RESEARCH CHALLENGE GRANTS FY'20 SUMMARY REPORTS:

1) Advancement of Science and Engineering for Localized Gas Utilization (WVU & MU)
2) Foundation of the Vaccine Development Center at WVU (WVU)
3) Center for Cognitive Computing (C3): A Multidisciplinary Research Center for Excellence (WVU).

Compiled by WV Science & Research, Higher Education Policy Commission

Project Title: Advancement of Science and Engineering for Localized Gas Utilization

a) For a lay reader explain what is the most important outcome of the project since the award started and why it is important (why anyone would care)

HEPC RCG grant supports 7 WVU faculty and one Marshall University Faculty.

Since 2014, through a series of cluster hires, WVU created a Center for Innovation in Gas Research and Utilization (CIGRU) to promote gas utilization science, engineering, law, policy, economic development, and community development. CIGRU involves 8 faculty from across five Colleges at WVU. Then, in January of 2018, we were awarded five years of funding under a Research Challenge Grant (RCG) from the West Virginia Higher Education Policy Commission (HEPC). The RCG grant allows multidisciplinary faculty working together to commercialize shale gas technology by providing science & engineering solution, legal & regulatory guidance, environmental and finance consultation. When industrial companies consider to invest in WV State on shale gas, they will have an entire package of solution (one-stop shopping). For shale gas utilization, funding from federal agencies such as DOE or NSF, are granted to project having very specific topics. It is unusual to find funding opportunity to support a project where multidisciplinary approach is involved. RCG grant enables such a collaboration among multidisciplinar faculty to solve shale gas utilization issues in a more broadways to create strong impact. RCG grant enables S&E faculty to win federal grants, and some CIGRU faculty who are traditionally not used to compete at national level but now won the federal grants. Professor Jesse Richardson from WVU College of Law, won an EPA grant this year. Professor Rosalynn Quinones-Fernandez from Chemistry Department of Marshall University Won NSF MRI and NASA grants.

b) Please provide a list of all publications since the award started that leveraged the resources provided by the award

Leveraging the resources from RCG, Faculty from WVU and Marshall University published 139 peer-reviewed journal articles and made 146 presentations at national and international conferences. Among these publications, **HEPC is acknowledged on 54 papers as a funding agency.** A details of these publications are listed in 2018 and 2019 annual reports, and three 2020 quarterly reports submitted to HEPC.

Year	Peer Reviewed Journal Articles	Conference Presentations
2018	36	44
2019	52	65
2020	51	37

c) Please provide a list of all BS, MS and PHD students who were supported by the award and indicate if they have graduated and where they are now if they have left WVU

Name	BS/MS/PhD	Major	University	Status
Ashley Caiola	PhD	ChE	WVU	Current Student
Brandon Robinson	PhD	ChE	WVU	Current Student
Christopher Ulishney	PhD	ME	WVU	Current Student
Jinlong Liu	PhD	ME	WVU	Graduated
Abdulafeez Adebiyi	PhD	ME	WVU	Graduated
Olatunde Abidakun	PhD	ME	WVU	Graduated
Furkan Kodakoglu	PhD	ME	WVU	Graduated
Lateef Kareem	PhD	ME	WVU	Current Student
Samuel Ogunfuye	PhD	ME	WVU	Current Student
Amanda Demmerle	JD	Law	WVU	Graduated
Erin O'Brien	JD	Law	WVU	Current Student
Iolanda Stocchi	MS	ME	WVU	Graduated

Lorenzo Gasbarro	MS	ME	WVU	Graduated
Luca Ambrogi	MS	ME	WVU	Graduated
Mohammed Alkhabbaz	MS	ME	WVU	Graduated
Sunita Pokharel	MS	ME	WVU	Graduated
Amanda Cathreno	BS	ME	WVU	Graduated
Elizabeth Ridgeway	BS	ME	WVU	Graduated
Brian Leonard	BS	ChE	WVU	Graduated
Deben Shoup	MS	Chemistry	Marshal University	Graduated
Sarah Nickel	BS	Chemistry	Marshal University	Current Student
Sara Moreno	BS	Chemistry	Marshal University	Current Student
Lena Salameh	BS	Chemistry	Marshal University	Current Student
Grayce Behnke	BS	Chemistry	Marshal University	Current Student
Keerigan Parks	BS	Chemistry	Marshal University	Current Student

d) Please provide a list of all postdocs supported by the award and their current status or location.

Name	Postdoc	Major	University	Status
Yuxin Wang	Postdoc	ChE	WVU	Current
Qingyuan Li	Postdoc	ChE	WVU	Left WVU
Jinlong Liu	Postdoc	ME	WVU	Current

e) Please provide a list of all proposals submitted and their status (rejected, funded, under review) that leveraged resources from the RCG award.

Total Number of proposal submitted by 8 faculty

Year	Number of Proposals Submitted	Number of Proposal Funded/funding amount$
2018	25	9/$1.27 Million
2019	31	13/$5.5 million
2020	17	13/$5.1 million

Currently Funded and Pending Proposals Directly Related to Shale Gas Utilization or RCG

Name of PI/Co-PI	Proposal Title	Funding Agency	Funding Amount	Status
John Hu	Natural gas catalytic pyrolysis to carbon nano materials	DOE NETL	$ 3million	Funded
John Hu	Microwave catalysis for natural gas conversion	DOE EERE	$ 2.25million	Funded
Jesse Richardson	Study on State's Policies and Regulations per CO2-EOR-Storage, Conventional, ROZ and EOR in Shale: Infrastructure, Incentives, Royalty Owners, Eminent Domain, Mineral-Pore Space, and Storage Lease Issues	USEA/DOE	$ 307,000	Funded
Rosalynn Quinones-Fernandez	NASA WVSGC Undergraduate Research Fellowship-Sara Moreno	NASA	$15,000	Funded
John Hu	Microwave Catalysis for Dehydroaromatization of Light Hydrocarbons with CO_2	DOE	$2.1 million	Pending
Cosmin Dumitrescu	Coal-Derived Syngas Cleanup Using an Integrated Novel	DOE	$1.25 million	Pending

	Desulfurizer for Fueling Solid Oxide Fuel Cells			
Akkerman (Co-PI)	Development of Critical Components for the Modular Staged Pressurized Oxy-Combustion Power Plant	DOE	$322,000	Pending

f) Please provide a highlight (a student who was awarded a prize, a grant awarded or a paper accepted that reflects a highlight of your activities)

Brian Leonard, WVU undergraduate student, won First Prize in undergraduate student competition at 2019 AIChE Annual Meeting, Orlando, Florida. Brian also co-authored two journal papers currently under revision (ACS Catalysis, Applied Catalysis B).

VACCINE DEVELOPMENT CENTER

WVU VACCINE DEVELOPMENT CENTER REPORT 2018-AUG 2020

Prepared by: Director, Vaccine Development Center, F.Heath Damron
and Assistant Director, Justin Bevere

1. Most important Outcomes of the Vaccine Development Center:

The Vaccine Development Center (VDC) is supported by a Research Challenge Grant from WV HEPC. The VDC at the West Virginia University Health Sciences Center has 3 main goals: 1) stimulate vaccine research, 2) enhance partnerships with industry, and 3) provide STEM education / biomedical research training. The center has acquired $11.5M in extramural support to date from private and federal sources of funding. The VDC has funded seven faculty lead projects over the past three years which has allowed those labs to become competitive for extramural support. Furthermore, the support has facilitated numerous publications in high tier journals and illuminated the research that is occurring at WVU. In order to facilitate translating pre-clinical research to humans, the VDC partners with vaccine industry companies and there are currently four VDC-industry partnership projects in progress at this time. These partnerships offer the opportunities to access the required substantial resources that are needed to develop vaccines to protect humans from deadly diseases. Dr. Damron and VDC supported staff and students enhance STEM education through the administration of a senior undergraduate and PhD student level course in Vaccinology that has currently taught 55 students since 2018. The VDC has supported 8 graduate student projects directly and 5 projects indirectly through support of their mentors. A previously VDC-funded graduate student completed his degree and is now a postdoctoral research fellow at a major vaccine research institute in Oregon. There are three VDC- funded PhD candidates that expect to graduate within the year.

The COVID-19 pandemic has impacted the entire world and the VDC has been involved in the WVU COVID-19 response since March 2020. Dr. Damron joined the WVU-HSC Task Force, that is led by Dr. Laura Gibson, with the goal to develop serological assays to determine antibody responses in COVID-19 patients treated at WVU Medicine. A collaboration was formed with the Department of Pathology where 500 human specimens were studied from 80 patients. The temporal production of antibodies was characterized and a novel biomarker of severe infection was identified along with critical observations regarding the ratios of antibody to surface antigens or internal proteins of SARS-CoV-2. The Medrxiv manuscript is listed below and is currently under peer review at a high impact journal. The antibody assays developed are soon to be used to study serological responses of people who work at Montgomery General Hospital in Fayette County, WV. This field study will be performed in collaboration with WVCTSI to illuminate the duration of antibody responses and paint a picture of exposure to SARS-CoV-2 in a rural WV population. The assays developed will soon be submitted for FDA approval. Furthermore, major investment in automation equipment through the establishment of the WV Rapid Response Development Laboratory have allowed for enhance testing capacity. The antibody assays developed by the VDC also initiated COVID-19 vaccine development studies at WVU. Dr. Damron currently has a patent application on vaccine formulations for children that would protect against pertussis and COVID-19 simultaneously. These vaccines are being studied in animals and industry partnerships are being sought to push the formulations forward into clinical development. In addition to the outcomes directly defined in the mission statement, the VDC has been directly involved in the response to COVID-19 and will continue to develop vaccines, assays, push WV economic development, train talent, and make an impact.

2. List of Publications Since the Award Started (bold = Member of VDC):

COVID-19

- **A. Horspool**, T. Kieffer, **B. P. Russ**, **M. A. DeJong**, **M. A. Wolf**, J. M. Karakiozis, B. J. Hickey, P. Fagone, D. H. Tacker, **J. R. Bevere**, I. Martinez, **M. Barbier**, P. L. Perrotta, **F. Heath Damron.** Interplay of antibody and cytokine production reveals CXCL-13 as a potential novel biomarker of lethal SARS-CoV-2 infection. https://www.medrxiv.org/content/10.1101/2020.08.24.20180877v1

Damron Lab

- **M. Barbier**, **D.T. Boehm**, **E. Sen-Kilic**, C. Bonnin, T. Pinheiro, C. Hoffman, M. Gray, E. Hewlett, **F.H. Damron** Modulation of pertussis and adenylate cyclase toxins by sigma factor RpoE in *Bordetella pertussis*. Infection and Immunity, 2017 vol: 85 (1) pp: IAI.00565-16. PMCID: PMC5203664
- **D.T. Boehm**, **J.M. Hall**, **T.Y. Wong**, A.DiVenere, **E. Sen-Kilic**, **J. R. Bevere**, **S. D. Bradford**, **C.B.Blackwood**, C. Elkins, K. A. DeRoos, M.C. Gray, **C. G. Cooper**, **M.E. Varney**, J. A. Maynard, E. L. Hewlett, **M. Barbier**, and **F.H. Damron**. Evaluation of adenylate cyclase toxoid antigen in acellular pertussis vaccines using a *Bordetella pertussis* challenge model in mice. Infection and Immunity. 2018 Sep 21;86(10). pii: e00857-17. doi: 10.1128/IAI.00857-17. Print 2018 Oct. PCMID: PMC5218874
- **D. T. Boehm**, **M. E. Varney, T. Y. Wong, E. S. Nowak, E. Sen-Kilic, J. M. Hall, S. D. Bradford, K. A. Begley, J. U. Bevere, M. S. Epperly**, J. A. Maynard, E. L. Hewlett, **M. Barbier, F. H. Damron**. Characterizing the innate and adaptive responses of immunized mice to *Bordetella pertussis* infection using in vivo imaging and transcriptomic analysis. https://www.biorxiv.org/content/10.1101/674408v2
- **M.E. Varney**, **D.T. Boehm**, K. DeRoos, E.S. Nowak, **T.Y. Wong**, **E. Sen-Kilic**, **S.D. Bradford**, C. Elkins, M.S. Epperly, **W.T. Witt**, **M. A. Barbier** and **F. H. Damron.** *Bordetella pertussis* Whole Cell Immunization, Unlike Acellular Immunization, Mimics Naïve Infection by Driving Hematopoietic Stem and Progenitor Cell Expansion in Mice Frontiers in Immunology 2018 vol: 9 pp:2376 PMCID: PMC6200895
- **T.Y. Wong, J.M. Hall, E. S. Nowak, D. T. Boehm,** L. A. Gonyar, E. L. Hewlett, J. C. Eby, **M. Barbier, and F. H. Damron.** Analysis of the *in vivo* transcriptome of *Bordetella pertussis* during infection of mice. mSphere. 2019 Apr 17;4(2). pii: e00154-19. doi: 10.1128/mSphereDirect.00154-19. PMID: 30996109
- **D. T. Boehm**, **M. A. Wolf**, **J. M. Hall**, **T. Y. Wong**, **E. Sen-Kilic**, H. D. Basinger, S.A. Dziadowicz, M. P. Gutierrez, C. **B. Blackwood**, **S. D. Bradford**, K. A. Begley, W. T. Witt, **M. E. Varney**, **M. Barbier** and **F. H. Damron**. Intranasal acellular pertussis vaccine provides mucosal immunity and protects mice from *Bordetella pertussis* Nature Vaccines. *npj Vaccines* volume 4, Article number: 40 (2019)
- **F. H. Damron**, M. Barbier, P. Dubey, K. M. Edwards, X. Gu, N. P. Klein, K. Lu, K. H. G. Mills, M. F. Pasetti, R. C. Read, P. Rohani, P. Sebo and E. T. Harvill, Overcoming Waning Immunity in Pertussis Vaccines: Workshop of the National Institute of Allergy and Infectious Diseases Journal of Immunology PMID: 32769142
- C. Locht, N.H Carbonetti, J. D Cherry, **F H. Damron**, K. M Edwards, R.Fernandez, E.T Harvill, D. Hozbor, K. H G Mills, M. E. Rodriguez, F. Mascart, Highlights of the 12th International Bordetella Symposium, Clinical Infectious Diseases, PMID: 32463883

