Name: Prof. Mohammad Mayyas, Ph.D

I. Academic Degrees

Degree	Institution	Year	Major	Area
Ph.D	University of Texas - Arlington	2007	Mechanical Engineering	Microsystem
Master of Science	University of Texas - Arlington	2004	Mechanical Engineering	Microsystem
Bachelor of Science	Jordan University of Sci. & Tech.	2001	Mechanical Engineering	Production

II. Academic Positions

A. Teaching and other Academic Positions

No.	Position	Institution	Years	Major Area
1	**Associate Professor**	Bowling Green State University	2013-Pres.	Eng. Technologies
2	**Associate Professor of Research**	University of Texas - Arlington	2013-2016	Mech. & Aerospace Dept.
3	**Senior Research Scientist**	Uni. of Texas - Arlin. Res. Inst.	2012-2013	Assistive Robotics
4	**Special Faculty Member**	Auto. & Robo. Research Institute	2009-2013	Mech. & Aerospace Dept.
5	**Faculty Associate of Research**	Auto. & Robo. Research Institute	2009-2012	Adv. Manufacturing/MEMS
6	**Research Associate (Post Doc)**	Auto. & Robo. Research Institute	2008-2009	Robotics & Microsys.
7	**Visiting Assistant Professor**	Hashemite University	Sum. 2009	Mechatronics Dept.
8	**Graduate Research Associate**	Auto. & Robo. Research Institute	2005-2007	Microsystems
9	**Graduate Teaching Assistant**	University of Texas - Arlington	2004-2005	Mech. & Aerospace Dept.
10	**Graduate Research Assistant**	University of Texas - Arlington	2003-2004	Adv. Manufacturing/Laser
11	**Graduate Teaching Assistant**	Jordan University of Sci. & Tech.	2001-2002	Mech. Eng. Dept.

B. Administrative Positions

No.	Position	Institution	Years	Major Area
1	**Hub Director of FalconBEST Robotics**	Bowling Green State University	2015-Pres.	Regional and National STEM Competition
2	**Director of Robotics**	Uni. of Texas - Arlin. Res. Inst.	2012-2013	Assistive Robotics

III. Non-Academic Positions

No.	Position	Institution	Years	Major Area
1	**Engineering Intern**	Rhodia Engineering Plastic	2000	FEM Developer
2	**Product designer**	Mayyas Pharmaceutical Inc.	1999-2002	Package development

C. Other Curriculum development

Development	Semester	Comment
Mechatronics Engineering Technology Program	2014-2016	• Created a new program (previously EMST), and get it approved at university level by fall 2016. • Approved check sheet with a balanced courses from ENGT and ECET programs.

Engineering Technologies accreditation	2015-2016	• Developed courses, and assessment tools. • Participated in writing self-study report, and final assessment report.

IV. Professional Development *

Year	Professional Development Activities
2017	• Obtained trainings on Mechatronics training mobile units, from RAPIDS 1.0 grant. • Visited and collaborated with regional robotic industries to help establish task-force for smart factories. • Participated in conference on STEM leadership. • Participated in undergraduate conference In Findlay-Ohio. • Participated in local poster session for Undergraduate workshop in BGSU. • Participated in regional collaborative research grant proposal RAPIDS 2.0. • Participating in institutional collaborative research grant, with interdisciplinary faculties from BGSU. • Conducted mentorship workshops for STEM teachers and student interested in robotics. • Participated in journal/conference review. • Participated in regional collaborative research grant proposal. • Participated as professional board member of international robotics journal
2016	• Obtained the *instructor* training on Mitsubishi robots • Visited robotic industry to help establish task-force for advanced manufacturing. • Visited robotic industry and schools to help grow STEM robotics competitions. • Conducted mentorship workshops for STEM teachers and student interested in robotics. • Participated in entrepreneurship workshops through Hatch. • Participated in journal/conference review. • Participated in regional collaborative research grant proposal, RAPIDS 1.0. • Participated as professional board member of international robotics journal
2015	• Toured robotics laboratories, and participated in talks at the Massachusetts Institute of Technology- Boston. • Toured the Disaster City- Texas, and participated in DOD research grant discussion at with colleagues from Texas A&M –College station. • Participated in creating NORTH Consortium, Institutions from Northwest Ohio. • Participated in institutional collaborative research grant proposal • Participated in international conferences • Participated in journal/conference review
2014	• Obtained NSF & NIH Grant writing training in University of Cleveland. • Obtained Adobe CMS training for BGSU website development. • Visited Industrial manufacturing companies and survived technologies and needs. • Participated in journal/conference review • Participated in seminar and discussion with industries.
Fall -2013	• Maintained a collaborative research activities with the Mechanical & Aerospace Engineering faculty from the University of Texas at Arlington. • Participated in journal/conference review
2008- 2013	• See Research Narrative, Service Narrative, and Teaching Narrative

*Few examples of professional development activities during employment in BGSU. A complete list of the professional development activities is available in the narratives, and categorized with detailed descriptions.

V. Academic Advising & Mentorship

Program	Year	Number of student assigned*
A- Undergraduate	2013-2017	• Advising ENGT and Mechatronics undergraduate on demand basis, which is coordinated with the CTAAE advisor staff. No headcount structure is implemented.

		• Advising (career, resume) for all senior deign student (on average 18 student per year). • Advising undergraduate research and coop student. (see section V for most recent number)
B- Graduate	2013-2017	• Provided supporting role as graduate faculty to the associate graduate dean. • Providing mentorship and advising to research students (see section V for most recent number).

* No formal faculty advising/mentorship assignment exist in CTAAE as of Today.

VI. Research Interest

- Design & development of Microsystem (Micro-Electro-Mechanical Systems); most recently includes:
  - MEMS sensors: Wearable smart sensor for collaborative robotics.
  - MEMS actuators: Micro Manipulation
- Design and development of advanced manufacturing toolbox for robotics factory ; most recently includes:
  - Parallel and serial inverse Kinematics for assembly robots.
  - Multiscale grasping mechanism.
  - Image processing for micro surface characterization.
- Integration of STEM field into workforce development (Started recently)
  - Development of Smart robotics factory.
  - Development of Education 4.0 and hybrid education with assistive robotics technologies.

VII. Funded Grants

D. Externally Funded Proposal (Research & Development)

1. **"E-Factory: Cyber Manufacturing Workforce Development"**. Funded by **N**orthwest **O**hio **R**egional **T**raining **H**ub, Regionally Aligned Priorities in Delivering Skills Program (RAPIDS 2.0), under the Department of Ohio Higher Education. *Accepted* amount **$394K** for BGSU's. (PI and lead: Mohammad Mayyas, Admin lead: Michael Ogawa, 2017 – present).
2. "**Advance Manufacturing Training Equipment: Mechatronics and Process Control Mobile Units**. "Funded by **N**orthwest **O**hio **R**egional **T**raining **H**ub, Regionally Aligned Priorities in Delivering Skills Program (RAPIDS 1.0), under the Department of Ohio Higher Education. Awarded **$1M** shared with NORTH consortium. (Lead: Todd Hernandez, BGSU's Technical lead and contributor: Mohammad Mayyas, 2015-present).
3. "**Development of Robotics Facility**". Funded by a donation from Rixan Associate Inc., net worth of **over $1M**. (Multiple leads: Sara Zulch Smith- Capital Campaign, Rodney Roger – Academic provost, Venu Dasigi – Interim Dean of CAATE, Mohammad Mayyas-Technical investigator, 2015-present).
4. "**Biomechanical Interface for Optimized Delivery of MEMS Orchestrated Mammalian Epimorphosis**" sponsored by The Armed Forces Institute of Regenerative Medicine, US Army, (PI Stephan Badylak - McGowan Institute for Regenerative Medicine at the University of Pittsburg, total award for 4 years **$2M**. (Sub award Mohammad Mayyas: **$80k per year** 2013).
5. "**BIODOME reactor**" sponsored by McGowan Institute for Regenerative Medicine at the University of Pittsburg. (contract **$12k**. PI Mohammad Mayyas. 06/13-08/13).

6. "**Tower of Hanol: A Sensorized Gaming Platform to Assess Cognitive Functions**" Sponsored by College of Nursing, **$10k** (Co-PI: Mohammad Mayyas 07/13-12/13).
7. "**3D Point-of-Gaze Based Wheelchair Control**," Contract **$72k**, sponsored by the University of Pittsburg, (PI- Mohammad Mayyas, 2012-2013).
8. "**Manufacturing Innovation for Technology Transition**", Sponsored by office of Naval Research.(PI- Harry Stephanou, Co-PI: Mohammad Mayyas, $1,533,649, 2011-2016).
9. "**High-density Interconnect for high-resolution APD/ROIC Hybridization**" SBIR Phase I, Department of Defense, Air Force.. Award **$70k**. (UTA PI- Mohammad Mayyas, Princeton Lightwave PI- Sabbir Rangwala 03/2009-07/2009).
10. "Disruptive techniques for hybridization of focal plane arrays for optical imaging sensors", SBIR Phase II, Department of Defense, Air Force. Award $**749,681** (Princeton Lightwave PI- Sabbir Rangwala, UTA sub award: Mohammad Mayyas 2010-2012).
11. "**Development of Microsystem Platforms in Hazardous environments Applications to Munitions and Enhancement**" sponsored by Office of Naval Research, Awarded amount $6,530,046.(PI- Harry Stephanou, Co-PI: Mohammad Mayyas,. 2008 –2012).
12. "**Microactuator Array for CMP Pressure Control**", Industry contact Phase I sponsored by Strasbugh, Amount **$120k**. (PI: Mohammad Mayyas, $120k, 2011-2012).

Summary of external (Research & Development) grant in BGSU only, excluding UT-Arlington.

Year	Agency	Amount (US dollar)
2017	DOHE	394,000
2016	Rixan Associate Inc.	~ 1000,000
2015	DOHE	1000,000 – Shared
Total =		**~2,394,000**

E. Externally and Internally Funded (STEM)

13. "**Falcon BEST Robotics**", Donation from First Solar, **$5k**, (Role: Facilitator and Hub-director, 2017).
14. "**Falcon BEST Robotics**", Donation from BGSU foundation, **$2k**, (Role: Facilitator and Hub-director, 2016).
15. "**Falcon BEST Robotics**", Donation from First Solar, **$5k**, (Role: Facilitator and Hub-director, 2016).
16. "**Falcon BEST Robotics**", Donation from Lothrop, **$5k**, (Role: Facilitator and Hub-director, 2017).
17. "**Falcon BEST Robotics**", Donation from Lothrop, **$5k**, (Role: Facilitator and Hub-director, 2016).
18. "**Texas Youth in Technology Program**" sponsored by Nanomaterials Design & Commercialization Center. Grant award amount **$71k**. (PI- Mohammad Mayyas, 2009-2010).

Summary of external (STEM) grant in BGSU only, excluding UT-Arlington.

Year	Agency	Amount (US dollar)
2017	Lathrop, First Solar	10000
2016	Lathrop, First Solar, BGSU foundation	10000 2000

Total =	**22,000**

F. Internally Funded Proposal (Research & Development)

19. "**Establishment of Multi-scale Robotics Laboratory**" Seed fund sponsored by BGSU's office of research (80%) and College of Technology, Architecture & Applied Engineering (20 %) , Internal start-up fund of **$20k**. (PI: Mohammad Mayyas, 2014-).

Summary of internally funded (Research & Development) proposal in BGSU only.

