

Artificial Intelligence Center (AIC)

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Center for Research in Computer Vision (CRCV)

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Motivation

- “AI is new electricity”, Andrew Ng, Stanford Professor
 - AI has a potential to impact our society as much as electricity has impacted our lives and livelihoods
- Directorate of Technology and Innovation at NSF, will focus on
 - Artificial intelligence and
 - Quantum science
- DoD Joint AI Center (JAIC),
 - Center of Excellence to provide a critical mass of expertise to help the Department harness the game-changing power of AI
- AI market size was valued at \$62.35 billion in 2020 and is expected to expand at a compound annual growth rate of 40.2% from 2021 to 2028
- Several Hi-tech companies are moving out of California, Florida has a chance to attract such companies by building strong AI Center

AI Center

- The center will serve as a unifying hub for commercialization, scholarship, and education in AI in the state of Florida.
- Faculty in the AI Center will conduct fundamental and applied research upon which future AI industries can be built upon.
- UCF is uniquely positioned among Florida universities to gain national prominence as a leading site for AI research by strategic investment.
- The center will bring together the expertise and resources needed to prepare Floridians for the momentous societal challenges and opportunities that AI will bring.
- The AI Center will provide the highest quality education and research experience in AI at all levels from K-12 to BS, MS, and Ph.D. levels

Building upon UCF Excellence and Strategic Investment

- Computer Vision
- Cyber Security

Center for Research in Computer Vision (CRCV)

- Computer Vision at UCF has been [ranked No. 10 nationally](#) by CSRankings.org between 2010-2020
 - while UF is ranked 48; FIU is ranked 82; USF is ranked 89; FSU is ranked 99.
- CRCV received [\\$5.9M](#) in research funding by 4 CRCV faculty and 42 Ph.D. students
- New Funding:
 - \$475K from Accenture Federal Systems (AFS)
 - \$2.8 million from IARPA for **BRIAR** program FAS
 - \$1.4 Million from ARL
- Dr. Shah and PhD graduate win ACM SIGMM **Test of Time Honorable Mention Award** for their paper
- CRCV researchers win ICPR **2020 Best Scientific Paper Award**
- Dr. Shah recognized as the **Most Influential Scholar Award Honorable Mention** for his outstanding and vibrant contributions to the field of Computer Vision between 2010 and 2020
- Five papers accepted in **European Conference on Computer Vision (ECCV) 2020**
- Six papers in **International Conference on Computer Vision (ICCV) 2021**
- Six papers accepted to **Computer Vision and Pattern Recognition [CVPR](#)** which is the 4th ranked top publication venue following Nature, New England Journal of Medicine, Science, CVPR, among all Sciences according to h-5 Index
- **MS in Computer Vision** (UCF is first public University to offer)
- Enrollment in CAP5415 Computer Vision has [doubled](#): **2019: 62; 2020:55; 2021:97**

Cyber Security & Privacy Faculty Cluster

- AI systems shown to be vulnerable to security attacks and prone to failure
- Active research areas in
 - Dependable and self-healing AI (funding: NSF, publication: DSN'21)
 - Adversarial machine learning (funding: NRF)
 - Post Moore's Law AI platform (funding: NSF and ONR, publication: ISCA, ASPLOS, MICRO, HPCA)
 - Privacy preserving system for AI (funding: NSF (x2) CNS \$1+MM, CCF 500K, publication: Security)
 - Serverless computing model for AI (funding: NSF PPOSS, publication: in preparation)
 - Block chain and AI (funding: NRF, publication: TDSC, CCS)
 - IoT security and AI (funding: NSF (x2) SaTC and SFS)
- Raised \$13M of external funding in three years (\$5M last year alone), \$1.2M expenditure last year, including 9 NSF grants (3 ranked HC)
- Funded by NSF, ONR, NRF, Intel, Samsung, Toshiba, Sophos
- H-index 177 (increase of 38%), citations 30,000+ (increase of 30%) in the last 3 years
- Published majority of papers at top-ranked CS conferences
- Two NSF CAREER awardees, HPCA Hall of Fame, ISCA Hall of Fame
- Record of graduating PhD students employed in academia
 - Tenure Earning/Tenured: Northeastern, NCSU, Binghamton, Wayne State, Loyola, and KKU
 - Postdoc: GATech and TAMU
- Alumni working in the industry: Facebook, Google, Apple, PayPal, Intel, IBM, AMD, etc.
- Started MS in Cyber Security & Privacy (Fall 2021), funded partially by \$2.9MM NSF SFS program