Barbier Lab

- M.C. Gestal, L.K. Howard, K. Dewan, H.M. Johnson, **M. Barbier**, C. Bryant, I.H. Soumana, I. Riviera, B. Linz, U. Mas-Blanchado, E.T. Harvill. Enhancement of immune response against *Bordetella* spp. by disrupting immunomodulation. Nature Scientific Reports 2019 Dec 30;9(1):20261. DOI: 10.1038/s41598-019-56652-z.
- **E. Sen-Kilic**, **C. Blackwood**, **D.T. Boehm**, **W.T. Witt**, **A.C. Malkowski**, **J. Bevere**, **T.Y. Wong**, **S.D. Bradford**, **J.M. Hall**, **M.E. Varney**, **F.H. Damron**, and **M. Barbier**. Intranasal peptide-based FpvA-KLH conjugate vaccine protects mice from *Pseudomonas aeruginosa* acute murine pneumonia. Frontiers in Immunology 2019. 10:2497; DOI: 10.3389/fimmu.2019.02497.
- **Sen-Kilic E**, **Blackwood CB**, **Horspool AM**, **Huckaby AB**, **Weaver K**, **Malkowski A**, **Witt WT**, **Bevere JR**, Winters MT, **Damron FH**, **Barbier M**. Identifying mechanistic correlates of protection against Pseudomonas aeruginosa in an acute lung pneumonia model. The Journal of Immunology. 2020 May, 204, 1 Supplement, 168.8

- **C.B. Blackwood**, **E. Sen-Kilic**, **K.Y. Weaver**, **D.T. Boehm**, **J.M. Hall**, **T. Wong**, **A. Malkowski**, **W. T. Witt**, **F.H. Damron**, **M. Barbier**. Two for one: Identification of *P. aeruginosa* and *B. pertussis* Cross-species Antigens. The Journal of Immunology. 2020 May, 204, 1 Supplement, 168.7

Robinson Lab

- Gleave Parson M, Grimmett J, Vance JK, Witt MR, Seman BG, Rawson TW, Lyda L, Labuda C, Jung JY, **Bradford SD**, **Robinson CM**. Murine myeloid-derived suppressor cells are a source of elevated levels of interleukin-27 in early life and compromise control of bacterial infection. Immunol Cell Biol. 2019; 97:445-456. PMCID: PMC6536317
- Seman BG, Vance JK, Rawson TW, Witt MR, **Huckaby AB**, Povroznik JM, **Bradford SD**, **Barbier M**, **Robinson CM**. Elevated levels of interleukin-27 in early life compromise protective immunity in a mouse model of gram-negative neonatal sepsis. Infect. Immun. 2020 20;88(3) pii: e00828-19. doi: 10.1128/IAI.00828-19. PMID: 31818960
- M Povroznik J, **Robinson CM**. IL-27 regulation of innate immunity and control of microbial growth. Future Sci OA. 2020 Jun 17; 6(7):FSO588. doi: 10.2144/fsoa-2020-0032. PMID: 32802395.
- Seman BG, Povroznik JM, Vance JK, Rawson TW, **Robinson CM**. A Neonatal Imaging Model of Gram-Negative Bacterial Sepsis. J Vis. Exp. 2020; 162:e61609. doi: 10.3791/61609.
- Seman BG, Vance JK, **Robinson CM**. Neonatal low-density granulocytes suppress bacterial clearance by monocytes in an extracellular DNA-dependent manner. J Cell Science. *In review*.

Lukomski Lab

- **Megan E Grund**, **Soo J Choi**, Dudley H McNitt, **Mariette Barbier**, Gangqing Hu, Paul R LaSala, Christopher K. Cote, Rita Berisio, and **Slawomir Lukomski**. 2020. Burkholderia collagen-like protein 8, Bucl8, is a unique outer membrane component of a tetrapartite efflux pump in *Burkholderia pseudomallei* and *Burkholderia mallei*. PLoS Neglected Tropical Diseases. In Review.
- **Megan E Grund**, Rita Berisio, and **Slawomir Lukomski**. 2020. Outer-membrane proteins as vaccine candidates against *Burkholderia pseudomallei* select agent. Cells. In Preparation. /invited for a special issue: Molecular Immunology in Bacterial Vaccine Discovery.

3. List of BS, PHD Students, and Post-Doctoral Fellows Supported by the RCP Award:

1. **Undergraduate students:**
   a. Emily Airing – undergraduate student – Mariette Barbier laboratory
   b. Annalisa Huckaby – undergraduate student – Mariette Barbier laboratory
2. **Graduate students:**
   a. Shelby Bradford – 4th year graduate student – Cory Robinson laboratory
   b. Emel Sen-Kilic – 5th year graduate student – Mariette Barbier laboratory
   c. Catherine Blackwood – 4th year graduate student – Mariette Barbier laboratory
   d. Jesse Hall – 4th year graduate student – Heath Damron laboratory
   e. Ting Wong – 4th year graduate student – Heath Damron laboratory
   f. Brynnan Russ – 5th year graduate student – Scott Bowdridge laboratory – will be hired as a post-doctoral fellow in Heath Damron's laboratory Dec 2020
   g. Megan Grund – 3rd year graduate student – Slawomir Lukomski laboratory
   h. Jessica Towey – 3rd year graduate student – Timothy Driscoll laboratory
   i. Dylan Boehm – PhD graduate of 2019 – currently a Post-Doctoral Fellow at Oregon Health and Sciences University, Vaccine and Gene Therapy Institute

3. **Post-Doctoral fellows:**
   a. Dr. Allison Wolf – PI Damron, supported *Bordetella pertussis* vaccine project
   b. Dr. Alexander Horspool – PI Barbier, supported *Pseudomonas aeruginosa* vaccine project
   c. Dr. Melinda Varney – PI Damron, supported *Bordetella pertussis* vaccine project – Currently Assistant Professor in the Department of Pharmaceutical Science and Research at Marshall University, WV.

4. Grants, Contracts, and Sponsored Research, that Leveraged Resources from the RCG:

The members of the Vaccine Development Center are highly active in seeking extramural support from numerous agencies. Since the VDC was formed researchers have applied for funding from the National Institutes of Health, Center for Disease Control, Department of Defense, Cystic Fibrosis Foundation, etc. The Assistant Director of the VDC is actively seeking extramural support from industry partners through sponsored research. Both fronts have been extremely successful and below is a brief summary of these efforts.

2018 – A total of 16 proposals were submitted requesting $18.74 million, of which $3.85 million were funded. For every $1.00 dollar of support from the RCP this resulted $14.8 of extramural support to members of the VDC. This is a **1,381%** Return on Investment for year 2018.
2019 – A total of 16 proposals were submitted requesting $18.47 million, of which $3.46 million were funded. For every $1.00 dollar of support from the RCP this resulted in $13.3 of extramural support to members of the VDC. This is a **1,234%** Return on Investment for year 2019.
2020 – A total of 38 proposals have been, or are anticipated to be submitted totaling $33.42 million, of which $4.15 million have thus far been awarded. For every $1.00 dollar of support from the RCP this resulted in $15.98 of extramural support to members of the VDC. This is a **1,498%** Return on Investment. Of proposals submitted, 15 have been supported thus far, 6 have not been supported, and 17 are pending ($24.28 million). For example, if all current pending funds are awarded that would mean every $1.00 dollar of support from the RCP this year would result in $109.39 of extramural support to members of the VDC. This would be a **10,833%** Return on Investment. However, we anticipate some will be successful and we project greater than **2,000%** return on investment for the 3rd year of the Vaccine Development Center.

5. Industry partners, Patents, and legal agreements:

Justin Bevere leads the front on coordinating legal agreements between collaborators (industry or academic) and WVU researchers. From 2018 to 08/31/20, the WVU technology transfer office has moved forward with 4 patent applications from members of the VDC. One for a *Bordetella pertussis* vaccine, one for a *Pseudomonas aeruginosa* vaccine, one for a *Burkholderia* vaccine, and one for a COVID-19 vaccine. The Vaccine Development Center now has 4 sponsored research projects with industry partners, and a multitude of industry partners that provide free materials under MTAs. There is 30+ NDAs, MTAs, MSAs, etc in place between our researchers and industry/academic partners that are directly focused to vaccine development research at WVU.

6. Highlights of the Vaccine Development Center per year:

2018 Highlight – Dr. Heath Damron received a 5th percentile score on an NIH R01, and is awarded $2,898,165 for the development of a mucosal vaccine to protect against whooping cough.
2019 Highlight – Dr. Mariette Barbier received a 12th percentile score on an NIH R01, and is awarded $2,610,412 for the development of a vaccines against bacterial pathogens by targeting iron acquisition proteins.

2020 Highlight – Dr. Alexander Horspool publishes a study in MedRxiv on the antibody and cytokine profile of West Virginian residents with COVID-19 infections (in peer review at PLOS Medicine 09/2020). Dr. Mariette Barbier (Tim Driscoll Co-I) received NIH R01 and is awarded $1,900,000 for the development of Lyme disease vaccines.

Center for Cognitive Computing (C3): A Multidisciplinary Research Center for Excellence

https://cognitivecomputinglab.faculty.wvu.edu/

Dr. Nasser M. Nasrabadi (PI), WVU Lane Computer Science & Electrical Engineering Department
Dr. Xin Li (Co-PI), WVU Lane Computer Science & Electrical Engineering Department
Dr. Guodong Guo, WVU Lane Computer Science & Electrical Engineering Department
Dr. Saiph Savage, WVU Lane Computer Science & Electrical Engineering Department
Dr. Yanfang Ye, WVU Lane Computer Science & Electrical Engineering Department
Dr. Yu Gu, WVU Mechanical & Aerospace Engineering Department
Kathleen Cullen, WVU Statler College of Engineering & Mineral Resources Dean's Office
Dr. Erin Winstanley, West Virginia University School of Pharmacy

The ongoing information explosion (i.e., BIG data) has resulted in tremendous growth in applications, while creating significant challenges in the way commercial and federal agencies run their daily operations in light of the massive amounts of data. Data science technology with emphasis in AI/ML technology is an emerging research area within the WV state's research universities that have the greatest potential for allowing researchers to obtain competitive funding in numerous applications to enhance WV economic development. The Center for Cognitive Computing (C3) is a WV HEPC founded center that explores advanced learning techniques to conduct fundamental/applied research in data science and exploit BIG data to address issues related to national security, border control, biometrics, cognitive automation, cybersecurity, banking & finance, education, healthcare, retail and commercial applications. Cognitive computing describes technology platforms that, broadly speaking, are based on the scientific disciplines of Artificial Intelligence (AI) , Machine Learning (ML) and Deep Neural Networks (DNN). These platforms encompass reasoning, statistics, graph theory, natural language processing, speech recognition and vision (object recognition), signal processing, sensor fusion, human-computer interaction, dialog and narrative generation, among other technologies. Big data consists of and involves information from diverse complex multimedia data sources (i.e., video, audio, text, speech, depth, geospatial, social media, etc.). The theme of our interdisciplinary Cognitive Computing Center is to catalyze innovations in research and economic development in West Virginia (WV), by leading advances in data science and machine learning (DS/ML), while exploring their innovative applications in diverse problems in engineering and digital health.

Opportunity & Vision: Our main goal has been to make the Cognitive Computing Center a key source of AI & ML intellectual resource for WV industry, federal agencies, and educational institutes. The Center has provided new opportunities for education and workforce development in the core disciplines underlying the data revolution, and in their innovative applications to emerging areas, such as biometrics, cybersecurity, AI in defense, and health sciences, which are expected to be the foundation for future economic growth in WV. Our center has been continuously working to create a sustainable, internationally recognized research and education institute in the State of WV, one that will be at the forefront of basic research and innovation in data science and artificial intelligence, while integrating novel analytics and machine learning techniques to build, strengthen, and advance the scientific and research enterprise in specific thrust areas that are relevant to the state, and to the nation at large.