Year	BGSU	Amount (US dollar)
2014	Faculty Start-up	20000
Total =		**20,000**

G. Internally Funded Proposal (Professional Development & Undergraduate Research)

20. "**Project Kaleidoscope (PKAL) Conference, AAC&U's STEM higher education reform center**" NSF-SEA, PI: Dr. Moira van Staaden, Registration and expenses **$3500**. (Granted to Mohammad Mayyas, 2017).
21. "**Finite Element Modeling Software, ANSYS – 50 educational seats**" Sponsored by BGSU-ITS, **$2400 Annual**. (Granted to Mohammad Mayyas since 2014).
22. "**Mechatronics Software, 20-sim – unlimited seats**" Sponsored by BGSU-ITS, Initial cost **$6000, with $896 Annual**. (Granted to Mohammad Mayyas since 2014).
23. "**Characterization of 3D grasping mechanism**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas, Student: Brycen Hupe, 2016).
24. "**Characterization of smart skin sensor**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas , Student: Hadi Aqeel, 2016).
25. "**Modeling and Simulation of capacitive sensor**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas , Student: Mohammad Almajed, 2016).
26. "**Development of weather station- students independent study**", **$1000** sponsored by CAATE, ENGT4950 summer workshop, 2016).
27. "**Outreach research program for development of Robotics Alliance**", **$2k** Sponsored from faculty development grant-BGSU, (Mohammad Mayyas, 2014).

Summary of internally funded (Professional Development & undergraduate Research) proposals in BGSU only.

Year	BGSU	Amount (US dollar)
2017	NSF-SEA	3500+2400+896
2016		2400+896+700+700+700+1000
2015		2400+896
2014		6000+2400+896+2000
Total =		**25,888**

A. Internally Funded Facility (Capital Investment)

28. "**Robotics Facility Renovation- Lab 123 - for the Mechatronics Engineering Technology Program"**, **~ 160k** Sponsored by the office of provost for academic affair-BGSU, (Admin facilitator: Dean Venu. Technical facilitator role: Mohammad Mayyas, 2016).

Summary of internally funded (Capital Investment) in BGSU only.

Year	BGSU	Amount (US dollar)
2016	Provost Office	~ 160,000
Total =		**~ 160,000**

Summary of career funded Projects

Institution	Total Amount (US dollar)
BGSU	**2,621,888**
UTA	**11,168,376***

*This does not include any fund obtained under my supervision as director of robotics division while I was overseeing and facilitating robotics grant activities in UTA-Research institute. *See Prof. Armanios acknowledgment in Appendix G- support letters.*

VIII. NOT Funded Grants (BGSU only)

1- "A **Hands-on Technology Based Learning and Mentorship Curricular to Prepare Industry-Ready Graduates**", NSF-SEA, requested amount **$20,000** (PI: Mohammad Mayyas, 2016
2- "**Understanding soiling and its effect on PV performance in extreme arid conditions**", Department of Energy, Requested **$1,209,000.** (BGSU PI and lead: Mohammad Mayyas, AURAK Co-PI: Bilal Akash, Pedro Banda, Mousa Mohsen, Zaki Iqbal , 2015).
3- "**Advanced manufacturing Grant**", Internal equipment grant submitted to BGSU provost, requested amount for the *robotics portion* is **$482,386**, (Contributor: Mohammad Mayyas, 2015).
4- "**Recoverable Ground Legged-Robot for Multiple Terrains Locomotion**", Micro Autonomous Systems and Technology, Us. Army. Requested **$412,011.** (PI: Mohammad Mayyas, 2014).

Summary of Not funded proposal.

Year	Funding Agency	Amount (US dollar)
2016	NSF-SEA	20,000
2015	Department of Energy Internal-BGSU	1,209,000 482,386
2014	MAST, US. Army	412,011
Total =		**2,123,397**

IX. Publications

A. Patents/Disclosures

1 **M. Mayyas**, , Shiakolas, P. "Method and Apparatus for Detethering Mesoscale, Microscale, and Nanoscale Components and Devices" U.S. Patent Appl.**(Issued 2014)**
2 **M. Mayyas**, " Multiscale grasping Mechanism," Provisional U.S. Patent Pending **(August, 2015)**

B. Dissertation/Thesis- Published

3 **M. Mayyas**, "METHODOLOGIES *FOR AUTOMATED MICROASSEMBLY*", Ph.D Dissertation, University of Texas at Arlington, Publisher: UMI, Ann Arbor, MI. Number 3310640, 308 pages. **(2008).**
4 **M. Mayyas**, "Wafer surface reconstruction and characterization for motion compensation in a femtosecond laser micromachining system", Master Thesis, University of Texas at Arlington, Publisher: UMI, Ann Arbor, MI. Number 1421283, 173 pages. **(2004).**

C. Peer-Reviewed Journal Publications

5 **M. Mayyas**, "Image Reconstruction and Evaluation: Applications on Micro-Surfaces and Lenna Image Representation," *J. Imaging*, *2*, 27 **(2016)**
6 **M. Mayyas**, R. Mellish "A method for the automatic generation of inverse kinematic maps in modular robotic systems," International Journal of Advanced Robotic Systems 1–15 **(2016)**
7 **M. Mayyas**, "Piezoelectric MEMS array package for distributed CMP pressure control Smart Materials and Structures **24**(6), 065006 **(2015)**.
8 **M. Mayyas**, "Bioinspired legged-robot based on large deformation of flexible skeleton Bioinspiration & biomimetics **9**(4), 046013 **(2014)**.
9 **Mayyas,** M. Comprehensive Thermal Modeling of ElectroThermoElastic Microstructures. *Actuators*, *1*,pp. 21-35 (**2012)**
10 **Mayyas, M**., Zhang, P., Lee, W-H., Popa, D., Chiao, JC. "An active micro joining mechanism for 3-D assembly." J. Micromech. Microeng., Volume 19 ,(**2009)**
11 **Mayyas, M.,** Sin, J., Stephanou, H. "Methodologies for the Assembly of a Fiber Coupled MEMS Fourier Transform Spectrometer." IEEE Transactions on Components and Packaging Technologies. Vol. 32,issue 1, **2009,** pp**.** 658-666.
12 **Mayyas, M**., Stephanou, H. "Electrothermoelastic modeling of MEMS gripper." Microsystem Technologies, 2009, Volume 15, Number 4, pp. 637-646. (**2009)**
13 **Mayyas, M.,** Shiakolas, P., Lee, W-H., Stephanou, H. "Thermal cycle modeling of electrothermal microactuators." Sensors and Actuators A: Physical, Volume 152, Issue 2, pp.192-202 (**2009)**
14 **Mayyas, M.,** Shiakolas, P. "Micro-surfaces reverse engineering and compensation for laser micromachining." IEEE Transactions on Automation Science and Engineering. Volume 6, issue 2, pp. 291-301 (**2009**)

D. Peer-Reviewed Conference Publications (Proceedings)

15 R. Mellish and **M. Mayyas**, A Sensor-Based Control Strategy for the Correction of Growth Abnormalities In, 2015 IEEE International Conference on Multisensor Fusion and Information Integration. (IEEE, San Diego, CA, USA, **2015**).

16 **Mayyas, M**. Lee. W.H., Stephanou H.. Microrobotic surveillance: discrete and continuous STARbots," *SPIE Defense, Security, and Sensing* , 25-29 April **2011** in Orlando, Florida, United States.

17 Sin J., Lee W.H., Mittal M., **Mayyas. M**, and Harry Stephanou, Manufacturability Analysis of Assembled FT Microspectrometer," *International Conference on Optical MEMS & Nanophotonics* (Clearwater Florida, **2009**)

18 **Mayyas, M.** Zhang, P., Lee, W- H., Shiakolas, P., Popa, D., 2007. Design Tradeoffs for Electrothermal Microgrippers, *ICRA07* (Roma, Italy, April 2007)

19 **Mayyas, M.,** Shiakolas, P. A Study on The Thermal Behavior Of Electrothermal Microactuators Due To Various Voltage Inputs. *Proceedings of IMECE 2006*, Paper No. IMECE2006-15321 (Chicago IL, November **2006**)

20 **Mayyas, M.,** Shiakolas, P. Micro-Surface Construction and Characterization from Digital Elevation Model Using Thin Plate Splines in Matlab Environment. *Proceedings of IMECE 2006*, Paper No. IMECE2006-13471, (Chicago IL, November **2006**)

21 Zhang, P., **Mayyas, M**., Lee,W. H., Popa,D., Shiakolas,, P., Stephanou, H., Chiao, JC., 2006. An Active Locking Mechanism for Assembling 3D Micro Structures. *SPIE International Smart Materials*, *Nano- & Micro-Smart Systems Symposium* (Adelaide Australia, Dec.10-13 2006).

22 **Mayyas, M**., Shiakolas, P. , Lee, W. H., Popa, D., Stephanou,H.; 2006. Static and dynamic modeling of thermal microgripper. *MED06-14th Mediterranean Conference in Automation and Control* (Ancona, Italy, June **2006**)

23 **Mayyas, M.,** Shiakolas, P. Application of Thin Plate Splines for Surface Reverse Engineering and Compensation for Femtosecond Laser Micromachining. *Proceedings of the IEEE International (Cyprus, **2005**)*

24 Zhang, P., **Mayyas, M.**, Lee W. H., Popa, D., Shiakolas P., Stephanou, H., Chiao, JC., 2006. Design of an Active Lock for Integrating 3D Micro Structures. *TEXMEMS VIII International Conference on MEMS* (Dallas, Texas, Sept-**2006**)

25 **Mayyas, M**., Zhang, P., Shiakolas, P., Lee W. H., Popa, D., Stephanou,H., 2006. Issues in the Current and Thermal Distribution for a Probed Electrothermal MEMS Actuator of Parallel Resistive Structure. *TEXMEMS VIII International Conference on MEMS* (Dallas, Texas, Sept-**2006**)

26 **Mayyas, M.,** Lee, W. H., Popa, D., Shiakolas, P., Zhang, P., Stephanou, H., 2005. Comprehensive Electrothermal Modeling of a Thermal Microgripper. *TEXMEMS VII International Conference on MEMS* (El Paso, TX, September **2005**)

27 Hsu, L.,George,V.,Popa, D., Lee, W. H., **Mayyas, M**., Zhang, P., Stephanou, H., Chiao, JC., 2005. 3D Microassembly Station. *in Proceedings of TexMEMS VII* (El Paso, Texas, September **2005**)

28 **Mayyas, M**., Shiakolas, P. Transient Thermal Model of an Attached Lateral Thermal Actuator. TEXMEMS VII International Conference on MEMS, (El Paso, TX, September **2005**)

29 **Mayyas, M.,** Yih, TC., 2003. Analytical Modeling of Circular Micropump Membrane Actuated by an Electromagnetic Actuator. *TexMEMS V Conference and Workshop* (Fort Worth, TX, May **2003**)

E. Selected Abstract and Major Presentation (Miscellaneous)

30 Advancing Interoperability and Integration of Ground and Water Robotics: is there a role for small scale robotics in defense application? Military robotic summit, Institute for Defense and Government Advancement, August 27 - 29, **2012** - Hilton Alexandria Old Town, Alexandria, Virginia.

31 Micro-robotics Application for Security: Unmanned Ground Systems Technology: The Role of Micro-Robotics in Border Management, 2nd Annual Border Management Summit Southwest, Institute for Defense and Government Advancement, El Paso, TX, May 23-25 **2011**. (Invited session leader)
32 Constructing Microrobots, Arlington Technology Association, College of Engineering, UT-Arlington, June 1st **2011**. (Invited speaker)
33 Proposal for National Center for Integrated Microsystems Technologies, and a National Center for the Security and Assurance of Information and Communication Systems, Video conference with King Abdulla II of Jordan, & President of Hashemite University, Feb. 11th **2011**.