Partnership with Industry

- Last three years

- DRS \$635k (CRCV)
- ELBIT \$200K(CRCV)
- Lockheed \$550K (CRCV)
- QinetiQ \$350k (CRCV)
- GTS \$100K(CRCV)

- Intel (\$225K) (Cyber Security)
- Samsung (\$150K) (Cyber Security)
- Tekelec (\$50K) (Cyber Security)
- IBM (\$40K) (Cyber Security)
- Sophos (\$25K) (Cyber Security)
- nVidia (\$30K) (Cyber Security)

- Joint Publications with

- IBM
- Adobe
- Siemens
- Intel
- AMD
- HP Enterprise
- RedHat Linux

AI Center

- The Center will hire 30 new faculty, who will be tenured in departments across different colleges.
- AI Center will be led by AI Center Director
 - Assisted by Office Manager and Grant Specialist and accountant
 - Advised by Executive Committee consisting of
 - Department Chairs of all participating departments from Different Colleges
 - Representatives from CGS, OR, all Colleges
 - Representatives from industry

Interdisciplinary Nature of AI Center will benefit more than one part of the university

- **Core Areas (CS and ECE):** The core areas span the central domains of AI: Computer Vision, Natural Language Processing, Robotics, Speech Recognition, Cyber Security
- **Theory of Deep Learning (Mathematics):** CRCV has long term with collaborating with Professor Xin Li and others
- **Data Science (Statistics & Data Science):** CRCV is collaborating with Professor Mitchell Hill
- **Efficient and Innovative AI Computing (ECE and MSE, CREOL):** Computational acceleration of the deep learning revolution. CRCV is collaborating with Profs Mingjie Li, T. Roy, G. Li
- **Justice Equity Diversity and Inclusion in Health AI (College of Medicine)** Dexter Hadley is building a community of patients, physicians, and data scientists to develop AI into the COM
- **AI for Future Cities (CEE):** To improve public and road safety, traffic flow, and mobility by monitoring public spaces. CRCV is interacting with Professor Aty of CEE
- **AI in Optics and Photonics (CREOL)** CRCV is collaborating with Professor Renshaw on Computer Vision based navigation of combat vehicles
- **AI for Renewable Energy (MSE):** CRCV is collaborating with Professor Kris Davis
- **AI for Restoring Florida Wildlife (Biology Department)** CRCV is collaborating with Biology Professor Dr. Daniel Smith on the conservation of the endangered Florida panther
- **AI for Cultural Heritage (Anthropology Department):** CRCV has collaborated with Professor Scott Branting on Automated detection of looting pits, fallen columns, building damage, fortification, and construction from satellite imagery
- **Brain-Augmented AI (Psychology Department):** Unlike humans, AI lacks the ability to adapt and improve over time. CRCV is collaborating with Professor Schmid of Psychology department on this project.

Supported by Seven Colleges

CECS

COS

COB

COM

CREOL

CGS

Rosen

Participants

- Mubarak Shah, CRCV
- Abhijit Mahalanobis, CRCV
- Chen Chen, CRCV
- Yogesh Rawat, CRCV
- Yan Solihin, CRCV
- Niels da Vitoria Lobo, Computer Science
- Gita Sukthankar, Computer Science
- Fei Liu, Computer Science
- Lotzi Boloni, Computer Science
- David Mohaisen, Computer Science
- Yanjie Fu, Computer Science
- Mohamad Aty, Civil Engineering
- Xin Li, Mathematics, COS
- Brian Moore, Mathematics, COS
- Dexter Hadley, College of Medicine
- Mitchel Hill, Statistics
- Kris Davis, Material Science and Engineering
- Scott Branting, Anthropology
- Daniel Smith, Biology
- Joseph Schmidt, Psychology
- Ray Surette, Criminal Justice
- Kyle Renshaw, CREOL
- Guifang Lee, CREOL
- Martin Richardson, CREOL