Justification for Cognitive Computing Center: Data science is considered to be an emerging discipline in this data driven era and it is considered to revolutionize the way we analyze data and make decisions. Data science spans activities such as data collection, storage, integration, analysis, inference, communication, and ethics as well as encompasses disciplines such as statistics, Artificial Intelligence, Machine Learning and Deep Neural Networks to solve important applications in defense, cybersecurity, law enforcement, forensic science, precision agriculture, smart manufacturing, digital city & health sciences and genomics. The U.S. National Science Foundation announced on August 26, 2020 that it is establishing *seven new artificial intelligence institutes* to accelerate research, expand America's workforce, and transform society in the decades to come. With an investment of over $100 million over the next five years, NSF's Artificial Intelligence Institutes represent the nation's most significant federal investment in AI research and workforce development to date. US National Science and Technology Council (NSTC) has recently initiated the coordination and the development of Federal artificial intelligence agency partnership and activities with

academia and industry (i.e., Summary of the 2018 White House Summit on Artificial Intelligence for American Industry). In President Trump's FY2019 Budget, harnessing AI as designated as one of the Administrative Research & Development Priorities, "*In AI holds the potential to transform the lives of Americans through improved technology integration in the workplace and enhanced standards of living at home*". Furthermore, the president Budget for FY2020 proposed large increase for key industries, including doubling AI and quantum information sciences R&D by 2022. In defense research, DARPA has announced a multi-year investment of more than $2 billion in new and existing programs called the "AI Next" campaign to develop machines to acquire human-like communication and reasoning capabilities, with the ability to recognize new situations and environments and adapt to them. Under the president's budget proposal, DoD's AI budget, located within the Office of the Undersecretary of Defense for Research and Engineering, would increase from $780 million this year to $841 million in FY 2021. Joint Artificial Intelligence Center (JAIC) which has a budget of more than $180 million in 2020, also plans to double its technical staff of 70 by 2021.

Our Cognitive Computing Center and its encompassing applications is essential to WV economic development. For example, investment in AI and Deep Learning technology is essential to WV interest in defense and law-enforcement applications supporting FBI, DFBA and the local industry associated with biometrics, forensic science. Use of AI for digital health and combating drug abuse supporting WV local hospitals, and associated industry. Also the Federal FY 2020 budget mentions funding for research into the biological and social-behavioral basis of drug addiction to improve the fundamental understanding of opioid addiction. The Budget FY 2020 also proposes accelerating the start of advanced autonomous systems research to ensure the safe integration of autonomous vehicle systems, such as advanced UAS and passenger-carrying urban air mobility aircraft, into the national airspace.

Cognitive Computing Center Key Accomplishments: Our center researchers within the last three years have already been very active in each of the above research activities and applications e.g., Dr. Nasrabadi and Li have secured FBI, DoD, DHS funding for their research activities. Dr. Y. Ye and Dr. Xin Li have secured funds from DoJ for opioid study. Dr. Y. Gu has secured funds from USDA to develop an autonomous system (called BrambleBee) that employs state-of-the-art localization and mapping, visual perception, path planning, motion control, and manipulation techniques to create an efficient and robust autonomous pollination system. Dr. Y. Ye. has secured funds from NSF to work on cyber defense purposes such as malware and fraud detection. Dr. S. Savage has recently secured funding from NSF to perform a large-scale analysis of "Chatbot" activity levels on Twitch platform. Dr. Nasrabadi has secured Biometrics funds from DHS via NSF-I/UCRC CITeR and ARL/ARO for AI in defense. Our Cognitive Computing Center has also provided significant research and education experiences for a diverse group of students and researchers. Our center has introduced couple of new graduate courses in the data mining and deep learning and has filed two patents. One of the key achievement of the center for cognitive computing was the financial milestone of reaching $7.158 Million in its second year (FY19) of funded research activities compared with $4.632 million in the first year (FY18) and in FY20 as of now the research fund has reached $4.08 million.

Noteworthy accomplishments by the members of the center:

1. National Institute of Justice, (Yanfang Yi–PI, and Xin li Co-PI), **$985,950**, "Using Artificial Intelligence Technologies to Expose Darknet Opioid Traffickers," Jan. 01 2019 – Dec. 31, 2021.
2. NSF- CNS-1845138 CAREER, (Yanfang Yi-PI), **$500,000**, "Securing Cyberspace: Gaining Deep Insights into the Online Underground Ecosystem," April 01, 2019 – March 31, 2024.
3. NSF- IIS-1908215, (Yanfang Yi-PI), **$489,465**, **"**Mining Heterogeneous Network Built from Multiple Data Sources to Reduce Opioid Overdose Risks," Oct. 01, 2019 – Sept. 30, 2022.
4. NSF- EPSCOR RII Track 2 FEC, (D. Adjeroh-PI, G. Doretto Co-PI, N. M. Nasrabadi Co-PI, X. LI Co-PI, **$2,000,000**, "Multi-Scale Integrative Approach to Digital Health: Collaborative Research and Education in Smart Health in West Virginia and Arkansas," Contract ID: OIA-1920920, Aug. 01, 2019 – July 31, 2023.
5. Federal Bureau Investigation (FBI), (Dawson PI, Nasrabadi Co-PI, Total $350,000 "Investigative Dataset: Face and Iris," March 01, 2018 – June 31, 2019.
6. NSF 16-504 I/UCRC, Supplement via Department of Homeland Security (DHS), Award CNS-ID 1650474, (M. Valenti-PI, N. Nasrabadi-Co-PI) **$2,167,536**, 03/15/2017 to 02/28/2022.

7. DOJ Student Fellowship, "Latent Fingerprint Image Enhancement & Matching Using Deep Generative Adversarial Networks," (A. Dabouei-Student, N. Nasrabadi-PI), **$99,618**, Award No: 2019-R2-CX-0041, Jan., 01, 2020 to Dec. 31, 2020.

8. Received **fourteen** different prestigious awards such as best student awards, best paper awards, student travel awards, and J&J women in STEM award nominee.
9. Two graduate students were selected for multi-year PhD fellowship, one from Facebook and another one from Dept. of Justice.
10. Organized Summer School on AI & Smart Health, July 20-21 2020, two members (N. Nasrabadi and X. Li) of the center presented a short tutorial on Deed Learning and AI in Smart Health,
11. Center enlisted two new affiliates for our NSF CITeR, Athena Sciences (a WV company) and SAIC.
12. Center developed a new graduate course on Deep Learning (CPE 620) and new course on Advanced Data Mining (CS 573).
13. Center filed two patents on use of deep learning for biometric identification.
14. Total funded research activities as of today: $15.760 Million.
15. Total number of Journal publications as of today: 64
16. Total number of Conference publications as of today: 111
17. Total number of Masters & PhD students advised: 29

Proposals submitted & Still Pending for Award: From Jan. 01 2020 to present:

1. NSF, "Towards Unified Neural and Computational Models of Face Representation", Total $611K
2. NSF, "CCSS: Collaborative Research: Adaptive Sensor Processing for Connected Autonomous Vehicles: a Collaborative Deep Learning Approach", Total $331K
3. DOE, "Physics-based Data-Driven Proxy Drag Models for Gas-Particle Flows", Total $500K
4. NIH, "Single-neuron Representation of Faces in the Human Medial Temporal Lobe", Total $1.9M
5. NSF, "SenSE: SenSE: Integrating Multimodal Sensing with Data Fusion for Precision Diagnosis of Autism Spectrum Disorder" Total $750K
6. USDA, "Integrated Invasive Pest Survey Using Satellites, Unmanned Aerial Systems, Sensors, and Artificial Intelligence" Total $500K
7. DOD, "Toward Computational Modeling of Face-avoidance Neurons", Total $50K
8. NSF pre-proposal, "Convergence AcceleratorTrack D: Developing an Academic-Industry Partnership in Biologically-Inspired Neural Computation", Total $1M
9. DOE, "Optically controlled quantum phase transitions at Van der Waals interfaces", Total $750K
10. NIH, "Toward closed-loop deep brain stimulation: an explainable Artificial Intelligence approach", Total $1.75M
11. NSF, "NRT-HDR: Bridges in Digital Health a Cross-Disciplinary Traineeship", Total $3M
12. NSF, "GCR: Toward Next-generation Neural Technologies: An Interdisciplinary Team Science Approach", Total $1M
13. NSF, "RII Track-2 FEC: Toward Convergence Research in Carbon Sequestration and Reuse through AI-based Meta Techno-economic Modeling", Total $4M
14. NSF: Collaborative Research: FW-HTF-P: Helping Workers Thrive with Algorithmic Management, Total $31,999
15. Facebook Research Grant, Total $50,000
16. Eberly College Racial Justice, Total $14,968.00
17. Microsoft Future of Work Grant, Total $50,000
18. IARPA-SMART Program: Machine Learning Methods for the Detection and Characterization of Natural or Anthropogenic Activities from Multi-modal Time-Series Satellite Data, Total $ 642,078
19. NSF CITeR NSF I/UCRC, Binary MobileNet for Face Recognition on Smartphones, Total $50,000
20. NSF CITeR NSF I/UCRC, Ensemble of Classifiers to Detect Deepfake Images and Videos, Total $50,000
21. NSF CITeR NSF I/UCRC, Masked Face Detection and Recognition, Total $50,000
22. NSF CITeR NSF I/UCRC, Joint Face Pose Estimation and Frontalization, Total $50,000
23. NSF CITeR NSF I/UCRC, Facial Image Privacy Via Face Manipulations, Total $50,000

24. NSF CITeR NSF I/UCRC, Deep Deblurring of Fingerphotos Captured by SmartphonesNSF CITeR NSF I/UCRC, Where is the Limit for Face Super-Resolution (FSR)?, Total $50,000
25. NSF CITeR NSF I/UCRC, Biometric Data Classification for Large-Scale Database Error Detection and Correction, Total $50,000

Total Projects Awarded in FY18 & FY19 & FY20 (15.760 Million)

Projects Awarded in FY20: ($4.08 Million)

1. Proposal to NSF I/UCRC, CITeR (Nasrabadi-PI, Dawson Co-PI), **$50,000**, "Benchmarking Video Face Super-Resolution Algorithms, 20S-02w," Aug. 15, 2020 to Aug. 14, 2021.
2. Proposal to NSF I/UCRC, CITeR (Nasrabadi-PI, Dawson Co-PI), **$50,000**, "Deep Spoof Detection for Text-independent Speaker Verification, 20S-05W- SP," Aug. 15, 2020 to Aug. 14, 2021.
3. Proposal to NSF I/UCRC, CITeR, DHS Supplement (Nasrabadi-PI, Dawson Co-PI), **$60,000**, "Wavelet-Based Morphed Artifacts Detection, 20S-13W-SP," Aug. 15, 2020 to Aug. 14, 2021.
4. Proposal to NSF I/UCRC, CITeR, DHS Supplement (Dawson-PI, Nasrabadi Co-PI), **$60,000**, "Determining the Uniqueness of Facial Images in Large Datasets, 20S-12W-SP," Aug. 15, 2020 to Aug. 14, 2021.
5. Proposal to NSF I/UCRC, CITeR (Dawson-PI, Nasrabadi Co-PI), **$50,000**, "Digitization of 10-Print Card Fingerprints Using Cellphone Cameras, 20S-07W-SP," Aug. 15, 2020 to Aug. 14, 2021.
6. Proposal to FBI, (Dawson PI, Nasrabadi Co-PI), Total **$350,000**, "Investigative Dataset: Face and Iris collection," March 01, 2020 to May 31, 2021, share **$78,436**.
7. Proposal to DOJ (Student Fellowship), "Latent Fingerprint Image Enhancement & Matching Using Deep Generative Adversarial Networks," (Nasrabadi-PI), **$99,618**, Award No: 2019-R2-CX-0041, Jan., 01, 2020 to Dec. 31, 2020.
8. Proposal to NSF I/UCRC, CITeR, DHS Supplement (Nasrabadi-PI, Dawson Co-PI), **$60,000**, "Detecting Morphed Faces Using Deep Siamese Network," Jan. 1, 2020 to Dec. 31, 2020.
9. Proposal to NSF I/UCRC, CITeR, DHS Supplement (Nasrabadi-PI, Dawson Co-PI), **$60,000**, "Face Quality Index Assessment for Sensor and Subject-Based Distortions," Jan. 1, 2020 to Dec. 31, 2020.
10. Proposal to NSF I/UCRC, CITeR, DHS Supplement (Dawson-PI, Nasrabadi Co-PI), **$60,000**, "Identical Twins as a Benchmark for Human Facial Recognition," Jan. 1, 2020 to Dec. 31, 2020.
11. Proposal to NSF-DHS I/UCRC, CITeR, DHS Supplement (Dawson-PI, Nasrabadi Co-PI), **$60,000**, "Evaluation of the Equitability of Speaker Recognition Algorithms," Jan. 1, 2020 to Dec. 31, 2020.
12. Proposal to NSF I/UCRC, CITeR (Dawson-PI, Nasrabadi Co-PI), **$50,000**, "Deep Cross-Spectral Iris Matching: High-Resolution Visible Iris Against Low-Resolution NIR Iris," Jan. 1, 2020 to Dec. 31, 2020.
13. Proposal to NSF I/UCRC, CITeR (Dawson-PI, Nasrabadi Co-PI), **$40,000**, "Deep Fingerprint Matching from Contactless to Contact Fingerprints for Increased Interoperability," Jan. 1, 2020 to Dec. 31, 2020.
14. Proposal to NSF 16-504 I/UCRC, Supplement via Department of Homeland Security (DHS), Award CNS-ID 1650474, (M. Valenti-PI, N. Nasrabadi-Co-PI), **$2,167,536**, 03/15/2017 to 02/28/2022.
15. Proposal to Proposal to DOE-EPSCoR, "Optically controlled quantum phase transitions at Van der Waals interfaces", Total: $749,023 (Share: **$250,000**)
16. Proposal to USDA NIFA, "Mid-Atlantic Sustainable Biomass for Value-added Products Consortium (MASBio)", Total: $10M (Share: **$250,000**)
17. Proposal to NSF CRESH, "Does fracking induce higher risk of stroke? a Geographic Information System approach", Total **$34,000**, Aug. 08, 2019 to Aug. 08, 2023.
18. Proposal to NSF I/UCRC CITeR (Li-PI), "Age invariant face recognition", Total $80K (Share: **$40,000**) Jan. 1, 2020 to Dec. 31, 2020.