F. Selected Media and News Highlights on Research / Outreach Outcomes

34 Interactive Art, 2017 Toledo Museum of ART summer camps, on Press newspaper: ***Toledo Blades, NBC***.
35 FalconBEST 2016, 25minutes program interview, ***WBGTV***.
36 FalconBEST 2016, multiple local newspaper interview articles, and TV coverage: ***The Blade, WBGTV, NBC.***
37 **BGSU promotional video** for Engineering technologies, interview and students working in the Lab., **2016**.
38 **BGSU TV Advertisement**, clip taken in the Lab with student constructing ground robots, **2014**.
39 Robotics Revolution, **UT Arlington Magazine**, Spring **2011** (on cover page).
40 Tiny machines for surveillance & intelligence-gathering, Randi Kaye from **CNN international news** interviews ARRI director to look at microrobotics for defense, August 19th **2011**.
41 Microrobots, 2nd generation industrial revolution, **CBNC**, Cramer discuss with ARRI director a flea that can do big things, May 26th **2011**.

X. Paper Read to Professional Societies

1 Associate Editor for Robotics & Automation Engineering Journal. Since 2017.
2 Member in the Editorial board for Journal of Robotics and Mechanical Engineering Research, since 2016.
3 Member of the international scientific committee for International Conference on Energy Water and Environment Systems (ICEWES 2015).
4 Head of international scientific committee of the Hashemite University- Jordan
5 Regular reviewers of journals/ conferences within the field (IEEE Robotics & Automation, JM3, ASME-IMEC, IEEE T-ASE, International journal of engineering science, Sensor & Actuators-Physics, SPIE-imaging, etc). Example of most reviewed paper is:
    a. "Design and Fabrication of Wearable Thermoelectric Generator Device for Heat Harvesting", by Shi, Yaoguang; Wang, Yancheng*; Mei, Deqing; Feng, Bo; Chen, Zichen Submitted to theIEEE Robotics and Automation Letters (RA-L), **May 2017**.

XI. Membership in Professional Organization

1 The Association of American colleges and Universities (AAC&U). since 2017
2 International Society for Optics, Photonics, and Imaging Engineering (SPIE), since 2011
3 IEEE, 2003-2009, renewed 2015
4 ASME, 2005-2013

5 Jordan Engineers Association, Since 2001 ,

XII. Service in BGSU

A. Department Service

1 Chair of search committee of NTTF for Mechatronics Engineering Technology, 2016
2 Chair of search committee of NTTF for Engineering Technology/ Quality System, 2015
3 Chair of search committee of NTTF for Electronic and Computer Engineering Technology, 2015
4 Review and generate recommendations for the merit dossier in annual basis.
5 Participated in major program recruitment events:
   a. President's Day: 2013 – Today
   b. STEM in the Park Day: 2013- Today
   c. Preview Day: 2013- Today
6 Informal undergraduate student advising: Engineering Technology, 2013-2016
7 Informal graduate student advising: MTM, 2013-2016
8 Mentor for undergraduate student of the Mechatronics Engineering Technology, 2017
9 Faculty advisor for student project competition in HATCH, 2016.
10 Evaluation of COOP report, and on-site visit to the employer.
11 Peer review for TTF/NTTF teaching, including Dr. Kluse 2016, Mr. Shilov 2016, Dr. Scontrino. 2016.
12 Graduate faculty representative of the department, since 2013
13 Undergraduate College council representative, 2015-Spring 2017.
14 Established Mechatronics Engineering Program with a new Checksheet, 2016
15 Added educational facility to the department, which include multimillion dollar equipment, 2016-Today.
16 In process of developing core courses for robotics, 2017-Today.
17 Key faculty in getting (ETAC-ABET) accreditation for ENGT, 2013-2015.
18 Founder and faculty advisor of "Falcon Robotics" Club – since 2015.
19 Maintain Robotics website since 2015.

B. College Service

20 College graduate faculty representative, and member of GCR committee between 2014-2015, and GSI between 2016-Today.
21 Member in the search committee for the Dean of college of technology, Architecture and Applied Engineering, 2016.
22 Member of a strategic prioritization committee for the college of technology, architecture, and applied engineering, 2016.

C. University Service

23 Member in the search committee for the Dean of the University's Graduate College, 2017
24 Member in the task force for college of computing engineering, 2014-2015.
25 Founder and the faculty advisor of Muslim Student Association Chapter in BGSU, since 2014.

26 Participated in the commercial video advertisement for the university, 2013.

D. External Community Service and Engagement

27 Hub director of BEST organization since 2015
28 Helped establish MOU with AURAK-UAE, 2015
29 Helped establish, and maintain NORTH consortium that include northwest Ohio institutions since 2015-Today.
30 Helped create dialogue with neighboring community colleges (Terra, Defiance Northwest State) to establish program articulation. 2016- Today
31 Participated in several industry-academia dialogue for workforce development (Rixan Associate Inc., Magna Nonplus, VeTek, First Solar, GKN driveline, Sauder, Cognex) 2016-Today.
32 Created and conducted Interactive Electronics and Art, a summer Camp in Toledo Museum of Art for underrepresented student population in Toledo, 2017.
33 Created seminar for Tech Trek summer camp to help women in engineering, 2016
34 Participated in judging STEM completions, FalconBest Robotics 2013-2014, and Science Olympiad 2016.

XIII. Others

See Research/Teaching/Service narratives for complete description and other work in previous institutions.

A. Award and Honor

1. Citizen Diplomat Certificate – North Texas Council for International Visitors, Department of State (2011)
2. International Academic Service Award – Hashemite University, Jordan (2011)
3. Madison Who's Who Among Executives and Professionals, "Honors Edition" (2009)
4. CGS/UMI Distinguished Dissertation Award– UTA (2008)
5. 1st Best Student Award for Highly Innovative and Out-of-the Box Concepts –UTA (2008)
6. Marquis Who'sWho in the World (2010)
7. Marquis Who'sWho in America (2010)
8. STEM Fellowship – Automation & Robotics Research Institute (2007)
9. Herman Fellowship – UTA (2007)
10. Hashemite University Doctoral Fellowship– Jordan (2003-2006)
11. 1st Best Symposium Paper Award, Nano- & Micro-Smart Systems Symposium –Australia (2006)
12. 2nd Best Conference Paper, TeXMEMS VII– Texas (2005)
13. IEAST/DAAD scholarship– Freiburg, Germany (2000)
14. Best Undergraduate Capstone Project in Mechanical Engineering –Jordan Engineers Society (2000)

B. Selected certification

1 Operation/Maintenance of Mitsubishi Robots Certification, *Rixan Associate, OH. 2016*
2 NSF, NIH Grant Technical Writing Training Certification, *Cleveland State University*. 2014

3 ANSYS APDL and Workbench Certification, *Phoenix Analysis & Design Technologies, AZ., 2010*

C. Ongoing Research and Grant Activities

- M. Mayyas, Ikya Mamidala, "Three dimensional multiscale gripping mechanism", submitted to sensors and actuators: physics.
- M. Mayyas, Adekunle Ayoko, "A modified Stewart platform for structural misalignment", to be submitted to journal of actuators.
- M. Mayyas "A skin-like flexible sensor based on conductive carbon nanotube on interdigitated microarray electrode array", to be submitted to journal of microsystems.
- Novel distributed remote sensing method for studying voluntary rat chronic drinking history coupled with exploratory movements and the emission of ultrasonic vocalizations , PI: Howard Casey Cromwell, Co-PI: Mohammad Mayyas, to be submitted to NIH-R21 on Oct. 8th 2017

XIV. Teaching Experience *for the Employment Period in BGSU*

A. Undergraduate Courses

Year of 2017					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
ENGT4500 CAPSTONE	15			ENGT 2480 Dynamics	24
ENGT4800/Tech4950 Introduction to Robotics	4+8			ENGT4900 Ind. Studies	1
ENGT1020 Intro. to Eng. Tech.*	23				
ENGT 3480 Thermodynamics *	12				

**Instructor of Record. Handed over to two graduate teaching assistants and an adjunct.*

Year of 2016					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
ENGT4500 CAPSTONE	17	Tech4950 Sp. Project	12	ENGT1020 Intro. to Eng. Tech.	28
ENGT 3280 Thermodynamics	10			ENGT 2480 Dynamics	9
				ENGT4900/4950 Ind. Studies	3

Year of 2015					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
ENGT1100 CAD	22			ENGT4800 Dynamics	13
ENGT4500 CAPSTONE	21			ENGT4800 FEM-ANSYS	18
ENGT4800 Thermodynamics	8			ENGT1020 Intro. to Eng. Tech.	21

Year of 2014					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
ENGT4500 CAPSTONE	20			ENGT4800 Dynamics	11
ENGT4800 Thermodynamics	14			ENGT1020 Intro. to Eng. Tech.	27

Year of 2013					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
				ENGT1020 Intro. to Eng. Tech.	35
				ENGT4800 Dynamics	8

B. Graduate Courses *for the Employment Period in BGSU*

Year of 2017					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
TECH5860/Tech6820 Industrial Robotics	12			Tech 6800 Adv. Mod. & Sim. of Mechatronics Systems	15

Year of 2015					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
				TECH6800 Advanced Finite Element Mod. & Analysis.	5

Year of 2014					
Spring		Summer		Fall	
Course No./Name	Enroll.	Course No./Name	Enroll.	Course No./Name	Enroll.
Tech6800 Modeling and Simulation of Dynamic Systems	4				

XV. Research and Advising

A. Thesis / Project and Dissertation Supervised

No.	Name	Project/Thesis	Year St.	University
1	Jay Patel	T: Wearable smart skin for Ubiquitous Corobots	2017 -	BGSU
2	Baqer Jaber	T: Serial to Parallel Assembly Toolkit for Advanced Robotics Manufacturing	2017 -	BGSU
3	Adkunel Ayoko	T: Design and Manufacturing of Modified Steward Platform	2016	BGSU
4	Ikya Mamidala	T: Scalable 3D Grasping Mechanism	2016	BGSU
5	James Hasting	T:Design of Capacitive Sensor for Laser Machining	2016 -	BGSU

6	Mudassir Ali	P: Development of flexible pressure touch sensor	2016	BGSU
7	Rochelle Mellish	P: control strategy for the correction of growth abnormalities	2011	UT-Arlington
8	Kristen Doelling	P: Integration of a CNC based Excimer laser and Robotic Arm for precision machining.	2012	UT-Arlington
9	Danny Hua	P: Development of wireless sensor network for micro robotics	2009	UT-Arlington
10	Alexis Bedoin	P: Modeling and simulation of solder reflow on a nitride coated silicon wafer	2009	UT-Arlington
11	Robert Rose	P: Development of a vibration platform for parallel and selective detethering of MEMS chips	2008	UT-Arlington
12	Kumar Sharad	P: Innovative Design for precision retractable catheter needle	2008	UT-Arlington

B. Undergraduate Independent Study Supervised

No.	Name	Project	Year St.	University
1	Mohammed Majed	FEM of MEMS Capacitive Force sensor	2016	BGSU
2	Hadi Aqeel	Characterization of MEMS Capacitive Force sensor	2016	BGSU
3	Brycen Hupe	Characterization of 3D printed robotics grippe	2016	BGSU

C. Undergraduate Research Workshop (Replacement of COOP) Supervised*

No.	Name	Project	Year St.	University
1	Mohammed Al Usail Mohammed Alkhadrawi	Force-Displacement tester for 3D printed plastic material	2016	BGSU
2	Abdullmohssen Alathmi Ahmed Alsalim	Manufacturing of Stewart platform	2016	BGSU
3	Mohammed Al-Majed	FEM Structural Analysis of Steward Platform	2016	BGSU
4	Ahmad Alzayer	Design and integration of Stewart platform	2016	BGSU
5	Hadi Aqeel Ali Alkhamis	Feedback control of linear actuator using LabVIEW	2016	BGSU
6	Michael Brown Denote Brown Baqer jaber	Design, Construction and Programming of Arduino based Weather station system	2016	BGSU

D. Undergraduate Senior Design Projects (CAPSTONE) Supervised*

Used ENGT4500 (CAPSTONE) to supervise the engineering senior design research projects of a total of 73 students, so far, who successfully completed the project requirements, and with four independent industry based projects per year since 2014.