- Sean Pang, CREOL
- Greg Welch, College of Nursing
- Mingjie Liu, Electrical Engineering
- Ivan Garibay, Industrial Engineering
- Steve Fiore, Philosophy/IST
- George Atia, Electrical Engineering
- Michael Georgiopoulos, Electrical Engineering, CECS
- Nazanin Rahnvard, Electrical Engineering
- Ying Ma, Electrical & Computer Engineering
- Mingjie Lin, Computer Engineering
- Yuxiao Yang, Electrical Engineering
- Fan Yao, Electrical Engineering
- Zhishan Guo, Electrical Engineering
- Chinwendu Enyioha, Electrical Engineering
- Azadeh Vosoughi, Electrical Engineering
- Yaser Fallah, Electrical Engineering
- Zhihua Qu, Electrical Engineering
- Aman Behal, Electrical Engineering
- Wasfy Mikhael, Electrical Engineering
- Murat Yuksel, Computer Engineering
- Paul Jarley, College of Business

Workforce Development: BS, MS, Ph.D.

MS in Computer Vision (starting in Fall 2021)

MS in Cyber Security (starting in Fall 2021)

MS in Data Analytics (current)

Ph. D. in Data Analytics (current)

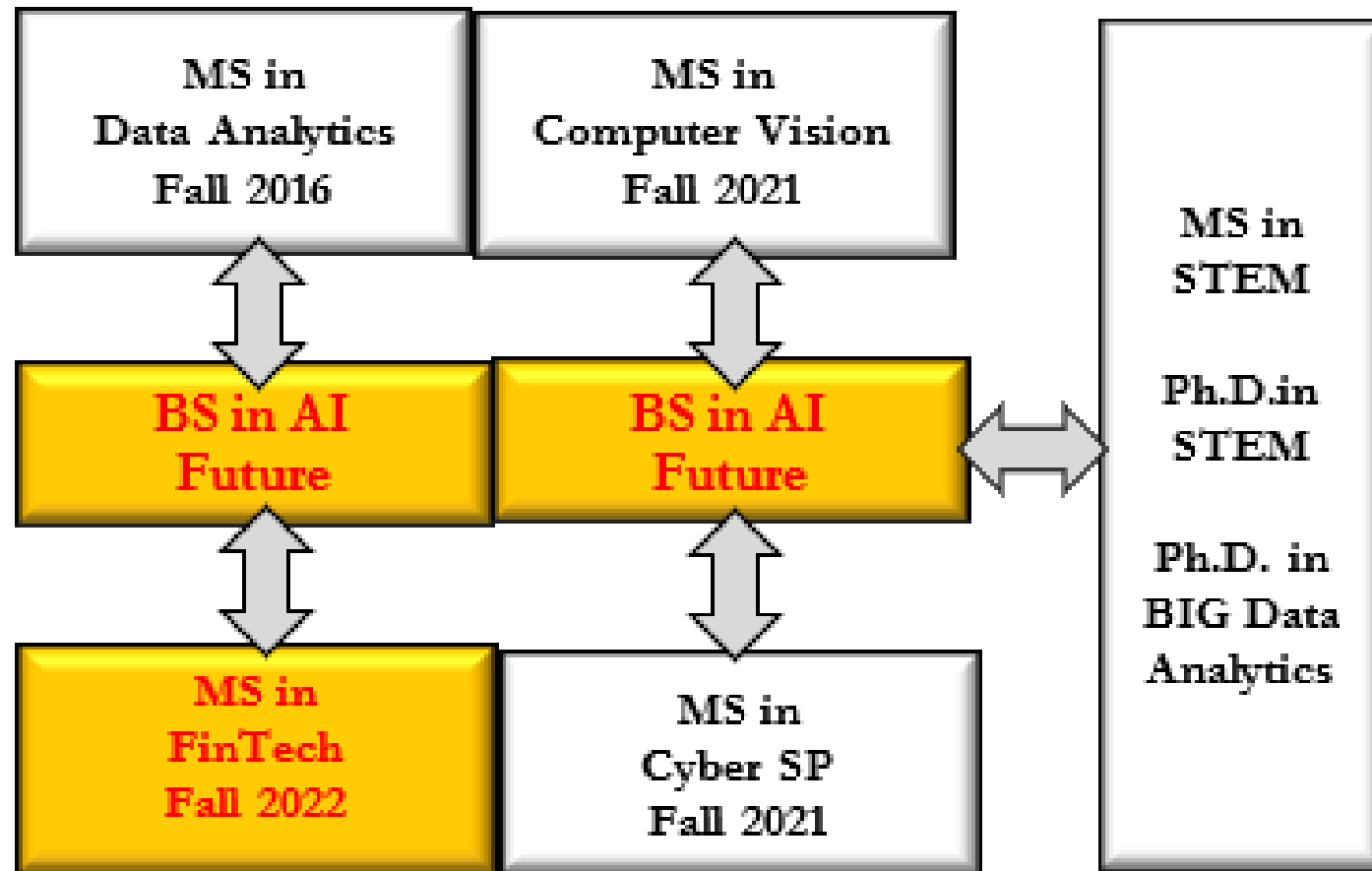
MS in Fintech (Fall 2022)