19. Proposal to NSF I/UCRC CITeR (Li-PI, Guo Co-PI), "Biometric and Biographic Data Cleanup with Deduplication and Quality Scoring", Total **$50,000**, Aug. 15 2020 to Aug. 14 2021.
20. Proposal to NSF I/UCRC CITeR (Li-PI, Guo Co-PI), "Detecting Face Morphing: Dataset Construction and Benchmark Evaluation," Total **$50,000**, Aug. 15 2020 to Aug. 14 2021.
21. Proposal to NSF I/UCRC CITeR (Guo-PI), "Federated Biometrics: Towards a Trustworthy Solution to Data Privacy," Total **$50,000**, Aug. 15 2020 to Aug. 14 2021
22. NSF I/UCRC CITeR (Guo-PI), "How to Assess Face Image Quality with Deep Learning," **$50,000**, Jan. 1, 2020 to Dec. 31, 2020.
23. Proposal to Twitch Fellowship (Savage-PI), **$10,000**

Projects Awarded in FY19: ($7.158 Million)

24. NSF FW-HTF-RL: Collaborative Research (Savage-PI), **$303,369**, "Enabling Marginalized Rural and Urban Digital Workers to Collaborate with AI to Learn Skills, Increase Wages, and Access Creative Work", Sept. 15, 2019 – Aug. 31, 2023.
25. Facebook (Savage – PI), **$75,000**, "Interfaces for Fighting Misinformation," 2019.
26. Facebook Hackathon (Savage-PI), **$22,000**, Interfaces for Using AI to Help immigrants, 2019.
27. NSF I/UCR, CITeR, (Savage-PI), **$50,000**, "Using Block chain for Biometrics," Jan. 01 2019- Dec. 31 2019.
28. NSF I/UCRC, CITeR, (Guo-PI), **$40,000**, "Cross-Quality Face Matching," Jan. 01 2019- Dec. 31 2019.
29. NSF EPSCoR RII Track 2 (Adjeroh-PI, Nasrabadi-Co PI, Li-Co PI, Ye-Co PI), **$2,000,000**, Multi-Scale Integrative Approach to Digital Health: Collaborative Research and Education in Smart Health in West Virginia and Arkansas," Aug. 08, 2019 – Aug. 08, 2023.
30. NSF REU Site (GU-PI), **$303,310**, "Undergraduate Robotics Research in Human-Swarm Interaction," March 07, 2019.
31. NASA, (Gu-PI), **$124,997**, "Micro-Probes Propelled and Powered by Planetary Atmospheric Electricity (MP4AE)," May 15, 2019 – Feb. 14, 2020.
32. Alpha Foundation, (Tulu-PI, Gu Co-PI), **$749,968,** $175,729"Autonomous Robotics Early Warning System for Underground Stone Mining Safety," Sept. 01, 2019 – Nov. 30, 2022.
33. National Institute of Justice, (Yanfang Yi–PI, and Xin li Co-PI), **$985,950**, "Using Artificial Intelligence Technologies to Expose Darknet Opioid Traffickers," Jan. 01 2019 –Dec. 31, 2021.
34. NSF- CNS-1845138 CAREER, (Yanfang Yi-PI), **$500,000**, "Securing Cyberspace: Gaining Deep Insights into the Online Underground Ecosystem," April 01, 2019 – March 31, 2024.
35. NSF- IIS-1908215, (Yanfang Yi-PI), **$489,465, "**Mining Heterogeneous Network Built from Multiple Data Sources to Reduce Opioid Overdose Risks," Oct. 01, 2019 – Sept. 30, 2022.
36. NSF I/UCRC, CITeR, (Xin Li-PI), "Face image super-resolution," **$50,000,** Jan. 01 2019 – Dec. 31 2019.
37. NIH R03 resubmission, PSCoR, (Xin Li-PI), **$25,000**, 2019.
38. FBI (Nasrabadi-PI), "Soft Biometrics Guided Sketch to Photo Synthesizer," **$133,920**, April 01, 2019 – May 01, 2020.
39. NSF I/UCRC, CITeR (Dawson PI, Nasrabadi Co-PI), **$40,000**, "Quantifying benefits of 500PPI vs. 1000PPI for Fingerprint Matching," Jan. 1, 2019 – Dec. 31, 2019.
40. NSF I/UCRC, CITeR (Nasrabadi PI, Valenti Co-PI,), **$35,000**, "Deep Virtual Facial Line-Up Using Soft Biometrics," Jan. 1, 2019 – Dec. 31, 2019.
41. Proposal to NSF I/UCRC, CITeR (Dawson PI, Nasrabadi Co-PI), **$45,000**, "Deep Profile-to-Frontal Face Verification in the Wild," Jan. 1, 2019 – Dec. 31, 2019.
42. Proposal to NSF I/UCRC, CITeR (Adjeroh-PI, Doretto, Dawson, and Nasrabadi Co-PI), **$50,000**, Human Age Estimation Using Genomic Data," Jan. 1, 2019 – Dec. 31, 2019.
43. Proposal to NSF I/UCRC, CITeR (Nasrabadi-PI), **$45,000**, "An End-to-End Deep Super-Resolution Face Recognition System," Jan. 1, 2019 – Dec. 31, 2019.
44. US DoD-Army Research Office, (Nasrabadi-PI), "Multilayer Sparse Coding Networks for Image Classification," **$50,000**, Aug. 01, 2019 – April 30, 2020.

Projects Awarded in FY 18: (4.632 Million)

45. Proposal to NSF I/UCRC Phase II: I/UCRC for Identification Technology Research, National Science Foundation (Valenti-PI, Nasrabadi Co-PI), $500,000 Dates Funded: January 1, 2017 - December 31, 2020.

46. Proposal to NSF I/UCRC, CITeR (Nasrabadi-PI), $43,000, A Dynamic Multi-Camera Topology-Aware Time-Tapestry for Surveillance," Aug. 11, 2017 to Aug. 10, 2018.

47. Proposal to US DoD-Army (Li-PI, Nasrabadi Co-PI), "Building a Multimodal Imaging System to Support Multimodal Data Fusion vis Deep Learning," $250,000, Award ID: W911NF-18-1-0210, 05/25/18 – 05/24/2019.

48. Proposal to FBI (Dawson-PI, Nasrabadi Co-PI), "Investigative Dataset: Face and Iris," $350,000, 03/01/2018-06/31/2019.

49. Proposal to NSF I/UCRC, CITeR (Dawson-PI, Nasrabadi Co-PI), $50,000, "Deep Hashing for Secure Multimodal Biometrics," Jan. 1, 2018 to Dec 31, 2018.

50. Proposal to NSF I/UCRC, CITeR (Dawson-PI, Nasrabadi Co-PI), $50,000, "Evaluation of Speaker Recognition Solutions to Guide Prototype Development," Jan. 1, 2018 to Dec 31, 2018.

51. Proposal to NSF (Ye-PI), "SaTC: CORE: Small: Collaborative: A Framework for Enhancing the Resilience of Cyber Attack Classification and Clustering Mechanisms," $237,791, 10/01/2018-10/01/2021.

52. Proposal to NSF (Ye-PI, Li & Woerner Co-PIs), "CICI: SSC: SciTrust: Enhancing Security for Modern Software Programming Cyberinfrastructure," $649,156, 10/01/2018-10/01/2021.

53. Proposal to NIJ, (Ye-PI, Li Co-PI) "Utilizing Artificial Intelligence Technologies to Link Darknet and Surface Net to Combat Opioid Trafficking," $985,950, 10/01/2018-10/01/2021.

54. Proposal to USDA, (Gu-PI, Li, Gross, Waterman and Park Co-PIs), "Precision Pollination Robots," Total budget $1,065,010.

55. Proposal to NSF I/UCRC, CITeR (Guo-PI, Li Co-PI), "Developing an Automated Method to Remove Labeling Noise in Very Large Scale Dataset," Jan. 1, 2018 to Dec 31, 2018.

56. Proposal to NSF I/UCRC, CITeR (Guo-PI), "Face Anti-Spoofing: A Comprehensive Evaluation," Jan. 1, 2018 to Dec 31, 2018.

Students Advised & Supported FY18 & FY19 & FY20: (Total number students 30 – 1 undergraduate, 8 Masters, 21 PhD) 6 PhD + 3 Masters graduated

1. Connor Castle, "Morphological computing for robust robot operations", **Graduated** Fall 2019 (Master – Guo advisor)
2. Na Zhang, "Face recognition with deep learning," **Graduated** May 2020 (PhD – Guo advisor)
3. Min Jiang, "Visual BMI from Face and Body," **Graduated** May 2019 (PhD – Guo advisor)
4. Mohamad Nouyed, "Facial Image Processing," Dec. 2023 (PhD – Guo advisor)
5. Mohamad Jazaery, "Facial Image Processing," **Graduated Dec. 2019** (Master – Guo advisor)
6. Qiangchang Wang, "Deep Face Recognition,", May 2022, (PhD – Guo advisor).
7. Yiming Zhang, "Machine learning, data mining, and applications in cybersecurity and health intelligence," May 2021 (PhD – Ye advisor)
8. Shifu Hou, "Automatic detection of insecure codes in stack overflow", May 2023 (PhD – Ye advisor)
9. Yujie Fan, "Cybersecurity Using AI,", May 2023 (PhD – Ye Advisor)
10. Aaron G. Saas, "Malware Detection," Sept. 2021, (PhD – Ye Advisor)
11. Sobhan Soleymani, "Deep learning for multimodal fusion," May 2021 (PhD – Nasrabadi advisor)
12. Seid Mehdi Iranmanesh, "Deep cross-spectral matching," Aug. 2021 (PhD – Nasrabadi advisor)
13. Fariborz Taherkhani, "Deep multispectral face recognition," May 2022 (PhD – Nasrabadi advisor)