E. Membership on Thesis / Project and Dissertation Completed

No.	Name / Advisor	Thesis/Project	Year St.	Degree/University
1	Ahoud Alwarsh/ Chris Kluse	P: Lean Six Sigma Implementation: The importance of Leadership	2016	MTM/BGSU
2	Jeremy Espinoza/ Chris Kluse	T: Development of an Associate Degree Level Course on Lean	2016	MTM/BGSU
	Zachary Brush/ Alan Bowling	T: Design And Control Of A Smart Bed For Pressure Ulcer Prevention	2012	MSME/UTA

XVI. Curriculum Development

A. Developed Graduate and Undergraduate Courses

Course	Semester	New	Modified	Comment
ENGT 2480 Dynamics	Fall 2017		X	• Created laboratory exercises to cover robotics dynamics (kinematics and kinetic of SCARA robot). • Created laboratory exercises to cover the simulation of robot rigid body motion by using MATLAB programming).
Tech 6800 Adv. Mod. & Sim. of Mechatronics Systems	Fall 2017	X		• Created a test course with new content for system dynamics modeling and simulation with applications related to mechatronics engineering and robotics. • Created system dynamics laboratory with series of training workshops on 20-sim software focusing on (iconic diagram, bond graph for multi-physics systems). • Created hands-on project for construction of system using robotics and automation electro-mechanical component.
- TECH5860/Tech6820 Advanced Industrial Robotics. - ENGT4800/Tech495 Introduction to Robotics	Spring 2017	X		• Created a new test course (Combining senior undergrad. and graduate students) with material contents to cover the theory and application of industrial robotics. • Developed new laboratory training exercises on usability (programming and TP) of SCARA Mitsubishi robots in automation environment. • Developed project proposal for groups that simulate industrial practices. • Created mentorship program and range of assignments that address the difference in the learning outcomes between grads and undergrads students. • Trained students on the hardware integration (system and network) for industry 4.0 factory. • Provided safety and maintenance trainings. • As certified Mitsubishi Robot instructor, I provided professional training for workforce development and provided students with Mitsubishi training certification.
ENGT4500 CAPSTONE	Spring 2017	X		• Developed new proposals for long term senior projects. • Create special technical workshops on numerical software (20-sim, ANSYS, MATLAB), to help student with their final engineering report.
ENGT1020 Intro. to Eng. Tech.	Fall 2016		X	• Created series of MATLAB lectures for numerical computation (graphing, solving, programming..). • Created workshops to support team project (concept development to demonstration of technology, by using Arduino or Mindstorms or in-house robotics capabilities)
ENGT 2480 Dynamics	Fall 2016		X	• Got it approved as core course for ENGT and Mechatronics programs. • Created series of lectures for dynamic numerical simulation with MATLAB.

ENGT4500 CAPSTONE	Spring 2016		X	• Developed new project proposals, one of which got funded by local industry (Golf project). • Created templates for project managements.
ENGT 3280 Thermodynamics	Spring 2016		X	• Got it approved as core course for ENGT and Mechatronics programs. • Provided workshops/trainings for term projects.
ENGT4800 Dynamics	Fall 2015			• Included hands-on projects, and teamwork.
ENGT1020 Intro. to Eng. Tech.	Fall 2015		X	• Developed Arduino workshops for Mechanical/Electrical applications.
ENGT4800 FEM-ANSYS	Fall 2015	X		• Created test course on finite element modeling and simulation for mechanical engineers; to replace ENGT4000. • Created Lab. workshops for (Mathematica, and ANSYS). • Obtained a grant to purchase ANSYS license software.
TECH6800 Advanced Finite Element Mod. & Analysis	Fall 2015	X		• Created a test course on advanced modeling using theories of finite element, with new material content (presentations, notes) • Created Lab. workshops for (Mathematica, and ANSYS). • Obtained a grant to purchase ANSYS license software.
ENGT1100 CAD	Spring 2015		X	• Create new material content for lecture (Engineering 2D graphics for mechanical engineers). • Created Lab for instructing 2D CAD using AutoCAD 2015 software.
ENGT4500 CAPSTONE	Spring 2015		X	• Created assessment tools for student learning outcome, and conducted surveys throughout the course. • Developed new projects proposal based on industrial application.
ENGT4800 Thermodynamics	Spring 2015			• Proposed Thermodynamic course as core ENGT course, and aligned it with ETAC-ABET student learning outcome. • Adopted a new text book (Cengel), and created new presentations, notes that suites engineering technology.
ENGT4800 Dynamics	Fall 2014		X	• Proposed Dynamic course as core ENGT course, and aligned it with ETAC-ABET student learning outcome. • Adopted a new text book (Hibeler), and created new presentations, notes that suites engineering technology.
ENGT1020 Intro. to Eng. Tech.	Fall 2014		X	• Added Solidworks training workshop to improve creativity and retention of students. • Added MATLAB tutorial to the lecture section
ENGT4500 CAPSTONE	Spring 2014	X		• New course with content for the for senior design project (Project management tools focused on mechanical design methodology). • CAD lab workshop to conduct research & development.
ENGT4800 Thermodynamics	Spring 2014	X		• A new test course introduced to the program for accreditation purposes. (Thermodynamic laws and application)
ENGT1020 Intro. to Eng. Tech.	Fall 2013	X		• New material content for the lecture. (Overview of Engineering technology careers, Engineering Ethics, Technical computing, Applications).

				• New Lab exercises for the Lab section. (Mindstorms Robotics, Measurement and Statistics)
ENGT4800 Dynamics	Fall 2013	X		• A new test course introduced to the program for accreditation purposes. (Kinematics and kinetics of particle and rigid bodies).

B. Undergraduate Course Underdevelopment

Course	Semester	Proposed	Comment
ROBO1010 Sensors & Actuators	Spring-Fall 2017	X	• Lecture: Fundamentals and theories of the components (Mechanical, Electrical, Fluidic, Thermal, Magnetic, etc.). • Lab: workshop rotations to overview the components in (Mechatronics training equipment, Robotics training equipment, CNC and Rapid prototyping equipment, Arduino S&A kits, ...).
ROBO2080 Industrial Robotics	Spring-Fall 2017	X	• Lecture: Basic principles of robotics technology and applications with focus on theory and hands-on operation of industrial robots. • Lab: Mitsubishi educational training units, and Fanuc Robot unit in integrated Automation Solution. (Programming with TPs, ROBOGUIDE, and MELFA software).
ROBO 4500, Senior Design Project	Spring-Fall 2017	X	• Lecture/Lab: "open-ended" design to realize original and creative interdisciplinary approach to applied engineering problems and may perform project under direction of one or more faculty.

A. Other Curriculum development

Development	Semester	Comment
Mechatronics Engineering Technology Program	2014-2016	• Created a new program (previously EMST), and get it approved at university level by fall 2016. • Approved check sheet with a balanced courses from ENGT and ECET programs.
Engineering Technologies accreditation	2015-2016	• Developed courses, and assessment tools. • Participated in writing self-study report, and final assessment report.

I. Professional Development *

Year	Professional Development Activities
2017	• Obtained trainings on Mechatronics training mobile units, from RAPIDS 1.0 grant. • Visited and collaborated with regional robotic industries to help establish task-force for smart factories. • Participated in conference on STEM leadership. • Participated in undergraduate conference In Findlay-Ohio. • Participated in local poster session for Undergraduate workshop in BGSU. • Participated in regional collaborative research grant proposal RAPIDS 2.0. • Participating in institutional collaborative research grant, with interdisciplinary faculties from BGSU. • Conducted mentorship workshops for STEM teachers and student interested in robotics. • Participated in journal/conference review.

	• Participated in regional collaborative research grant proposal. • Participated as professional board member of international robotics journal
2016	• Obtained the *instructor* training on Mitsubishi robots • Visited robotic industry to help establish task-force for advanced manufacturing. • Visited robotic industry and schools to help grow STEM robotics competitions. • Conducted mentorship workshops for STEM teachers and student interested in robotics. • Participated in entrepreneurship workshops through Hatch. • Participated in journal/conference review. • Participated in regional collaborative research grant proposal, RAPIDS 1.0. • Participated as professional board member of international robotics journal
2015	• Toured robotics laboratories, and participated in talks at the Massachusetts Institute of Technology- Boston. • Toured the Disaster City- Texas, and participated in DOD research grant discussion at with colleagues from Texas A&M –College station. • Participated in creating NORTH Consortium, Institutions from Northwest Ohio. • Participated in institutional collaborative research grant proposal • Participated in international conferences • Participated in journal/conference review
2014	• Obtained NSF & NIH Grant writing training in University of Cleveland. • Obtained Adobe CMS training for BGSU website development. • Visited Industrial manufacturing companies and survived technologies and needs. • Participated in journal/conference review • Participated in seminar and discussion with industries.
Fall -2013	• Maintained a collaborative research activities with the Mechanical & Aerospace Engineering faculty from the University of Texas at Arlington. • Participated in journal/conference review
2008- 2013	• See Research Narrative, Service Narrative, and Teaching Narrative

*Few examples of professional development activities during employment in BGSU. A complete list of the professional development activities is available in the narratives, and categorized with detailed descriptions.

II. Academic Advising & Mentorship

Program	Year	Number of student assigned*
A- Undergraduate	2013-2017	• Advising ENGT and Mechatronics undergraduate on demand basis, which is coordinated with the CTAAE advisor staff. No headcount structure is implemented. • Advising (career, resume) for all senior deign student (on average 18 student per year). • Advising undergraduate research and coop student. (see section V for most recent number)
B- Graduate	2013-2017	• Provided supporting role as graduate faculty to the associate graduate dean. • Providing mentorship and advising to research students (see section V for most recent number).

* No formal faculty advising/mentorship assignment exist in CTAAE as of Today.

III. Research Interest

- Design & development of Microsystem (Micro-Electro-Mechanical Systems); most recently includes:
  - MEMS sensors: Wearable smart sensor for collaborative robotics.
  - MEMS actuators: Micro Manipulation
- Design and development of advanced manufacturing toolbox for robotics factory ; most recently includes:

  - Parallel and serial inverse Kinematics for assembly robots.
  - Multiscale grasping mechanism.
  - Image processing for micro surface characterization.
- Integration of STEM field into workforce development (Started recently)
  - Development of Smart robotics factory.
  - Development of Education 4.0 and hybrid education with assistive robotics technologies.