Ph.D. in Computer Vision, NLP, Machine Learning

BS In AI

AI+X

Workforce Development



Workforce Development: Training

34 Years of NSF Research Experience (REU) in Computer Vision

NSF Research Experience for Teachers (RET)

STRONG: STEM TRansfers' Opportunities for Nurtured Growth NSF

ARO High School Apprenticeship Program (HSAP)

Research & Engineering Apprenticeship Program (REAP)

SFS (we have in Cyber, can add SFS in AI)

REU; RET, High School students in Robotics, NLP, Cyber

Budget

Request From SIP:

- Recurring(**\$2,840,400**): 15 Faculty and two Staff;
- Non-Recurring(**\$4,750,000**):
 - Startups, 10 Post Docs,
 - 20 GRAs,
 - Undergraduate, High School Students and Teacher Research Experience, and
 - Faculty, GRA and Postdoc recruiting

Matching Commitment:

- Recuring (**\$2,084,230**) + Startup (**\$1,555,500**)
 - CECS: 5 faculty lines at \$568K;
 - COS 2.25 faculty lines at \$218K and \$140K startup;
 - COM: 1 faculty line at \$200K;
 - CREOL: 1 faculty line at \$150K and \$500K startup;
 - COB: 1 faculty lines at \$200K and \$50K startup;
 - FCI: 2 faculty lines at \$175K and \$615.5K startup;
 - Rosen: 1 faculty line at \$80K;
- Non-Recurring (**\$1,815,000**)
 - CGS 10 post docs for two years at \$550K;
 - CRCV: \$300K;
 - CECS: \$500K for Equipment;
 - FCI: \$100K;
 - COS: \$100K;
 - CEE: \$150K.

Expected impact and return on investment

- Significantly boost the [rankings](#)
- Provide the highest quality education and research experience in AI
 - MS and Ph.D. degrees in Robotics, NLP and ML, and B.S. in AI
- Create a critical mass of AI faculty needed for large proposals
- Attract AI giants to establish their new headquarters in central Florida creating numerous high paying jobs and opportunities
- Address some of the society's greatest challenges: climate change, safe and secured transportation, affordable health care, restoring Wildlife, justice-equity-diversity-inclusion
- Facilitate creation of AI startups and contribute towards making I-4 Hitech corridor next Silicon Valley.

This is BIG!

- 30 faculty lines and over \$4 million in non-recurring funds.
- Aim is to **scale** up the current **excellence** in Computer Vision and to other areas of AI:
 - Robotics
 - Natural Language Processing
 - Speech Recognition
 - Foundational areas of AI
- **Impact = Excellence x Scale**
- To have the highest possible **impact** on students, community, and Science.

Thank You

UCF CS Ranking csrankings.org