14. Ali Dabouei, “Deep Fingerprint recognition,” May 2022 (PhD – Nasrabadi advisor)
15. Domenick Poster, “Deep iris recognition,” May 2022 (PhD – Nasrabadi advisor)
16. Moktari Mostofa, “Deep target detection,” May 2023 (PhD – Nasrabadi advisor)
17. Syeda Nyma Ferdous, “Deep pedestrian detection,” May 2023 (PhD – Nasrabadi advisor)
18. Osahor Uche, “Deep adversarial sketch-to-face synthesis,” May 2023 (PhD – Nasrabadi advisor)
19. Poorya Aghdaie, “Fake image detection,” May 2024 (PhD – Nasrabadi advisor)
20. Hadi Kazemi, “Deep learning sketch-to-image synthesis,” **Graduated** Aug. 2019 (PhD – Nasrabadi advisor)
21. Salam Mohamadi, “Cross-spectral iris matching,” May 2024 (PhD – Nasrabadi advisor)
22. Alexandria Wilson, “Off-angle iris matching,” April 2021 (Master – Nasrabadi advisor)
23. Baarria Chaudhary, “Morphed face detection,” April 2021 (Master – Nasrabadi advisor)
24. Yiming Zhang, “Machine learning, data mining, and applications in cybersecurity and health intelligence,” May 2021 (PhD – Ye advisor)
25. Mindi Ruan, “Computational methods for autism research,” May 2021 (MS/PhD – Li advisor)
26. Jacob Dameron, “Image and video forensics: deepfake detection”, May 2021 (MS/PhD – Li advisor)
27. Stephen Itschner, “Deep learning for RADAR,” May 2021 (PhD – Li advisor)
28. Jinge Wang, “Image processing for smart agriculture,” May 2021 (PhD – Li advisor)
29. Ahmed Cheikh Sidiya,”Point cloud processing for intelligent vehicles,” May 2021 (PhD – Li advisor)
30. Xuan Xu, “Deep learning for image superresolution,” **Graduated** May 2020 (PhD – Li advisor)
31. Yixin Du, “Deep learning for image restoration,” **Graduated** May 2019 (PhD – Li advisor)
32. Nathan Utzman (Deep Learning) (MS – Li advisor)
33. Minglei Yin (Deep Learning) (PhD – Li advisor)
34. Surekha Pachipulusu, Deep learning for image restoration, **Graduated** April 2020 (MS – Li advisor)
26. Conner Castle, autonomy,” **Graduate**d Dec 2019 (PhD – Gu advisor)
27. Dylan Covell, Robot Design,” May 2020 (undergraduate – Gu advisor)
28. Carlos Toxtli, “Crowdsourcing social good,” May 2021 (PhD – Savage advisor)
29. Claudia Flores Saviaga, “Mobilizing online collective action,” May 2021 (PhD – Savage advisor)

Awards & Service FY18 + FY19 + FY20:

1. ***Best Student Paper Award 2018***, IEEE BTAS’18, Los Angeles, CA, 22-26 October, 2018. (Nasser Nasrabadi)
2. ***Best Poster Presentation Award 2018,*** IEEE BTAS’18, Los Angeles, CA, 22-26 October, 2018. (Nasser Nasrabadi)
3. ***Highest Impact Paper Award 2018***, IEEE Trans. on Geoscience and Remote Sensing Society, July 2018. (Nasser Nasrabadi)
4. ***Best Paper Award Grand Challenge***, IEEE ICME’18, San Diego, CA, 23-27 July, 2018. (Nasser Nasrabadi)
5. ***Best Student Paper Award***, IEEE CVPRW’18, Salt Lake City, UT, 18 June, 2018. (Nasser Nasrabadi)
6. ***Best Paper Award,*** IEEE WACV-CDBR, Lack Tahoe, Nevada, 12-14 March, 2018. (Nasser Nasrabadi)
7. ***Best Student Paper Award,*** 11th IAPR International Conference on Biometrics, ICB’18, 20-23 February, 2018. (Nasser Nasrabadi)
8. ***J&J Women in STEM Award Nominee***, 2018. (Yangfang Ye)
9. ***Big 12 Faculty Fellow 2018-2019***, WVU, June 2018. (Yu Gu)
10. ***Excellence in Research***, Statler College of Engineering and Mineral Resources, Mar. 2018. (Yu Gu)
11. ***Recognition for Mountaineer Values during WVU’s 150th Anniversary Celebration***, Feb. 2018. (Yu Gu)
12. Saiph Savage’s research on Crowd Workers' earnings won an ***honorable mention at CHI'18!***
13. Saiph Savage’s blockchain based systems for helping immigrants was ***featured in Fortune Mexico!***
14. Saiph Savage’s ***3 PhD Students were awarded scholarships*** to attend and present at the AAAI Conference on Human Computation and Crowdsourcing (HCOMP'18) Doctoral Consortium!
14. Nasser Nasrabadi ***- Best Poster Presentation Award 2019,*** IEEE BTAS’19, Tampa, FL, 23-26 Sept., 2019.
15. **Best Outstanding Researcher**, Statler College of Engineering and Mine. Res., WVU, 2019
16. **Best Researcher** of the Year, Statler College of Engineering and Mine. Res., WVU, 2019

17. Yanfang Ye - ***NSF Career Award***, 2019.

18. Yanfang Ye - ***IJCAI Early Career Spotlights***, 2019.

19. Yanfang Ye - APLU Member Spotlights, 2019.

20. Yanfang Ye - AAAI Workshop on AI for Cyber Security (AICS) Challenge Problem Winner, 2019.

21. Yanfang Ye - ***Associate Editor***, IEEE Transactions on Big Data (IEEE TBD), 2018-2020.
22. Yanfang Ye - ***Editorial Board***, Journal of Information Engineering and Applied Computing, 2018-2020.
23. Yanfang Ye - ***Invited Talks*****,** IJCAI 2019 Early Career Spotlights, 2019.
24. Yanfang Ye - ***Workshop/Tutorial/Session/Publicity Chair***: IJCAI (2019), IEEE ICDM (2019, 2018), IEEE Big Data (2019, 2018), CIKM (2017), IEEE ICSC (2015-2016), ICMLA (2015), WISE (2015).
25. Yanfang Ye - ***Program Committee:*** S&P (2020), ACSAC (2019), AAAI (2019), ACM SIGKDD (2017-2019), IJCAI (2017, 2019), CIKM (2019), IEEE ICDM (2018-2019), SciSec (2019), ICMLA (2019), ICICS (2018), EISIC (2018), SNAST (2016-2019), WEBIST (2017-2018), WISE (2015-2018), SIA (2017), ACCSE (2016), MobiApps (2016), ICTAI (2016), DPNoC (2016).
26. Yanfang Ye - ***Panels***, NSF Panels (2018-2019), UTSA-DoD Panel (2019), Cyber Florida Panel (2018), Heidelberg Laureate Forum (2018-2019).
27. Yu Gu - NASA Innovative Advanced Concepts (NIAC) Fellow, April 2019, **Best Paper Award,** SPIE 2020, Target classification in infrared imagery by cross-spectral synthesis using GAN, Anaheim CA, 27 April - 1 May 2020.

Patents Filed:

1. N. M. Nasrabadi, J. Dawson and A. Dabouei, "Cross Matching Contactless Fingerprint Against Contact-based Fingerprints," patent application filed on 05/23/2019. (Pending)

2. N. M. Nasrabadi, J. Dawson and A. Dabouei, Patent Application filed, "Fingerprint Distortion Rectification & Restoration Using Deep Convolutional Neural Networks" on 03/12/2018. (pending)

Total Journal Publications for FY18 + FY19 + FY20: (Total Journal Publications 64)

Journal Publications FY20 (22 publications):

1. Moktari Mostofa, Syeda Nyma Ferdous, Benjamin S. Riggan, and Nasser M. Nasrabadi, "Joint-SRVDNet: Joint Super Resolution and Vehicle Detection Network," *IEEE Access*, vol. 8, issue 1, pp. 82306-82319, Dec. 2020.

2. Fariborz Taherkhani, Veeru Talreja, Matthew Valenti, and Nasser M. Nasrabadi, "Error Corrected Margin-Based Deep Cross-Modal Hashing for Facial Image Retrieval," *IEEE Transactions o on Biometrics, Behavior, and Identity Science*, vol. 2, no. 3, July 2020.

3. Seyed Mehdi Iranmanesh, Benjamin Riggan, Shuowen Hu, Nasser M. Nasrabadi, "Coupled Generative Adversarial Network for Heterogeneous Face Recognition," *Image and Vision Computing*, vol. 94, February 2020.

4. Fangfang Wu et al., "Hybrid Sparsity Learning for Image Restoration: an Iterative and Trainable Approach", accepted by *Signal Processing*, to appear in 2020

5. Runnan Cao et al., "A flexible neural representation of faces in the human brain", *Cerebral Cortex Communications*, to appear in 2020
6. Mindi Ruan et al., "Deep neural network reveals the world of autism from a first-person perspective", accepted by *Autism Research*, to appear in 2020
7. Xu, Xuan, Yanfang Ye, and Xin Li. "Joint Demosaicing and Super-Resolution (JDSR): Network Design and Perceptual Optimization." *IEEE Transactions on Computational Imaging*, 2020.

8. Huang, T., Dong, W., Liu, J., Wu, F., ming Shi, G. and Li, X., Accelerating Convolutional Neural Network via Structured Gaussian Scale Mixture Models: A Joint Grouping and Pruning Approach. *IEEE Journal of Selected Topics in Signal Processing*, 2020.
9. Zhao, C., Cao, Z., Yang, J., Xian, K. and Li, X., "Image Feature Correspondence Selection: A Comparative Study and a New Contribution," *IEEE Transactions on Image Processing*, 29, pp.3506-3519, 2020.
10. Fighting Disaster Misinformation in Latin America:The #19S Mexican Earthquake Case Study, Claudia Flores-Saviaga, Saiph Savage, Springer *Journal on Personal and Ubiquitous Computing,* 2020.
11. Predicting the Working Time of Microtasks Based on Workers' Perception of Prediction Errors, Susumu Saito, Chun-Wei Chiang, Saiph Savage, Jeffrey Bigham, *Journal of Human Computation,* 2020.
12. Flexible Work and Personal Digital Infrastructures, Mohammad H Jarrahi, et al., Saiph Savage, CACM 2020: *Communications of the ACM*., 2020.
13. J Li, J Zhao, C Lang, Y Li, Y Wei, G Guo, T Sim, S Yan, J Feng, Multi-Human Parsing With a Graph-based Generative Adversarial Model," *J. ACM*, vol. 37, 2020
14. M. Jiang, G. Guo, G. Mu, "Visual BMI estimation from face images using a label distribution based method," *Computer Vision and Image Understanding*, Volumes 197–198, August 2020.
15. M. Jiang, Y. Shang, G. Guo, Computational approach to body mass index estimation from dressed people in 3D space, IET Image Processing 14 (7), pp.1248-1256, 2020.
16. S. Jia, G. Guo, Z. Xu, "A survey on 3D mask presentation attack detection and countermeasures," Pattern Recognition, vol. 98, Pages 107032, Feb. 2020
17. S. Jia, G. Guo, Z. Xu, Q. Wang, "Face presentation attack detection in mobile scenarios: A comprehensive evaluation," Image and Vision Computing, Vol. 93, Pages 103826, 2020.
18. Q. Wu, F. Yan, Z. Chai, G. Guo, Crowd counting by the dual-branch scale-aware network with ranking loss constraints, *IET Computer Vision*, Vol. 14, Issue 3, Pages 101-109, April 2020.
19. Mohammad Jazaery and G-D. Guo, Automated Cleaning of Identity Label Noise in a Large Face Dataset with Quality Control, *IET Biometrics*, Vol. 9, Issue. 1, pp. 25-30, 2020.
20. J. W. XuxinLin, Y. Xie, S. Zhang, C. Lin, Y. Liang, G. Guo, S. Z. Li, "Task-Oriented Feature-Fused Network With Multivariate Dataset for Joint Face Analysis," IEEE Transactions on Cybernetics, vol. 50. No.3, 2020
21. G. Hedrick, N. Ohi, Y. Gu, "Terrain-Aware Path Planning and Map Update for Mars Sample Return Mission," IEEE Robotics and Automation Letters, Vol. 5, No.4, pp. 5181-5188, 2020.
22. C Yang, J Strader, Y Gu, A Canciani, K Brink, "Cooperative Navigation Using Pairwise Communication with Ranging and Magnetic Anomaly Measurements," Journal of Aerospace Information Systems, 1-10, 2020

Journal Publications FY19 (27 Publications):

23. Xiaoxia Sun, **Nasser M. Nasrabadi** and Trac D. Tran, "Supervised Deep Sparse Coding Networks for Image Classification," *IEEE Trans. on Image Processing*, March, 2019.

24. **Nasser M. Nasrabadi**, "Deep Target: An Automatic Target Recognition using Deep Convolutional Neural Networks*," IEEE Transactions on Aerospace and Electronic Systems*, Jan. 18, 2019. DOI: 10.1109/TAES.2019.2894050

25. Hu, Chuan-Bo, Fan Zhang, Fang-Ying Gong, Carlo Ratti, and **Xin Li**. "Classification and mapping of urban canyon geometry using Google Street View images and deep multitask learning." *Building and Environment* (2019): 106424.

26. Weisheng Dong, Huan Wang, Fangfang Wu, Guangming Shi, and **Xin Li**, "Deep Spatial-spectral Representation Learning for Hyperspectral Image Denoising," *IEEE Trans. On Computational Imaging*, April 17, 2019.

27. Weisheng Dong, Tao Huang, Guangming Shi, **Xin Li** and Yi Ma, "Robust Tensor Approximation with Laplacian Scale Mixture Modeling for Multiframe Image and Video Denoising," *Journal of Selected Topics in Signal Processing,* vol.12, no. 6, Dec. 2018.

28. Qiangchang Wang and **Guodong Guo**, LS-CNN: Characterizing Local Patches at Multiple Scales for Face Recognition, *IEEE Trans. on Information Forensics & Security*, Accepted on September 29, 2019. In press.