IV. Funded Grants

B. Externally Funded Proposal (Research & Development)

1. **"E-Factory: Cyber Manufacturing Workforce Development"**. Funded by **N**orthwest **O**hio **R**egional **T**raining **H**ub, Regionally Aligned Priorities in Delivering Skills Program (RAPIDS 2.0), under the Department of Ohio Higher Education. *Accepted* amount **$394K** for BGSU's. (PI and lead: Mohammad Mayyas, Admin lead: Michael Ogawa, 2017 – present).
2. "**Advance Manufacturing Training Equipment: Mechatronics and Process Control Mobile Units**. "Funded by **N**orthwest **O**hio **R**egional **T**raining **H**ub, Regionally Aligned Priorities in Delivering Skills Program (RAPIDS 1.0), under the Department of Ohio Higher Education. Awarded **$1M** shared with NORTH consortium. (Lead: Todd Hernandez, BGSU's Technical lead and contributor: Mohammad Mayyas, 2015-present).
3. "**Development of Robotics Facility**". Funded by a donation from Rixan Associate Inc., net worth of **over $1M**. (Multiple leads: Sara Zulch Smith- Capital Campaign, Rodney Roger – Academic provost, Venu Dasigi – Interim Dean of CAATE, Mohammad Mayyas-Technical investigator, 2015-present).
4. "**Biomechanical Interface for Optimized Delivery of MEMS Orchestrated Mammalian Epimorphosis**" sponsored by The Armed Forces Institute of Regenerative Medicine, US Army, (PI Stephan Badylak - McGowan Institute for Regenerative Medicine at the University of Pittsburg, total award for 4 years **$2M**. (Sub award Mohammad Mayyas: **$80k per year** 2013).
5. "**BIODOME reactor**" sponsored by McGowan Institute for Regenerative Medicine at the University of Pittsburg. (contract **$12k**. PI Mohammad Mayyas. 06/13-08/13).
6. "**Tower of Hanol: A Sensorized Gaming Platform to Assess Cognitive Functions**" Sponsored by College of Nursing, **$10k** (Co-PI: Mohammad Mayyas 07/13-12/13).
7. "**3D Point-of-Gaze Based Wheelchair Control**," Contract **$72k**, sponsored by the University of Pittsburg, (PI- Mohammad Mayyas, 2012-2013).
8. "**Manufacturing Innovation for Technology Transition**", Sponsored by office of Naval Research.(PI- Harry Stephanou, Co-PI: Mohammad Mayyas, $1,533,649, 2011-2016).
9. "**High-density Interconnect for high-resolution APD/ROIC Hybridization**" SBIR Phase I, Department of Defense, Air Force.. Award **$70k**. (UTA PI- Mohammad Mayyas, Princeton Lightwave PI- Sabbir Rangwala 03/2009-07/2009).
10. "Disruptive techniques for hybridization of focal plane arrays for optical imaging sensors", SBIR Phase II, Department of Defense, Air Force. Award $**749,681** (Princeton Lightwave PI- Sabbir Rangwala, UTA sub award: Mohammad Mayyas 2010-2012).
11. "**Development of Microsystem Platforms in Hazardous environments Applications to Munitions and Enhancement**" sponsored by Office of Naval Research, Awarded amount $6,530,046.(PI- Harry Stephanou, Co-PI: Mohammad Mayyas,. 2008 –2012).

12. "**Microactuator Array for CMP Pressure Control**", Industry contact Phase I sponsored by Strasbugh, Amount **$120k**. (PI: Mohammad Mayyas, $120k, 2011-2012).

Summary of external (Research & Development) grant in BGSU only, excluding UT-Arlington.

Year	Agency	Amount (US dollar)
2017	DOHE	394,000
2016	Rixan Associate Inc.	~ 1000,000
2015	DOHE	1000,000 – Shared
Total =		**~2,394,000**

C. Externally and Internally Funded (STEM)

13. "**Falcon BEST Robotics**", Donation from First Solar, **$5k**, (Role: Facilitator and Hub-director, 2017).
14. "**Falcon BEST Robotics**", Donation from BGSU foundation, **$2k**, (Role: Facilitator and Hub-director, 2016).
15. "**Falcon BEST Robotics**", Donation from First Solar, **$5k**, (Role: Facilitator and Hub-director, 2016).
16. "**Falcon BEST Robotics**", Donation from Lothrop, **$5k**, (Role: Facilitator and Hub-director, 2017).
17. "**Falcon BEST Robotics**", Donation from Lothrop, **$5k**, (Role: Facilitator and Hub-director, 2016).
18. "**Texas Youth in Technology Program**" sponsored by Nanomaterials Design & Commercialization Center. Grant award amount **$71k**. (PI- Mohammad Mayyas, 2009-2010).

Summary of external (STEM) grant in BGSU only, excluding UT-Arlington.

Year	Agency	Amount (US dollar)
2017	Lathrop, First Solar	10000
2016	Lathrop, First Solar, BGSU foundation	10000 2000
Total =		**22,000**

D. Internally Funded Proposal (Research & Development)

19. "**Establishment of Multi-scale Robotics Laboratory**" Seed fund sponsored by BGSU's office of research (80%) and College of Technology, Architecture & Applied Engineering (20 %) , Internal start-up fund of **$20k**. (PI: Mohammad Mayyas, 2014-).

Summary of internally funded (Research & Development) proposal in BGSU only.

Year	BGSU	Amount (US dollar)
2014	Faculty Start-up	20000
Total =		**20,000**

E. Internally Funded Proposal (Professional Development & Undergraduate Research)

20. "**Project Kaleidoscope (PKAL) Conference, AAC&U's STEM higher education reform center**" NSF-SEA, PI: Dr. Moira van Staaden, Registration and expenses **$3500**. (Granted to Mohammad Mayyas, 2017).
21. "**Finite Element Modeling Software, ANSYS – 50 educational seats**" Sponsored by BGSU-ITS, **$2400 Annual**. (Granted to Mohammad Mayyas since 2014).
22. "**Mechatronics Software, 20-sim – unlimited seats**" Sponsored by BGSU-ITS, Initial cost **$6000, with $896 Annual**. (Granted to Mohammad Mayyas since 2014).
23. "**Characterization of 3D grasping mechanism**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas, Student: Brycen Hupe, 2016).
24. "**Characterization of smart skin sensor**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas , Student: Hadi Aqeel, 2016).
25. "**Modeling and Simulation of capacitive sensor**", sponsored by BGSU-CURS, $**500 equipment, and $200** student stipend (Advisor: Mohammad Mayyas , Student: Mohammad Almajed, 2016).
26. "**Development of weather station- students independent study**", **$1000** sponsored by CAATE, ENGT4950 summer workshop, 2016).
27. "**Outreach research program for development of Robotics Alliance**", **$2k** Sponsored from faculty development grant-BGSU, (Mohammad Mayyas, 2014).

Summary of internally funded (Professional Development & undergraduate Research) proposals in BGSU only.

Year	BGSU	Amount (US dollar)
2017	NSF-SEA	3500+2400+896
2016		2400+896+700+700+700+1000
2015		2400+896
2014		6000+2400+896+2000
Total =		**25,888**

A. Internally Funded Facility (Capital Investment)

28. "**Robotics Facility Renovation- Lab 123 - for the Mechatronics Engineering Technology Program", ~ 160k** Sponsored by the office of provost for academic affair-BGSU, (Admin facilitator: Dean Venu. Technical facilitator role: Mohammad Mayyas, 2016).

Summary of internally funded (Capital Investment) in BGSU only.

Year	BGSU	Amount (US dollar)
2016	Provost Office	~ 160,000
Total =		**~ 160,000**

Summary of career funded Projects

Institution	Total Amount (US dollar)
BGSU	**2,621,888**

UTA	**11,168,376***

*This does not include any fund obtained under my supervision as director of robotics division while I was overseeing and facilitating robotics grant activities in UTA-Research institute. *See Prof. Armanios acknowledgment in Appendix G- support letters.*

V. NOT Funded Grants (BGSU only)

1- "A **Hands-on Technology Based Learning and Mentorship Curricular to Prepare Industry-Ready Graduates**", NSF-SEA, requested amount **$20,000** (PI: Mohammad Mayyas, 2016
2- "**Understanding soiling and its effect on PV performance in extreme arid conditions**", Department of Energy, Requested **$1,209,000.** (BGSU PI and lead: Mohammad Mayyas, AURAK Co-PI: Bilal Akash, Pedro Banda, Mousa Mohsen, Zaki Iqbal , 2015).
3- "**Advanced manufacturing Grant**", Internal equipment grant submitted to BGSU provost, requested amount for the *robotics portion* is **$482,386**, (Contributor: Mohammad Mayyas, 2015).
4- "**Recoverable Ground Legged-Robot for Multiple Terrains Locomotion**", Micro Autonomous Systems and Technology, Us. Army. Requested **$412,011.** (PI: Mohammad Mayyas, 2014).

Summary of Not funded proposal.

Year	Funding Agency	Amount (US dollar)
2016	NSF-SEA	20,000
2015	Department of Energy Internal-BGSU	1,209,000 482,386
2014	MAST, US. Army	412,011
Total =		**2,123,397**

VI. Publications

A. Patents/Disclosures

1 **M. Mayyas**, , Shiakolas, P. "Method and Apparatus for Detethering Mesoscale, Microscale, and Nanoscale Components and Devices" U.S. Patent Appl.**(Issued 2014)**
2 **M. Mayyas**, " Multiscale grasping Mechanism," Provisional U.S. Patent Pending **(August, 2015)**

B. Dissertation/Thesis- Published

3 **M. Mayyas**, "*METHODOLOGIES FOR AUTOMATED MICROASSEMBLY*", Ph.D Dissertation, University of Texas at Arlington, Publisher: UMI, Ann Arbor, MI. Number 3310640, 308 pages. **(2008).**
4 **M. Mayyas**, "Wafer surface reconstruction and characterization for motion compensation in a femtosecond laser micromachining system", Master Thesis, University of Texas at Arlington, Publisher: UMI, Ann Arbor, MI. Number 1421283, 173 pages. **(2004).**

C. Peer-Reviewed Journal Publications

5 **M. Mayyas**, "Image Reconstruction and Evaluation: Applications on Micro-Surfaces and Lenna Image Representation," *J. Imaging*, *2*, 27 **(2016)**

6 **M. Mayyas**, R. Mellish "A method for the automatic generation of inverse kinematic maps in modular robotic systems," International Journal of Advanced Robotic Systems 1–15 **(2016)**

7 **M. Mayyas**, "Piezoelectric MEMS array package for distributed CMP pressure control Smart Materials and Structures **24**(6), 065006 **(2015)**.

8 **M. Mayyas**, "Bioinspired legged-robot based on large deformation of flexible skeleton Bioinspiration & biomimetics **9**(4), 046013 **(2014)**.

9 **Mayyas,** M. Comprehensive Thermal Modeling of ElectroThermoElastic Microstructures. *Actuators*, *1*,pp. 21-35 (**2012)**

10 **Mayyas, M**., Zhang, P., Lee, W-H., Popa, D., Chiao, JC. "An active micro joining mechanism for 3-D assembly." J. Micromech. Microeng., Volume 19 ,(**2009)**

11 **Mayyas, M.,** Sin, J., Stephanou, H. "Methodologies for the Assembly of a Fiber Coupled MEMS Fourier Transform Spectrometer." IEEE Transactions on Components and Packaging Technologies. Vol. 32,issue 1, **2009,** pp**.** 658-666.

