year    | 1400-1500 | 2000    |

|               |                         |          |          |
|---------------|-------------------------|----------|----------|
| Grad Students | #PhD/MS                 | 650/1350 | 850/1800 |
|               | PhD/MS graduations      | 130/450  | 170/650  |
|               | Graduate Public Ranking | 43       | Top 40   |

|             |                      |        |        |
|-------------|----------------------|--------|--------|
| UG Students | EXCEL Students       | 400    | 800    |
|             | First year retention | 93.20% | 93.50% |
|             | 4-year graduation    | 30%    | 37%    |
|             | 6-year graduation    | 68.40% | 72%    |
|             | UG Public Ranking    | 47     | Top 40 |

## *Other Research Initiatives*

- CECS Infrastructure Funds for Equipment and Software; \$1.4M
- University of Distinction proposal (\$28M recurring; in review)
  - LBR FY23: Unleashing Florida's Innovation Economy through UCF's STEM Talent Pipeline & Research Excellence

# *Some Ideas on stronger UCF-Industry collaboration*

- Closer collaboration with industry based on past partnership record – strategic partnerships –

## **Pegasus Partnerships**

- Research – federal and state grant opportunities, IR&D
- Internship, e.g., LM CWEP
- Professors of Practice, Courtesy Professors
- Faculty Fellows
- Annual forum in key research areas

**Thank You  
Questions?**