29. Qiangchang Wang and **Guodong Guo**, Benchmarking Deep Learning Techniques for Face Recognition, *Journal of Visual Communication and Image Representation*, Accepted on September 29, 2019. In press.
30. **Guodong Guo** and Na Zhang, A Survey on Deep Learning based Face Recognition, *Computer Vision and Image Understanding*, Vol. 189, December 2019.
31. **Guodong Guo**, Mohammad Jazaery, "Automated Cleaning of Identity Label Noise In A Large Face Dataset with Quality Control," IET Biometrics, Sept. 2019
32. Min Jiang, Yuanyuan Shang, **Guodong Guo**, "On visual BMI analysis from facial images," Image Vision Computing, 89: 183-196, 2019.
33. Min Jiang, **Guodong Guo**, "Body Weight Analysis From Human Body Images," IEEE Trans. Information Forensics and Security, 14(10): 2676-2688, 2019.
34. Lining Zhang, Hubert P. H. Shum, Li Liu, **Guodong Guo**, Ling Shao, "Multiview discriminative marginal metric learning for makeup face verification," Neurocomputing, 333: 339-350, 2019.
35. Xiuzhuang Zhou, Kai Jin, Min Xu, **Guodong Guo**, "Learning deep compact similarity metric for kinship verification from face images," Information Fusion, 48: 84-94, 2019.
36. Ce Li, Baochang Zhang, Chen Chen, Qixiang Ye, Jungong Han, **Guodong Guo**, Rongrong Ji, "Deep Manifold Structure Transfer for Action Recognition," IEEE Trans. Image Processing, 28(9): 4646-4658, 2019.
37. Zichang Tan, Yang Yang, Jun Wan, Hanyuan Hang, **Guodong Guo**, Stan Z. Li, "Attention-Based Pedestrian Attribute Analysis," IEEE Trans. Image Processing, 28(12): 6126-6140, 2019.
38. Chunlei Liu, Wenrui Ding, Jinyu Yang, Vittorio Murino, Baochang Zhang, Jungong Han, **Guodong Guo**," Aggregation Signature for Small Object Tracking," *IEEE Transactions on Image Processing*," Sept. 2019.
39. Zhaohui Che, Ali Borji, Guangtao Zhai, Xiongkuo Min, **Guodong Guo**, Patrick Le Callet, "How is Gaze Influenced by Image Transformations? Dataset and Model," *IEEE Transactions on Image Processing*, October 2019.
40. Xiongkuo Min, Guangtao Zhai, Ke Gu, Yucheng Zhu, Jiantao Zhou, **Guodong Guo**, Xiaokang Yang, Xinping Guan, Wenjun Zhang, "Quality Evaluation of Image Dehazing Methods Using Synthetic Hazy Images," IEEE Trans. Multimedia, 21(9): 2319-2333, 2019.
41. Wenhan Zhu, Guangtao Zhai, Xiongkuo Min, Menghan Hu, Jing Liu, **Guodong Guo**, Xiaokang Yang, "Multi-Channel Decomposition in Tandem With Free-Energy Principle for Reduced-Reference Image Quality Assessment," IEEE Trans. Multimedia, 21(9): 2334-2346, 2019.
42. Shifeng Zhang, Yiliang Xie, Jun Wan, Hansheng Xia, Stan Z Li, **Guodong Guo**, "WiderPerson: A Diverse Dataset for Dense Pedestrian Detection in the Wild," *IEEE Transactions on Multimedia*, July 2019.
43. Shan Jia, **Guodong Guo**, Z Xu, "A survey on 3D mask presentation attack detection and countermeasures, *Pattern Recognition*, vol. 98, Jan. 2020.
44. Yu-Feng Yu, Chuan-Xian Ren, Min Jiang, Man-Yu Sun, Dao-Qing Dai, **Guodong Guo**, "Sparse approximation to discriminant projection learning and application to image classification," *Pattern Recognition*, vol. 96, Dec. 2019.
45. Jun Jia, Guangtao Zhai, Jiahe Zhang, Zhongpai Gao, Zehao Zhu, Xiongkuo Min, Xiaokang Yang, **Guodong Guo, "**EMBDN: An Efficient Multi-class Barcode Detection Network for Complicated Environments," *IEEE Internet of Things Journal*, Aug. 2019.
46. Xiuzhuang Zhou, Kai Jin, Min Xu, **Guodong Guo**, "Learning deep compact similarity metric for kinship verification from face images," *Information Fusion*, vol. 48, pp. 84-94, Aug. 2019
47. Xuxin Lin, Jun Wan, Yiliang Xie, Shifeng Zhang, Chi Lin, Yanyan Liang, **Guodong Guo**, Stan Z Li, "Task-Oriented Feature-Fused Network With Multivariate Dataset for Joint Face Analysis*," IEEE transactions on cybernetics*, June 2019.
48. Liang Zhao, Feng Chen, **Yanfang Ye**. "Efficient Learning with Exponentially-Many Conjunctive Precursors for Interpretable Spatial Event Forecasting", *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2019.
49. Tian, P., Chao, H., Flanagan, P., Hagerott, S., **Gu, Y**., "Design and Evaluation of UAV Flow Angle Estimation Filters*," IEEE Transactions on Aerospace and Electronic Systems*, Vol.: 55, Issue: 1, Feb., 2019.

Journal Publications FY18 (14 Publications):

50. Zhangming Ding, **Nasser M. Nasrabadi**, Yun Fu, *"*Semi-supervised task-driven Deep transfer learning via coupled neural networks*," IEEE Transaction on Image Processing*, vol. 27, issue 11, pp. 5214-5224, June 2018.

51. Zhiguo Cao Chi Li, Yang Xiao and **Xin Li**. Despeckling via deep residue learning: a hybrid approach. submitted to *IEEE Signal Processing Letter*, 2018.

52. Weisheng Dong, Huan Wang, Fangfang Wu, Guangming Shi and **X. Li**, ``Deep Spatial-spectral representation learning for hyperspectral image denoising", submitted to *IEEE Trans. on Computational Imaging*, 2018.

53. P. Tian, H. Chao, H.P. Flanagan, S. G. Hagerott, **Y. Gu**, "Design and evaluation of UAV flow angle estimation filters" *IEEE Transactions on Aerospace and Electronic Systems*, 2018.
54. **Y. Gu**, J. Strader, N Ohi, S. Harper, K.. Lassak, C. Yang, L. Kogan, B. Hu, "Robot foraging: autonomous sample return in a large outdoor environment," *IEEE Robotics & Automation Magazine*, 2018.
55. **Y. Gu**, N. Ohi, K. Lassak, J. Strader, L. Kogan, A. Hypes, S. Harper, B. Hu, "Cataglyphis: An autonomous sample return rover," *Journal of Field Robotics*, 35 (2), 248-274, 2018.
56. X. Zhou, K. Jin, M. Xu, **G. Guo**, "Learning deep compact similarity metric for kinship verification from face images," *Information Fusion*, 48, 84-94, 2018.
57. Z. Tan, J. Wan, Z. Lei, R. Zhi, **G. Guo**, S. Z. Li, "Efficient group-n encoding and decoding for facial age estimation, "*IEEE transactions on pattern analysis and machine intelligence*, 40 (11), 2610, 2018.
58. M. Al Jazaery, **G. Guo**, Video-based depression level analysis by encoding deep spatiotemporal features," *IEEE Transactions on Affective Computing*, 2018.
59. M. Barr, **G. Guo**, S Colby, M Olfert, "Detecting body mass index from a facial photograph in lifestyle intervention," *Technologies* 6 (3), 83, 2018.
60. X. Zhou, K. Jin, Y Shang, **G Guo**, "Visually interpretable representation learning for depression recognition from facial images," *IEEE Transactions on Affective Computing*, 2018
61. J. Wan, Z. Tan, Z Lei, **G Guo,** SZ Li, "Auxiliary demographic information assisted age estimation with cascaded structure," *IEEE Transactions on Cybernetics*, 1-11, 2018
62. D. P. Chowdhury, S. Bakshi, **G Guo**, PK Sa, "On applicability of tunable filter bank based feature for ear biometrics: a study from constrained to unconstrained," *Journal of medical systems* 42 (1), 11, 2018
63. Junxiang Wang, Liang Zhao, **Yanfang Ye**, Yuji Zhang. "Adverse event detection by integrating twitter data and VAERS", *Journal of Biomedical Semantics*, 9:19, 2018.

64. **Yanfang Ye**, Lingwei Chen, Shifu Hou, William Hardy, **Xin Li**. "DeepAM: a heterogeneous deep learning framework for intelligent malware detection." *Knowledge and Information Systems* 54.2 (2018): 265-285.

Conference Publications for FY18 + FY19 + FY20: (Total conference publications 111)

Conference Publications FY20: **(28 publications)**

1. Seyed Mehdi Iranmanesh, Ali Dabouei, **Nasser M. Nasrabadi**, "Attribute Adaptive Margin Softmax Loss using Privileged Information," ***31st British Machine Vision Conference***, 7-11 Sept. 2020. **Acceptance Rate 29.1%**

2. Fariborz Taherkhani, Ali Dabouei, Sobhan Soleymani, Jeremy Dawson, **Nasser M. Nasrabadi**, "Transporting Labels via Hierarchical Optimal Transport for Semi-Supervised Learning," *16th European Conference on Computer Vision* (ECCV 2020) 23-28 Aug. 2020. (Spotlight paper) **Acceptance Rate 27%**

3. Saba Heidari, Omid Dehzangi, **Nasser M. Nasrabadi**, Ali Rezai, "OCT Image Segmentation Using Neural Architecture Search and SRGAN," *26th Int. Conf. on Pattern Recognition (ICPR)*, April 15, 2020, Milan, Italy.

4. Sertac Arisoy, **Nasser M. Nasrabadi**, Koray Kayabol, "GAN-based Hyperspectral Anomaly Detection,"*28th European Signal Processing Conference* (EUSIPCO2020), January 18-22, 2021 Amsterdam, Nederland.

5. Saba Heidari Gheshlaghi, Omid Dehzangi, Ali Dabouei, **N. M. Nasrabadi**, "OCT Image Segmentation Using an Efficient Neural Architecture Search," in *IEEE Int. Conf. Image Processing (ICIP)*, 25-28 October, 2020, United Arab Emirates. (*Acceptance rate 42%*)

6. M. Mostofa, F. Taherkhani, J. Dawson and **N. M. Nasrabadi**, "Cross-Spectral Iris Matching Using Coupled cGAN," *IEEE International Joint Conference on Biometrics (IJCB'20)*, Sept. 28- 1 Oct., 2020, Houston, Taxes.

7. F. Taherkhani, V. Talreja, J. Dawson, M. Valenti, **N. M. Nasrabadi**, "PF-CpGAN: profile to frontal coupled GAN for face recognition in the wild," *IEEE International Joint Conference on Biometrics (IJCB'20)*, Sept. 28-1 Oct., 2020, Houston, Taxes.

8. U.M. Osahor, H. Kazemi, A. Dabouei, **N. M. Nasrabadi,** "Quality Guided Sketch-to-Photo Image Synthesis," in *IEEE Computer Vision and Pattern Recognition Workshop on Biometrics (CVPRW),* 16 June, 2020.

9. Ali Dabouei, Sobhan Soleymani, Fariborz Taherkhani, Jeremy Dawson, Nasser M. Nasrabadi, "Exploiting Joint Robustness to Adversarial Perturbations," ***Computer Vision and Pattern Recognition*** **(CVPR 2020)**, June 14-19, 2020, Seattle, Washington. **(*Acceptance rate 22%)***

10. Moktari Mostofa, Syeda Nyma Ferdous, **Nasser M. Nasrabadi**, "A joint cross-modal super-resolution approach for vehicle detection in aerial imagery," *SPIE Symposium on* Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications II, *Proceedings Volume 11413*, Anaheim CA, 27 April - 1 May 2020

11. Syeda Nyma Ferdous, Moktari Mostofa, Uche Osahor, **Nasser M. Nasrabadi**, "Target classification in infrared imagery by cross-spectral synthesis using GAN," *SPIE Symposium, Automatic Target Recognition XXX, Proc. SPIE. 11394*, Anaheim CA, 27 April - 1 May 2020. **(the best paper award)**

12. H. Kazemi, F. Taherkhani, **N. M. Nasrabadi**, "Preference-Based Image Generation," *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*, March 2-5, 2020, Aspen, Colorado.

13. A. Dabouei, S. Soleymani, F. Taherkhani, J. Dawson, **N. M. Nasrabadi**, "SmoothFool: An Efficient Framework for Computing Smooth Adversarial Perturbations," *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*, March 2-5, 2020, Aspen, Colorado.

14. A. Dabouei, S. Soleymani, F. Taherkhani, J. Dawson, **N. M. Nasrabadi**, "Boosting Deep Face Recognition via Disentangling Appearance and Geometry," *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*, March 2-5, 2020, Aspen, Colorado.