12 **Mayyas, M**., Stephanou, H. "Electrothermoelastic modeling of MEMS gripper." Microsystem Technologies, 2009, Volume 15, Number 4, pp. 637-646. (**2009)**

13 **Mayyas, M.,** Shiakolas, P., Lee, W-H., Stephanou, H. "Thermal cycle modeling of electrothermal microactuators." Sensors and Actuators A: Physical, Volume 152, Issue 2, pp.192-202 (**2009)**

14 **Mayyas, M.,** Shiakolas, P. "Micro-surfaces reverse engineering and compensation for laser micromachining." IEEE Transactions on Automation Science and Engineering. Volume 6, issue 2, pp. 291-301 (**2009**)

D. Peer-Reviewed Conference Publications (Proceedings)

15 R. Mellish and **M. Mayyas**, A Sensor-Based Control Strategy for the Correction of Growth Abnormalities In, 2015 IEEE International Conference on Multisensor Fusion and Information Integration. (IEEE, San Diego, CA, USA, **2015**).

16 **Mayyas, M**. Lee. W.H., Stephanou H.. Microrobotic surveillance: discrete and continuous STARbots," *SPIE Defense, Security, and Sensing* , 25-29 April **2011** in Orlando, Florida, United States.

17 Sin J., Lee W.H., Mittal M., **Mayyas. M**, and Harry Stephanou, Manufacturability Analysis of Assembled FT Microspectrometer," *International Conference on Optical MEMS & Nanophotonics* (Clearwater Florida, **2009**)

18 **Mayyas, M.** Zhang, P., Lee, W- H., Shiakolas, P., Popa, D., 2007. Design Tradeoffs for Electrothermal Microgrippers, *ICRA07* (Roma, Italy, April 2007)

19 **Mayyas, M.,** Shiakolas, P. A Study on The Thermal Behavior Of Electrothermal Microactuators Due To Various Voltage Inputs. *Proceedings of IMECE 2006*, Paper No. IMECE2006-15321 (Chicago IL, November **2006**)

20 **Mayyas, M.,** Shiakolas, P. Micro-Surface Construction and Characterization from Digital Elevation Model Using Thin Plate Splines in Matlab Environment. *Proceedings of IMECE 2006*, Paper No. IMECE2006-13471, (Chicago IL, November **2006**)

21 Zhang, P., **Mayyas, M**., Lee,W. H., Popa,D., Shiakolas,, P., Stephanou, H., Chiao, JC., 2006. An Active Locking Mechanism for Assembling 3D Micro Structures. *SPIE International Smart Materials*, *Nano- & Micro-Smart Systems Symposium* (Adelaide Australia, Dec.10-13 2006).

22 **Mayyas, M**., Shiakolas, P. , Lee, W. H., Popa, D., Stephanou,H.; 2006. Static and dynamic modeling of thermal microgripper. *MED06-14th Mediterranean Conference in Automation and Control* (Ancona, Italy, June **2006**)

23 **Mayyas, M.,** Shiakolas, P. Application of Thin Plate Splines for Surface Reverse Engineering and Compensation for Femtosecond Laser Micromachining. *Proceedings of the IEEE International (Cyprus, **2005**)*

24 Zhang, P., **Mayyas, M.**, Lee W. H., Popa, D., Shiakolas P., Stephanou, H., Chiao, JC., 2006. Design of an Active Lock for Integrating 3D Micro Structures. *TEXMEMS VIII International Conference on MEMS* (Dallas, Texas, Sept-**2006**)

25 **Mayyas, M**., Zhang, P., Shiakolas, P., Lee W. H., Popa, D., Stephanou,H., 2006. Issues in the Current and Thermal Distribution for a Probed Electrothermal MEMS Actuator of Parallel Resistive Structure. *TEXMEMS VIII International Conference on MEMS* (Dallas, Texas, Sept-**2006**)

26 **Mayyas, M.,** Lee, W. H., Popa, D., Shiakolas, P., Zhang, P., Stephanou, H., 2005. Comprehensive Electrothermal Modeling of a Thermal Microgripper. *TEXMEMS VII International Conference on MEMS* (El Paso, TX, September **2005**)

27 Hsu, L.,George,V.,Popa, D., Lee, W. H., **Mayyas, M**., Zhang, P., Stephanou, H., Chiao, JC., 2005. 3D Microassembly Station. *in Proceedings of TexMEMS VII* (El Paso, Texas, September **2005**)

28 **Mayyas, M**., Shiakolas, P. Transient Thermal Model of an Attached Lateral Thermal Actuator. TEXMEMS VII International Conference on MEMS, (El Paso, TX, September **2005**)

29 **Mayyas, M.,** Yih, TC., 2003. Analytical Modeling of Circular Micropump Membrane Actuated by an Electromagnetic Actuator. *TexMEMS V Conference and Workshop* (Fort Worth, TX, May **2003**)

E. Selected Abstract and Major Presentation (Miscellaneous)

30 Advancing Interoperability and Integration of Ground and Water Robotics: is there a role for small scale robotics in defense application? Military robotic summit, Institute for Defense and Government Advancement, August 27 - 29, **2012** - Hilton Alexandria Old Town, Alexandria, Virginia.

31 Micro-robotics Application for Security: Unmanned Ground Systems Technology: The Role of Micro-Robotics in Border Management, 2nd Annual Border Management Summit Southwest, Institute for Defense and Government Advancement, El Paso, TX, May 23-25 **2011**. (Invited session leader)

32 Constructing Microrobots, Arlington Technology Association, College of Engineering, UT-Arlington, June 1st **2011**. (Invited speaker)

33 Proposal for National Center for Integrated Microsystems Technologies, and a National Center for the Security and Assurance of Information and Communication Systems, Video conference with King Abdulla II of Jordan, & President of Hashemite University, Feb. 11th **2011**.

F. Selected Media and News Highlights on Research / Outreach Outcomes

34 Interactive Art, 2017 Toledo Museum of ART summer camps, on Press newspaper: ***Toledo Blades, NBC***.

35 FalconBEST 2016, 25minutes program interview, ***WBGTV***.

36 FalconBEST 2016, multiple local newspaper interview articles, and TV coverage: ***The Blade, WBGTV, NBC.***

37 **BGSU promotional video** for Engineering technologies, interview and students working in the Lab., **2016**.

38 **BGSU TV Advertisement**, clip taken in the Lab with student constructing ground robots, **2014**.

39 Robotics Revolution, **UT Arlington Magazine**, Spring **2011** (on cover page).

40 Tiny machines for surveillance & intelligence-gathering, Randi Kaye from **CNN international news** interviews ARRI director to look at microrobotics for defense, August 19th **2011**.
41 Microrobots, 2nd generation industrial revolution, **CBNC**, Cramer discuss with ARRI director a flea that can do big things, May 26th **2011**.

VII. Paper Read to Professional Societies

1 Associate Editor for Robotics & Automation Engineering Journal. Since 2017.
2 Member in the Editorial board for Journal of Robotics and Mechanical Engineering Research, since 2016.
3 Member of the international scientific committee for International Conference on Energy Water and Environment Systems (ICEWES 2015).
4 Head of international scientific committee of the Hashemite University- Jordan
5 Regular reviewers of journals/ conferences within the field (IEEE Robotics & Automation, JM3, ASME-IMEC, IEEE T-ASE, International journal of engineering science, Sensor & Actuators-Physics, SPIE-imaging, etc). Example of most reviewed paper is:
   a. "Design and Fabrication of Wearable Thermoelectric Generator Device for Heat Harvesting", by Shi, Yaoguang; Wang, Yancheng*; Mei, Deqing; Feng, Bo; Chen, Zichen Submitted to theIEEE Robotics and Automation Letters (RA-L), **May 2017**.

VIII. Membership in Professional Organization

1 The Association of American colleges and Universities (AAC&U). since 2017
2 International Society for Optics, Photonics, and Imaging Engineering (SPIE), since 2011
3 IEEE, 2003-2009, renewed 2015
4 ASME, 2005-2013
5 Jordan Engineers Association, Since 2001 ,

IX. Service in BGSU

A. Department Service

1 Chair of search committee of NTTF for Mechatronics Engineering Technology, 2016
2 Chair of search committee of NTTF for Engineering Technology/ Quality System, 2015
3 Chair of search committee of NTTF for Electronic and Computer Engineering Technology, 2015
4 Review and generate recommendations for the merit dossier in annual basis.
5 Participated in major program recruitment events:
   a. President's Day: 2013 – Today
   b. STEM in the Park Day: 2013- Today
   c. Preview Day: 2013- Today
6 Informal undergraduate student advising: Engineering Technology, 2013-2016
7 Informal graduate student advising: MTM, 2013-2016
8 Mentor for undergraduate student of the Mechatronics Engineering Technology, 2017
9 Faculty advisor for student project competition in HATCH, 2016.
10 Evaluation of COOP report, and on-site visit to the employer.

11 Peer review for TTF/NTTF teaching, including Dr. Kluse 2016, Mr. Shilov 2016, Dr. Scontrino. 2016.
12 Graduate faculty representative of the department, since 2013
13 Undergraduate College council representative, 2015-Spring 2017.
14 Established Mechatronics Engineering Program with a new Checksheet, 2016
15 Added educational facility to the department, which include multimillion dollar equipment, 2016-Today.
16 In process of developing core courses for robotics, 2017-Today.
17 Key faculty in getting (ETAC-ABET) accreditation for ENGT, 2013-2015.
18 Founder and faculty advisor of "Falcon Robotics" Club – since 2015.
19 Maintain Robotics website since 2015.

B. College Service

20 College graduate faculty representative, and member of GCR committee between 2014-2015, and GSI between 2016-Today.
21 Member in the search committee for the Dean of college of technology, Architecture and Applied Engineering, 2016.
22 Member of a strategic prioritization committee for the college of technology, architecture, and applied engineering, 2016.

C. University Service

23 Member in the search committee for the Dean of the University's Graduate College, 2017
24 Member in the task force for college of computing engineering, 2014-2015.
25 Founder and the faculty advisor of Muslim Student Association Chapter in BGSU, since 2014.
26 Participated in the commercial video advertisement for the university, 2013.

D. External Community Service and Engagement

27 Hub director of BEST organization since 2015
28 Helped establish MOU with AURAK-UAE, 2015
29 Helped establish, and maintain NORTH consortium that include northwest Ohio institutions since 2015-Today.
30 Helped create dialogue with neighboring community colleges (Terra, Defiance Northwest State) to establish program articulation. 2016- Today
31 Participated in several industry-academia dialogue for workforce development (Rixan Associate Inc., Magna Nonplus, VeTek, First Solar, GKN driveline, Sauder, Cognex) 2016-Today.
32 Created and conducted Interactive Electronics and Art, a summer Camp in Toledo Museum of Art for underrepresented student population in Toledo, 2017.
33 Created seminar for Tech Trek summer camp to help women in engineering, 2016
34 Participated in judging STEM completions, FalconBest Robotics 2013-2014, and Science Olympiad 2016.

X. Others

See Research/Teaching/Service narratives for complete description and other work in previous institutions.

A. Award and Honor

1. Citizen Diplomat Certificate – North Texas Council for International Visitors, Department of State (2011)
2. International Academic Service Award – Hashemite University, Jordan (2011)
3. Madison Who's Who Among Executives and Professionals, "Honors Edition" (2009)
4. CGS/UMI Distinguished Dissertation Award– UTA (2008)
5. 1st Best Student Award for Highly Innovative and Out-of-the Box Concepts –UTA (2008)
6. Marquis Who'sWho in the World (2010)
7. Marquis Who'sWho in America (2010)
8. STEM Fellowship – Automation & Robotics Research Institute (2007)
9. Herman Fellowship – UTA (2007)
10. Hashemite University Doctoral Fellowship– Jordan (2003-2006)
11. 1st Best Symposium Paper Award, Nano- & Micro-Smart Systems Symposium –Australia (2006)
12. 2nd Best Conference Paper, TeXMEMS VII– Texas (2005)
13. IEAST/DAAD scholarship– Freiburg, Germany (2000)
14. Best Undergraduate Capstone Project in Mechanical Engineering –Jordan Engineers Society (2000)

B. Selected certification

1 Operation/Maintenance of Mitsubishi Robots Certification, *Rixan Associate, OH. 2016*
2 NSF, NIH Grant Technical Writing Training Certification, *Cleveland State University*. 2014
3 ANSYS APDL and Workbench Certification, *Phoenix Analysis & Design Technologies, AZ., 2010*

C. Ongoing Research and Grant Activities

- M. Mayyas, Ikya Mamidala, "Three dimensional multiscale gripping mechanism", submitted to sensors and actuators: physics.
- M. Mayyas, Adekunle Ayoko, "A modified Stewart platform for structural misalignment", to be submitted to journal of actuators.
- M. Mayyas "A skin-like flexible sensor based on conductive carbon nanotube on interdigitated microarray electrode array", to be submitted to journal of microsystems.
- Novel distributed remote sensing method for studying voluntary rat chronic drinking history coupled with exploratory movements and the emission of ultrasonic vocalizations , PI: Howard Casey Cromwell, Co-PI: Mohammad Mayyas, to be submitted to NIH-R21 on Oct. 8th 2017

(1) Statement of Teaching

It was through my teaching and advising experience that ignited my passion for teaching; essential to unfold the potential of young people. Teaching is the true power that allows me to forge the future of our young generation. I began teaching as a graduate teaching assistant in 2001; it was there that I discovered that education is where I can have the greatest impact. I feel *great* sense-of-accomplishment and satisfaction every time I learn about a person whom I helped to be a member of a society; a person who can impact the world for better, and advance civilization through innovation.

I subscribed my teaching philosophy model, as I would have been sitting in a student chair, by identifying two important elements: commitment and proper communication. I carry these elements and others through my teaching habits by being well-prepared to effectively answer student's endless curious questions in an interactive dynamic environment that encourage creative thinking ability. This has allowed me to understand diverse spectrum and adapt for the learning differences among the students in a classroom.

Teaching with excellence is not only important to me, but it is a family pride which I deem to keep on. My older brother, who was my college professor, is a role model and a source of inspiration to myself and many other students. In my family, we learned that the success start from within. That has brought an educated family with advanced degrees and professions in engineering and medical fields. It gives me passion, pride, solid work ethics, pressure and commitment to carry on these teachings.

I began my teaching practice in 2000 during my undergraduate program in Mechanical Engineering at Jordan University of Science and Technology. I was asked by my undergraduate advisor Prof. M. Othman to prepare a series of lectures on MATLab/Simulink for graduate level students. Since, this program was newly launched product in the curriculum and having demonstrated mastery in this software through my senior project in Mechatronics, I was elected to give the lecture series. I learned it is the unique ability of teaching profession that gives me the *complete* satisfaction and values my knowledge by sharing it with others. This insight directed me to focus my career interests in academia and teaching.

Following the graduation in 2001, I continued Master's Program in Mechanical Engineering at the same university. I focused my coursework on applied mathematics geared towards the fundamental of physics and mechanic with strong analytical background. In my class, I was among one of the few graduate students who could strongly understand the mechanical and electrical systems. Thus on the merit bases, I was given the responsibility to teach and supervise Mechatronics labs focused on PLC, pneumatic and hydraulic circuits. Also, I provided teaching assistance through lecturing classes in solid mechanic courses which included dynamics, vibration systems and modern control systems. As these courses were related, I was comfortable to borrow examples from different text books and expanded them to integrate with the subject material, posing challenging problems that push students to think hard. More importantly, I have integrated different course materials to bring excitement and to fit the subject matter into the student's life.

My *passion* for teaching has continued after I transferred from Jordan University to Mechanical Engineering Department Master's program at University of Texas Arlington. There, I started to implement my teaching skills on myself and quickly adapted to the American education system. I was given an opportunity to assist Professor's Tong and Hullender in Engineering Mathematics and Simulation of Dynamic Systems. In these courses, I gave multiple lectures, prepared and published key solutions in electronic format. Along, with these responsibilities, I assisted in forming exams and graded them. It was through my direct exposure with undergraduate students that I learned there is no unique or predominant technique or pattern that could solely work for all class; they might change within a class. In these classes, I was challenged to apply different learning styles to balance the knowledge with the differences found between the students. I required student's direct involvement in class discussions and project assignments, thus, giving them the chance to be creative, and to test their ideas. My involvement with students at individual and class level has further deepened my passion for teaching.

Upon finishing Ph.D. degree, I joined Automation & Robotics Research Institute (Currently renamed: The University of Texas at Arlington Research Institute) at the University of Texas Arlington. The director of Texas Microfactory, Dr. Harry Stephanou hired me as Post Doctorate and then I was promoted to a Research Scientist. Here, I was able to exploit many resources and created outreach programs to bridge a gap between young scholars and emerging technologies. As a program leader, I organized and developed training workshops and educational tours to foster the interest of new generation students in robotics and microsystems technology. Through the collaborative work with Nanomaterials Design & Commercialization Center and University of Texas El Paso, I had won a 2 years outreach grant to promote high school students entering 4 years college program in engineering. The participants were selected from underrepresented groups and low income students who have high potentials. I felt responsible to give proper guidance and encourage the students to pursue higher degrees. I followed a strategy which insures excitement through hands-on experience in the research laboratories and endorses the sense-of-accomplishment for *every* student.

The invaluable teaching experience has reinforced my goals to pursue academic career in Engineering Technologies at BGSU. In fact, such interdisciplinary program is essential to prepare new generation of students for the next generation of engineering technology in the area of Mechatronics and Robotics. This will create exciting environment that is necessary to drive student's interest in classroom or laboratory settings. As a faculty in the department, I am committed to the principle of intellectual essential to infuse diverse perspectives for new discoveries in science and engineering. I am keen to unlock student's imagination and energies out of the box and beyond the transfer of information- the true value is to create the potential for improvement in the life of the one being taught. The true values are when the students practice what they learn; to become leaders in their profession working together to grow our societies. Therefore, it is essential to me to encourage students to learn by doing and be more hands-on.

In a class, I will make every effort to seize the moment and quickly respond to student questions, augment information with excitement and follow-ups. Topics will be built on what students already know and move from simple to complex concepts. I will give the students the opportunity to relate material to *real world* and their lifestyle to value education and pursue higher degrees. I will further engage the students by selecting teaching strategies and materials that require their direct involvement, giving them the chance to be creative and critical problem solver to test their ideas. I will provide constructive feedback to make students aware of their progress and to make their goals attainable. In addition, I will

provide reward mechanisms that praise student's desired learning outcomes with a sense of growing and accepted competence to progress in their educational career. And last but not least, I will accommodate to every possible learning style and activity that could help students learn. This will include modern education method such as visual and audible or learning by doing.

In fact, being a teacher is a long-life career commitment. On my behalf, it requires continuous improvement and addition of new approaches by evaluating my teaching through self-monitoring and reviewing audio tape or video tape. I will assess my teaching quality by measuring how well students do in the tests, exam or project. I will effectively respond to students' feedback to accommodate different learning styles. Also, I believe in constructive criticism where a fellow faculty or staff member could observe my teaching performance. I believe that part of my responsibility as a teacher is to update myself with teaching techniques within my full capacity and understanding of the program's needs.

It has been exciting to grow a *Robotics and Mechatronics* platform in BGSU. This is aligned with my field of research and teaching interest. My interdisciplinary background qualifies me to teach in different areas for both graduate and undergraduate levels. The course categories that I could immediately fit in are (i) solid mechanics including static and dynamic, vibration, control, strength of material, simulation of dynamic systems, etc. (ii) mechatronics, robotics, electronics and logics, (iii) MEMS or Microsystems, and (iv) Applied mathematics and numerical techniques for engineering. Although I feel conservative about restricting my future involvement to what I think as of today, but I propose to create a curriculum that focuses on topics in Mechatronics, Robotics, Manufacturing and Automation that encourage creativity! I would like to initiate special topic course on physics and math at multiple scales and for several hybrid systems. I will provide students with methods I learned or developed to better understand systems design and simulation. I believe my industry and academia background will be unique and helpful to bring teaching into practice.

(2) Statement of Scholarship

My specific research interests and scholarly achievements are capitalized in the areas of Microsystems, robotics, and Mechatronics. Microsystems or popularly known as MicroElectroMechanal (MEMS) systems, is a new interdisciplinary field that benefit from machine or sensor technologies at small scale. Mechatronics is a multidisciplinary field that integrates mechanics, electronics, controls and system design engineering to produce economical and versatile products.

My research strengths are application driven and can be described into four categories. Firstly, at the fundamental level of science, mathematics and engineering, I am focused on multi physics synthesis and analysis of electromechanical and thermo systems, structural analysis of vibrating microsystems and systems under large deformation. At the design and fabrication levels, I established a portfolio, as indicated in the *Research Projects* section in the CV, on creating plausible mechanisms and processes with emphasis on design for manufacturability. At the technical level, I am skilled and proficient in operating common hardware/software and inventing revolutionary technologies. Finally, at system level, I have the knowledge and hands-on experience to generate practical solutions for Robotics, mechatronics, biomedical, defense and industrial applications.

I established my scientific research interests in electro mechanical systems early on in my childhood and evolved through my technical and educational background. It started as a hobby at home and school where I was self- motivated to *investigate* on the wonders of nature and to *understand* the technologies that we all use every day. My curious mind has always pushed me to know *how things work* and further inspired me to make new things. At an early age, I would open electronic devices and try to modify circuit board hoping it will do amusing things! Slowly, and with some guidance from family members and teachers, I understood the basic functions of many electronic and mechanical parts. I successfully completed my first project at the age of 12. I built 3 wheel motorcycle toy controlled by a tethered joystick from the components that I collected by tearing other electronic devices. I was able to steer and drive the vehicle.

My passion for science and engineering continued and I established a platform for research during my undergraduate years. I presented my first technical research paper in 2000 on *solar tracking system* as a part of my senior design project. I had developed and prototyped, from scratch and with low budget, a portable solar panel with analogue PID control algorithm that can track and harvest maximum solar energy. I was awarded second place for the best undergraduate project presented from Jordan engineering association at the national level.

My second research project was on *Nano and micromachining by using femotosecond laser* during my master's degree at UT-Arlington, I developed prediction and reconstruction algorithm to automate micromachining and compensate for the irregularity in surfaces from few measured cloud points.

Further, as part of my doctoral dissertation, my research was focused on *methods for microassembly and manufacturing to construct system from heterogeneous components*. This is where I first investigated electro- thermo-elastic structures, or Microgrippers, for the custom-made assembly work-cell. I developed and prototyped new types of *multipurpose MEMS grippers* on a single layer that are capable of handling micro-parts with micro- heating and force sensing capabilities. I established a

comprehensive analytical, finite element and numerical methods to extract static and dynamic responses for electrothermal systems. I designed experimental methods to characterize their responses, and obtained system identification models. I built and studied the kinematic of the first in-house assembly robot which comprised linear and rotary stages with handle arm for operating MEMS gripper.