15. S. M. Iranmanesh, A. Dabouei, S. Soleymani, H. Kazemi, **N. M. Nasrabadi**, "Robust Facial Landmark Detection via Aggregation on Geometrically Manipulated Faces," *IEEE Winter Conference on Applications of Computer Vision (WACV 2020)*, March 2-5, 2020, Aspen, Colorado.

16. Lu, X., Huang, H., Dong, W., **Li, X.**, and Shi, G., "Beyond network pruning: a joint search-and-training approach," In *International Joint Conference on Artificial Intelligence*, 2020. (**Acceptance rate: 12.6%**)
17. Xiong, X., Xiong, H., Xian, K., Zhao, C., Cao, Z. and **Li, X**., 2020, January. Sparse-to-Dense Depth Completion Revisited: Sampling Strategy and Graph Construction⋆. In *European Conference on Computer Vision (ECCV), 23-28 Aug. 2020.* ***(Acceptance rate: 27%)***
18. Xuan Xu and **Xin Li**, "Deformable Kernel Convolutional Network for Video Extreme Super-Resolution", *ECCV AIM Workshop*, 2020.
19. Qiangchang Wang, Tianyi Wu, He Zheng, **G. Guo**, Hierarchical Pyramid Diverse Attention Network for Face Recognition, *IEEE Conf. on Computer Vision and Pattern Recognition* (CVPR), 2020, June 2020.
20. Z. Tan, Yang Y, J. Wan, **G. Guo,** and Stan Z. Li, Relation-Aware Pedestrian Attribute Recognition with Graph Convolutional Networks, In AAAI 2020.
21. **Saiph Savage**, Chun-Wei Chiang, Susumu Saito, Carlos Toxtli, Jeffrey Bigham, "Becoming the Super Turker:Increasing Wages via a Strategy from High Earning Workers," *WWW: The Web Conference* 2020
22. Carlos Toxtli, Angela Richmond-Fuller, **Saiph Savage**, "Reputation Agent: Prompting Fair Reviews in Gig," Markets, *WWW: The Web Conference* 2020.
23. Claudia Flores-Saviaga, Yuwen Li, Benjamin Hanrahan, Jeffrey Bigham, **Saiph Savage**, "The Challenges of Crowd Workers in Rural and Urban America," *HCOMP: AAAI Conference on Human Computation and Crowdsourcing*, 2020.

24. **Saiph Savage,** Mohammad H Jarrahi, "Solidarity and A.I. for Transitioning to Crowd Work during COVID-19," *The New Future of Work Symposium*, 2020.
25. **Saiph Savage**, "Citizens as More Than Sensors, Citizens as Agents for Change," *WWW: The Web Conference 2020*, Extended Abstract
26. Carlos Toxtli, **Saiph Savage**, "Enabling Expert Critique at Scale with Chatbots and Micro-Guidance," *ACHI: Advances in Computer-Human Interactions*, 2020.
27. Benjamin Hanrahan, Ning Ma, Eber Betanzos, **Saiph Savage**, "Reciprocal Research: Providing Value in Design Research from the Outset in the Rural United States," *ICTD:Conference on Information and Communication Technologies and Development*, 2020.
28. Alberto Garcia, Cameron Dennis, Norma Elva Chavez, Amy Ruckes, Eber Betanzos, **Saiph Savage**, "Using Smart Contracts for Governance and Identity," *FAB'20: Symposium on Foundations and Applications of Blockchain*, 2020 (Poster)

Conference Publications FY19 (56 publications)

29. Anna Kasunik, Chun-Wei Chiang, Geoff Kaufman, **Saiph Savage**, "Turker Tales: Integrating Tangential Play into Crowd Work," *DIS: ACM Conference on Designing Interactive Systems,* 2019.
30. Claudia Flores Saviaga, Jessica Hammer, Juan Pablo Flores, **Saiph Savage**, "Audience and Streamer Participation at Scale on Twitch," *HT: ACM Conference on Hypertext and Social Media,* 2019.
31. Susumu Saito, Chun-Wei Chiang, **Saiph Savage**, Jeffrey Bigham, "TurkScanner: Predicting the Hourly Wage of Microtasks," *WWW: The Web Conference*, 2019
32. Chun Wei Chiang, Eber Betanzos, **Saiph Savage**, "Deploying Real World Blockchain Systems," *Journal of Cyberspace Studies*, 2019.
33. Liliana Savage, Eber Betanzos, **Saiph Savage**, "BOTS: For Building a Better Society?," Book Chapter for CIDOB International Yearbook 2019.
34. Carlos Toxtli, Juan Pablo Castillo, Alberto Campos, et al. **Saiph Savage**, "Understanding the Crowd Markets that Workers and Requesters Imagine," *CI: ACM Conference on Collective Intelligence* 2019
35. Claudia Flores-Saviaga, **Saiph Savage**, "Anti-LatinX: Computational Propaganda in the US," *Institute of the Future* White Paper 2019.
36. Seth Frey, Grace Benefield, Clark Bernier, Maarten Bos, Ceren Budak, Simon DeDeo, Rosta Farzan, Benjamin Mako Hill, Abigail Jacobs, **Saiph Savage**, Aaron Shaw, "Org-scale analytics: Today's startups build societies. Do it right," *Towards Data Science Journal* 2019
37. Liliana Savage, Rafael Salas, **Saiph Savage**, "Blockchain for Governance and Civic Participation in Mexico," White Paper 2019.
38. Kotaro Hara, Kristy Milland, Benjamin Hanrahan, Chris Callison-Burch, Abigail Adams, **Saiph Savage**, Jeffrey Bigham, *CHI: ACM Conference on Human Factors in Computing Systems* 2019.
39. F. Taherkhani, H Kazemi, A Dabouei, J. Dawson, **N. M. Nasrabadi**, "A Weakly Supervised Fine Label Classifier Enhanced by Coarse Supervision," IEEE Int. Conf. on Computer Vision (ICCV'19), Oct. 23 - Nov. 2, 2019. **(*Acceptance rate 25%)***
40. S. Soleymani, A. Dabouei, J. Dawson, **N. M. Nasrabadi**, "Defending Against Adversarial Iris Examples Using Wavelet Decomposition," *The Tenth IEEE International Conference on Biometrics: Theory, Applications, and Systems* (BTAS 2019), Sept. 23, 2019. (**Best Poster Paper**)
41. V. Talreja, M. Valenti, **N. M. Nasrabadi**, Zero-Shot Deep Hashing and Neural Network Based Error Correction for Face Template Protection," *The Tenth IEEE International Conference on Biometrics: Theory, Applications, and Systems* (BTAS 2019), Sept. 23, 2019.
42. V. Talreja, F. Taherkhani, **N. M. Nasrabadi**, M. Valenti, "Attribute-Guided Coupled GAN for Cross-Resolution Face Recognition," *The Tenth IEEE International Conference on Biometrics: Theory, Applications, and Systems* (BTAS 2019), Sept. 23, 2019.
43. H. Kazemi, F. Taherkhani, **N. M. Nasrabadi**, "Identity-Aware Deep Face Hallucination via Adversarial Face Verification," *The Tenth IEEE International Conference on Biometrics: Theory, Applications, and Systems* (BTAS 2019), Sept. 23, 2019.

44. D. Poster, B. S. Riggan, S. Hu, **N. M. Nasrabadi**, "An Examination of Deep-Learning Based Landmark Detection Methods on Thermal Face Imagery," CVPRW'19, *15th IEEE Workshop on Perception Beyond the Visible Spectrum* (PBVS'19), 2019.

45. F. Taherkhani, J. Dawson, **N. M. Nasrabadi**, "Hyperspectral Band Selection for Face Recognition Based on a Structurally Sparsified Deep Convolutional Neural Networks," in *the 12th IAPR International Conference On Biometrics* (ICB'19), 4-7 June 2019, Crete, Greece.

46. S. Soleymani, A. Dabouei, J. Dawson, **N. M. Nasrabadi**, "Adversarial Examples to Fool Iris Recognition Systems" in *the 12th IAPR International Conference On Biometrics* (ICB'19), 4-7 June 2019, Crete, Greece.

47. A. Dabouei, S. Soleymani, J. Dawson, **N. M. Nasrabadi**, "Deep Contactless Fingerprint Unwarping," in *the 12th IAPR International Conference On Biometrics* (ICB'19), 4-7 June 2019, Crete, Greece.

48. S. M. Iranmanesh, **N. M. Nasrabadi**, "Attribute-Guided Deep Polarimetric Thermal-to-visible Face Recognition," in *the 12th IAPR International Conference On Biometrics* (ICB'19), 4-7 June 2019, Crete, Greece.

49. V. Talreja, M. Valenti, **N. M. Nasrabadi**, "Learning to Authenticate with Deep Multibiometric Hashing and Neural Network Decoding," *IEEE International Conference on Communications (ICC'19),* 20-24 May 2019, Shanghai, China. (acceptance rate 39.9%)

50. U. M. Osahor, **N. M. Nasrabadi**, "Design of adversarial targets: fooling deep ATR systems," in Automatic Target Recognition XXIX 10988, 109880F, https://doi.org/10.1117/12.2518945, SPIE Defense & Commercial Sensing, April 2019, Baltimore, MD, US.

51. U. M Osahor, **N. M Nasrabadi**, "Deep adversarial attack on target detection systems," in Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications, 1100617 (2019) https://doi.org/10.1117/12.2519045, SPIE Defense & Commercial Sensing, April 2019, Baltimore, MD, US.

52. S. N. Ferdous, M. Mostofa, **Nasser M. Nasrabadi**, "Super resolution-assisted deep aerial vehicle detection," Proceedings Volume 11006, Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications; 1100617 (2019)

    https://doi.org/10.1117/12.2519045, SPIE Defense & Commercial Sensing, April 2019, Baltimore, MD, US.

53. F. Taherkhani, H. Kazemi, **N. M. Nasrabadi**, "Matrix Completion for Graph-Based Deep Semi-Supervised Learning", *33rd AAAI Conference on Artificial Intelligence (AAAI)*, Jan. 27-Feb. 1, 2019, Honolulu, Hawaii. **(acceptance rate 16.7%)**

54. A. Dabouei, S. Soleymani, J. Dawson, **N. M. Nasrabadi**, "Fast Geometrically-Perturbed Adversarial Faces," *2019 IEEE Winter Conference on Applications of Computer Vision (WACV'19)*, Waikoloa, Hawaii, January 8-10, 2019. (acceptance rate 34%)

55. H. Kazemi, S. M. Iranmanesh, **N. M. Nasrabadi**, "Style and Content Disentanglement in Generative Adversarial Networks," *2019 IEEE Winter Conference on Applications of Computer Vision (WACV'19)*, Waikoloa, Hawaii, January 8-10, 2019. (acceptance rate 34%)

56. Yixin Du and **Xin Li**, "Recursive Image Dehazing via Perceptually Optimized Generative Adversarial Network (POGAN)", *IEEE Conf. on CVPR Workshop*'2019.

57. Xuan Xu and **Xin Li**, "SCAN: Spatial Color Attention Networks for Real Single Image Super-Resolution", *IEEE Conf. on CVPR Workshop*'2019.

58. Stephen Itschner and **Xin Li**, "Radio Frequency Interference (RFI) Detection in Instrumentation Radar Systems: a Deep Learning Approach", IEEE RADAR, 2019.

59. Chen Zhao, Z. Cao, **Xin Li** and J. Yang, "NM-Net: Mining Reliable Neighbors for Robust Feature Correspondences", CVPR (oral), 2019

60. **Yanfang Ye** (✉), Shifu Hou*, Lingwei Chen*, Jingwei Lei, Wenqiang Wan, Jiabin Wang, Qi Xiong, Fudong Shao. "Out-of-sample Node Representation Learning for Heterogeneous Graph in Real-time Android Malware Detection", *28th International Joint Conference on Artificial Intelligence (IJCAI)*, 2019. *(17.9% acceptance rate)*
61. Yujie Fan*, Yiming Zhang*, Shifu Hou*, Lingwei Chen*, **Yanfang Ye** (✉), Chuan Shi, Liang Zhao, Shouhuai Xu. "iDev: Enhancing Social Coding Security by Cross-platform User Identification Between GitHub and Stack Overflow", *28th International Joint Conference on Artificial Intelligence (IJCAI)*, 2019. *(17.9% acceptance rate)*
62. Yuyang Gao, Liang Zhao, Lingfei Wu, **Yanfang Ye**, Hui Xiong, Chaowei Yang. "Incomplete Label Multi-task Deep Learning for Spatio-temporal Event Subtype Forecasting", *33rd AAAI Conference on Artificial Intelligence (AAAI)*, 2019. *(16.7% acceptance rate)*
63. Deqiang Li, Qianmu Li, **Yanfang Ye**, Shouhuai Xu. "Enhancing Robustness of Deep Neural Networks Against Adversarial Malware Samples: Principles, Framework, and Application to AICS'2019 Challenge". *The AAAI-19 Workshop on Artificial Intelligence for Cyber Security (AICS)*, 2019. ***AICS 2019 Challenge Problem Winner***.
64. Yiming Zhang*, Yujie Fan*, Wei Song, Shifu Hou*, **Yanfang Ye** (✉), Xin Li, Liang Zhao, Chuan Shi, Jiabin Wang, Qi Xiong. "Your Style Your Identity: Leveraging Writing and Photography Styles for Drug Trafficker Identification in Darknet Markets over Attributed Heterogeneous Information Network", *The Web Conference (WWW)*, 2019. *(20% acceptance rate for short paper)*
65. Xiao Wang, Houye Ji, Chuan Shi, Bai Wang, Peng Cui, Philip Yu, **Yanfang Ye**. "Heterogeneous Graph Attention Network", *The Web Conference (WWW)*, 2019. *(18% acceptance rate)*
66. Shifu Hou*, Yujie Fan*, Yiming Zhang*, **Yanfang Ye**, Jingwei Lei, Wenqiang Wan, Jiabin Wang, Qi Xiong and Fudong Shao. "*αCyber*: Enhancing Robustness of Android Malware Detection System against Adversarial Attacks on Heterogeneous Graph based Model", *International Conference on Information and Knowledge Management (CIKM)*, 2019. *(19.4% acceptance rate)*
67. Yiming Zhang*, Yujie Fan*, **Yanfang Ye**, Chuan Shi, Liang Zhao. "Key Player Identification in Underground Forums over Attributed Heterogeneous Information Network Embedding Framework", *International Conference on Information and Knowledge Management (CIKM)*, 2019. *(19.4% acceptance rate)*
68. Yuanfu Lu, Xiao Wang, Chuan Shi, Philip Yu and **Yanfang Ye**, "Temporal Network Embedding with Micro- and Macro-dynamics", *International Conference on Information and Knowledge Management (CIKM)*, 2019. *(19.4% acceptance rate)*
69. Yuyan Zheng, Chuan Shi, Xiangnan Kong and **Yanfang Ye**, "Author Set Identification via Quasi-Clique Discovery", *International Conference on Information and Knowledge Management (CIKM)*, 2019. *(19.4% acceptance rate)*
70. Qingzhe Li, Liang Zhao, Yi-Ching Lee, **Yanfang Ye**, Jessica Lin, and Lingfei Wu. "Contrast Feature Dependency Pattern Mining for Controlled Experiments with Application to Driving Behavior", *19th IEEE International Conference on Data Mining (ICDM)*, 2019. *(18.5% acceptance rate)*
71. Lingwei Chen, Shifu Hou, **Yanfang Ye,** Thirimachos Bourlai, Shouhuai Xu, Liang Zhao. "iTrustSO: An Intelligent System for Automatic Detection of Insecure Code Snippets in Stack Overflow", *Proceedings of International conference on Advances in Social Network Analysis and Mining (ASONAM)*, 2019.
72. Yuyang Gao, Liang Zhao, Lingfei Wu, **Yanfang Ye**, Hui Xiong, Chaowei Yang. "Incomplete Label Multi-Task Deep Learning for Spatio-temporal Event Subtype Forecasting", *33rd AAAI Conference on Artificial Intelligence (AAAI)*, 2019. *(16.2% acceptance rate)*
73. Xuan Xu and **Xin li**, "SCAN: Spatial Color Attention Networks for Real Single Image Super-Resolution," IEEE CVPRW, 2019.
74. Yixin Du and **Xin Li**, "Recursive Image Dehazing via Perceptually Optimized Generative Adversarial Network (POGAN)," IEEE CVPRW, 2019.
75. Chen Zhao, Zhiguo Cao, Chi Li, **Xin Li**, Jiaqi Yang, "NM-Net: Mining Reliable Neighbors for Robust Feature Correspondences," IEEE CVPR, 2019
76. Stephen Itschner and Xin Li, "Radio Frequency Interference (RFI) Detection in Instrumentation Radar Systems: a Deep Learning Approach," IEEE Radar Conference, 2019

77. Strader, J., Nguyen, J., Tatsch, C., Du, Y., Lassak, K., Buzzo, B., Watson, R., Cerbone, H., Ohi, N., Yang, C., **Gu, Y**., "Flower Interaction Subsystem for a Precision Pollination Robot," Accepted, to be presented at *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'19)*, Macau, China, Nov 2019.
78. Kilic, C., Gross, J., Ohi, N., Watson, R., Strader, J., Swiger, T., Harper, S., **Gu, Y**., "Improved Planetary Rover Inertial Navigation and Wheel Odometry Performance through Periodic Use of Zero-Type Constraints," Accepted, to be presented at *IEEE/RSJ International Conference on Intelligent Robots and Systems* (*IROS'19)*, Macau, China, Nov 2019.
79. Rhudy, M., Gross, J. **Gu, Y**., "Stochastic Wind Modeling and Estimation for Unmanned Aircraft Systems," *AIAA Aviation 2019 Forum* (p. 3111), Dallas, TX, Jun 2019.
80. Ajian Liu, Jun Wan, Sergio Escalera, Hugo Jair Escalante, Zichang Tan, Qi Yuan, Kai Wang, Chi Lin, **Guodong Guo**, Isabelle Guyon, Stan Z. Li, "Multi-Modal Face Anti-Spoofing Attack Detection Challenge at CVPR2019." CVPR Workshops 2019.
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83. Chunlei Liu, Wenrui Ding, Xin Xia, Yuan Hu, Baochang Zhang, Jianzhuang Liu, Bohan Zhuang, **Guodong Guo**, "Rectified Binary Convolutional Networks for Enhancing the Performance of 1-bit DCNNs," IJCAI 2019: 854-860.
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Conference Publications FY18: (27 publications)

85. Ali Dabouei, Sobhan Soleymani, Jeremy Dawson, **Nasser M. Nasrabadi**, "Fast Geometrically-Perturbed Adversarial Faces," *2019* IEEE Winter Conference on Applications of Computer Vision (*WACV'19*), Waikoloa, Hawaii, January 8-10, 2019.
86. Hadi Kazemi, Seyed Mehdi Iranmanesh, **Nasser M. Nasrabadi**, "Style and Content Disentanglement in Generative Adversarial Networks," *2019* IEEE Winter Conference on Applications of Computer Vision (*WACV'19*), Waikoloa, Hawaii, January 8-10, 2019.
87. F. Taherkhani, H. Kazemi, **N. M. Nasrabadi**, "Matrix Completion for Graph-Based Deep Semi-Supervised Learning", *33rd AAAI Conference on Artificial Intelligence (AAAI)*, Jan. 27-Feb. 1, 2019, Honolulu, Hawaii. *(16.2% acceptance rate)*
88. H. Kazemi, M. Iranmanesh, F. Taherkhani, S. Soleymani, **N. M. Nasrabadi**, "Unsupervised Image-to-Image Translation Using Domain-Specific Variational Information Bound," Thirty-second Conference on Neural Information Processing Systems (NIPS'18), 4-6 Dec., 2018, Montreal, Canada.
89. F. Taherkhani, V. Talreja, **N. M. Nasrabadi**, M. Valenti "Using Deep Cross Modal Hashing and Error Correcting Codes for Improving the Efficiency of Attribute Guided Facial Image Retrieval," in *IEEE GlobalSIP*, Nov. 26-29, 2018, Anaheim, CA.
90. X. Sun, **N. M. Nasrabadi**, T. D. Tran, "Supervised Multilayer Sparse Coding Networks for image classification," *2018 IEEE International Conference on Image Processing (ICIP'18)*, Athens, Greece.
91. S. Soleymani, A. Dabouei, H. Kazemi, J. Dawson, **N. M. Nasrabadi**, "Generalized Bilinear Deep Convolutional Neural Networks for Multimodal Biometric Identification," *2018 IEEE International Conference on Image Processing (ICIP'18)*, Athens, Greece.

92. S. M. Iranmanesh, H. Kazemi, S. Soleymani, A. Dabouei, **N. M. Nasrabadi**, "Deep Sketch-Photo Face Recognition Assisted by Facial Attributes," *9th IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS 2018)*. **(Best Poster Presentation Award)**

93. S. Soleymani, A. Dabouei, S. M. Iranmanesh, H. Kazemi, J. Dawson, **N. M. Nasrabadi**, "Prosodic-Enhanced Siamese Convolutional Neural Networks for Cross-Device Text-Independent Speaker Verification," *9th IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS 2018)*.

94. A. Dabouei, S. Soleymani, H. Kazemi, SM Iranmanesh, Jeremy Dawson, **Nasser M. Nasrabadi**, "ID Preserving Generative Adversarial Network for Partial Latent Fingerprint Reconstruction," *9th IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS 2018)*. **(Best Student Paper Award)**

95. S. Soleymani, A. Dabouei, H. Kazemi, J. Dawson, **N. M. Nasrabadi**, "Multi-Level Feature Abstraction from Convolutional Neural Networks for Multimodal Biometric Identification," *2018 International Conference on Pattern Recognition (ICPR'18).*

96. A. Soleimani, **N. M. Nasrabadi**, Elias Griffith, Jason Ralph, Simon Maskell, "Convolutional Neural Networks for Aerial Vehicle Detection and Recognition," *IEEE National Aerospace & Electronics Conference (NAECON)*, 2018.

97. A. Torfi, J. Dawson, **N. M. Nasrabadi**, "Text-independent speaker verification using 3-D convolutional neural networks," *IEEE Int. Conf. on Multimedia and Expo (ICME'18)*.

98. A Soleimani, **N. M. Nasrabadi**, "Convolutional Neural Networks for Aerial Multi-Label Pedestrian Detection," *21st International Conference on Information Fusion (Fusion'18*), 2018.

99. B. S Riggan, N. J Short, M. S Sarfraz, S Hu, H Zhang, V. M Patel, S Rasnayaka, J Li, T Sim, S. M Iranmanesh, **N. M Nasrabadi**, "ICME grand challenge results on heterogeneous face recognition: Polarimetric thermal-to-visible matching, "*IEEE International Conference on Multimedia and Expo (ICME)*, San Diego, CA, 2018. **(2nd Place Grand Challenges)**

100. F. Taherkhani, **N. M. Nasrabadi**, Jeremy Dawson, "A Deep Face Identification Network Enhanced by Facial Attributes Prediction," *IEEE CVPRW 2018*. **(The Best Workshop Paper)**

101. H Kazemi, S Soleymani, A Dabouei, M Iranmanesh, **N. M. Nasrabadi**, "Attribute-Centered Loss for Soft-Biometrics Guided Face Sketch-Photo Recognition," *IEEE CVPRW 2018*.

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104. O. Ulutan, B. S. Riggan, **N. M. Nasrabadi**, B. S. Manjunath, "An Order Preserving Bilinear Model for Person Detection in Multi-Modal Data," *IEEE Winter Conf. on Applications of Computer Vision (WACV 2018)*, Lake Tahoe, NV, March 12-14, 2018.

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107. Hara K., Adams A., Milland K., **Savage S.**, Callison-Burch C., Bigham J., A Data-Driven Analysis of Workers Earnings on Amazon Mechanical Turk. *CHI 2018: ACM Conference on Human Factors in Computing Systems,* 25% acceptance rate and Honrable Mention (only 5% of all accepted papers.).

108. Saviaga C., Keegan B., **Savage S**., Mobilizing the Trump Train: Understanding Collective Action in a Political Troll Community. *ICWSM 2018: International AAAI Conference on Web and Social Media 2018*, 15% acceptance rate.

108. Chun-Wei Chiang, Anna Kasunic, **Saiph Savage**, "Crowd Coach: Peer Coaching for Crowd Workers' Skill Growth," *CSCW: ACM Conference on Computer-Supported Cooperative Work*, 2018.

109. Juan Pablo Flores, **Saiph Savage**, Jessica Hammer, Joseph Seering, "The Social Roles of Bots: Evaluating Impact of Bots on Discussions in Online Communities," *CSCW: ACM Conference on Computer-Supported Cooperative Work*, 2018.

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26. Yixin Du and **Xin Li**, "Recursive deep residue learning for single image dehazing", *IEEE Conf. on CVPR Workshop*'2018.

27. **G Guo**, N Zhang, "What Is the Challenge for Deep Learning in Unconstrained Face Recognition?," *13th IEEE International Conf. on Automatic Face & Gesture Recognition (FG 2018)*, 2018.
28. X Liu, **G Guo**, "Attributes in Multiple Facial Images," *13th IEEE International Conf. on Automatic Face & Gesture Recognition (FG 2018)*, 2018.
29. Yuyang Gao, Liang Zhao, Lingfei Wu, **Yanfang Ye**, Hui Xiong, Chaowei Yang. "Incomplete Label Multi-task Deep Learning for Spatio-temporal Event Subtype Forecasting", *33rd AAAI Conference on Artificial Intelligence (AAAI)*, 2019. *(16.2% acceptance rate)*

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