In my dissertation, I *adapted the principals of DNA recognition of gene to enable self-assembly of micro-parts*. I fabricated "Interlock key like-shapes" with mechanical interfaces and selective encoders to improve on the weak forces between the mated parts. I demonstrated that such part can form large structures in a stochastic self-assembly process. Because this requires huge number of micro-parts, I discovered and invented a *method to massively release micro-parts* post to the fabrication process. My method was based on releasing an array of suspended micro-parts by assigning cantilever-like shapes "tethers" with mechanical signature, and then selectively breaks them at resonance frequency by using external agitation pattern. Along with the other research projects during my doctoral dissertation, I also worked on *stochastic assembly methods,* where I developed and implemented energy based method to organize micro-parts on a vibrating surface. The surface had an array of control nodes "vibrating node" and traps "holes" to precisely manipulate the force squeeze field that drives micro-parts. This principle was demonstrated on a funded project for a MEMS safe and arm device, where I collected randomly placed proof masses from a surface and then picked them and packaged them onto the device by using my developed MEMS microgrippers. In addition, I conducted other research projects during my doctoral degree as a part of my research assistantship duties which includes *3D interconnect of MEMS component*; *integration of MEMS spectroscopy*; *hot-plate platform with force and temperature sensory for a custom-made assembly station; MEMS drug delivery device powered by microorganisms*; *MEMS drug delivery system powered by electromagnetic*; *and micro-flap array to control drag force on surface in harsh environment*.

After finishing my doctoral degree, I started my professional career as a research scientist at the University of Texas Arlington in the Automation & Robotics Research Institute. I worked on a broad spectrum of funded research and development projects in robotics, biomedical, lasers, imaging and sensing and MEMS components. I have created a program in *low cost Microrobot for DoD applications*. As a project leader, I have created mechanisms for legged robots from flexible laminate by using origami style. I developed, constructed and patented a *shaking mechanism hardware* called "ARRIShaker" for releasing micro-part from wafer and further added hot-plate for MEMS reliability measurement. Also, I have developed and manufactured a *MEMS biomechanical device* for animal study as part of collaboration with McGowan Institute for Regenerative Medicine. Recently, I won a contract for this project covering a period of two years. I worked with companies on Small Business Innovation Research (SBIR) projects; one of the funded projects is based on my novel concept for creating *high density interconnects for IR imaging*. In this research, I created mathematical and numerical models that correlate the free-force self-alignment in conjunction with the geometry and materials used in solder bump's array. I worked on multiple projects that required "innovation in mechanisms or manufacturing processes and in collaboration with private companies. Example includes the development of *a modified Stewart platform for orthopedic fixation*, *a retractable catheter needle for blood drainage, and ultra sharpening of Sapphire blade*. For the important list of research topics, please refer to the resume in the attachment.

The framework of my professional career and educational background allowed me to successfully accomplish research projects. In the future, I will continue working on interdisciplinary fields and expand my research to include hot topics in the Microsystems and Nanotechnologies. Specifically, I will focus my interest on plausible mechanisms and technologies for advanced manufacturing, biomedical and robotics applications.

One of my previous research topics was the development multiscale flexible joint autonomous vehicle for advanced ground and shallow water operations, and with embedded microsystems. The approach uses engineered robots that conform to the locomotion of legged animals found in nature. I researched the origami style to fold 3D robots from 2D layers. The mimicked configurations was inspired by nature with objective to combine multiple locomotion modalities including walking/running, hoping/jumping, and swimming/floating. The proposed research stands on strong intellectual merits in both science and engineering. In future work, I will propose to study different hybrid mechanisms for robot including legged motion with active foot. Part of the research is to develop flexible leg with specialized layers incorporating sensors and actuators for energy harvesting; environmental sensing; motion control, and so on. I propose to study the performance of several robotic shapes in terms of cost of transportation, scale, ability to carry load, ability to run over different grounds, ability to combine locomotion, stability and maneuverability. I will use robust material and silicon manufacturing technologies to construct cost effective robot. One of my recent finding while developing tactile sensor technology has led to the development of a wearable skin technology for Corobot applications. Currently, I am embedding this technology into the operation of industrial robots to enable a safe human-robot interaction. For the success of proposed research project, I expect a team of students working on different topics as part of their senior projects or thesis/dissertation. As a team orient professional, I will collaborate with my colleagues in the engineering departments and bring more opportunities by writing proposals such as NSF and DoDs or industrial partnership that are interested in such robots. I will seek every opportunity and establish connection to secure major funds with which I can support students and increase the intellectual property of the university. And last but not least, I will work on surgical microrobotic tools to advance the micro surgical operation. I propose 2D and 3D end effectors ultra- machined from gemstones or synthetic metal or non-metal materials and with capability to cutting, weld,… etc. I will seek more collaboration opportunities with faculties to push additional technologies.

In addition to the proposed research topics, I will work together with my colleagues in joint proposals in several robotics and advanced manfuacturing areas. I will offer my expertise in mechatronics, robotics and micromanufacturing to provide innovative engineering solutions for research project and technologies. I would bring to the team my research skills; passion for the field, extensive hands-on experience on design, characterization, and fabrication that will expedite and support the needs of interdisciplinary research teams. In summary, my research interest is application driven capitalizing on innovation and basic sciences. If given the opportunity I would contribute to the overall vision of the institution, department, research goals, and the engineering profession.

(3) Statement of Leadership

I. ADMINISTRATIVE & RESEARCH LEADERSHIP ACCOMPLISHMENTS

A. Interdisciplinary Robotics Research Program: (2003 – Present)

Worked my way up in developing interdisciplinary research programs where I began first as research fellow contributing to funded projects to a visionary and a leader to initiate and establish the state-of-the-art research program and facility. I have attracted significant research funds to establish the research program and I have served as PI or Co-PI on multimillions research projects. I have served as a supervisor and mentor for full time staff including research scientists and postdoctoral research associates, international visiting scholars, graduate and undergraduate students. In this role I have directed and steered research proposal, projects and program initiation, planning, development and research operations. Performed supervision, performance evaluation and management, conflict resolution and leadership for the team and project personnel; and managed budget and operations of the research facility.

B. Industrial-Academic Research Partnerships & Technology Transfer

I have actively demonstrated my leadership to pursue and successfully establish interest and relationship with several universities, industries, organizations, and technology incubators for research and development of technology and intellectual property generation and commercialization of application related to robotics and precision manufacturing industries. Some of the accomplishments include, establishment of a long-term collaboration between McGowan Institute for Regenerative Medicine University of Pittsburgh and The University of Texas, and the goal is to accelerate the technology transfer of biomedical device technology by development manufacturing methodologies for low-high volume production. Similar interest was established with Semiconductor industry such as silicon wafer polishing technology for Strasbaurgh Company. Also, I directed the collaboration to advance and transfer the technology of military robotic vehicles to commercial products for Re2*, QinetiQ North America* and Humanistic Robotics.

C. Development | Administration of Research and Sponsored Projects and Programs

Strategic collection and dissemination of information including the marketing aspects for internal and external constituents, identification of funding opportunities, identification of internal capabilities. Serve as a liaison for establishing relationship among internal academic units, funding sources, cooperative arrangements and maintain good public relations on research activities. Knowledge on various agency structures and practices. Knowledge and experience in proposal development processes including proposal writing, budget preparation, documentation to meet sponsor requirements, internal proposal processing, negotiation techniques. Knowledge and experience in the best practices for research administration through ethical and professional practices. Identify and address conflicts of interests, professional research policies and procedures.

D. Legal, Intellectual Property Management and Commercialization

Knowledge on regulatory and legislative process, governmental relations, mandated requirements. Knowledge on compliance aspects for federal sponsors and professional practices. Knowledge on federal disclosure requirements, international traffic in arms regulation (ITAR). Experienced in the process of intellectual property development and management, and the establishment of patents, copyrights, licensing and commercialization of technology, and management of data and proprietary information.

E. Financial Management of Research and Sponsored Programs

Knowledgeable on budgeting/accounting aspects during proposal development and accounting management, managing accounting systems/management information systems, maintaining sponsor documents, internal documents. Knowledge and experience in costs such as direct costs, indirect costs, and allowable costs, indirect cost rates for development and cost sharing.

F. General Management of Research and Sponsored Program Office Activities

Knowledge on the facility management such as property, utility, and equipment management, inventory control, sale/disposal of equipment and property, leasing, capital expenditures, sharing/pooling and central services. Knowledge on managing safety and health requirements and procedures, hazardous and nonhazardous materials, security, renovation and construction - differentiation & impact analysis, biohazards. Knowledge on contracts and purchasing, human resource management, employee/labor relations, career development/training, staffing, affirmative action/equal employment opportunity and compensation.

II. ACADEMIC LEADERSHIP ACCOMPLISHMENTS

A. Founder – Mechatronics Engineering Technology Program: (2016 – Present)

I am the Founding faculty of the Bachelor Degree of Mechatronics Engineering Technology of the Department of Engineering Technologies at Bowling Green State University. The purpose of this interdisciplinary program is to prepare industry-ready students, inspire innovation and leadership for the growing digital manufacturing in a multitude of industries that focus on robotics and automation solutions. I have created a four-year degree curriculum which marriages mechanical design, quality systems, electrical, electronic and computer software engineering. I have worked closely with University Advancement, Provost and Dean Offices in securing over $1 *Million* capital equipment donation to establish a state-of-the-art educational Robotic facility that supports courses and student/faculty research projects.

B. Director – FalconBEST Robotics: (2015 – Present)

I am the executive director of the BEST hub in BGSU which serves schools from the Midwest region. The main goal is to promote for the involvement of rural and inner city schools and engage students in

STEM through robotics design competitions, thus maximizing the "pipeline" of future engineers, scientist, and technical professionals. I demonstrated an active role in managing and working as a team player with professional staff to create and organize multiple events including workshops, kick-off day, practice day, and game day. Responsibilities include communicating with BEST regional, recruiting and outreaching schools, recruiting internal and external volunteers, training and supporting teachers, purchasing robotics kit and disseminating information and resources, constructing game field, evaluating and scoring, organizing facility and developing logistic, scheduling, budgeting, and conducting events. I played an active and leadership role in bringing support and sponsorship from industry and internal interties with annual budget of $30k; this include significant contribution from First Solar, Lathrop, Lubrizol, Honda, college of technology, college of business, and many others.

C. Faculty Advisor – Student organization chapters: (2014 – Present)

I am the founder and the faculty advisor of Falcon Robotics Organization in BGSU, a student organization which aims at creating an intellectual environment and prepare leaders through engaging a diverse students in interdisciplinary projects that relate to technology. This STEM club has created self-motivated student population and brought in collaboration between students from several colleges in a fun and highly energetic environment. One accomplishment was the success of the organization to compete in the Hatch program, where a team of students presented their idea to investors, and then succeeded to move to the finale. In addition, I am the faculty advisor of MSA chapter in BGSU which serves a few hundreds of students. The organization demonstrated an effective role in helping out students adjust to the university environment through building and maintaining an engaged community in BGSU. I supervise both club's activities where I provide advice and support in regular basis.

D. Strategic Planning and Partnerships

Chaired the University of Texas Research Institute strategic planning for the Robotics Division to improve the University of Texas at Arlington's collaboration activities with internal and external entities. Also, I actively participated in the development and implementation of College of Technology, Architecture and Applied Engineering of BGSU's strategic plan in alignment with the university strategic plan through participation in the task-force and polarization committees. I established industry partnerships that resulted in support for students, research and education.

E. International Program Development and Implementation

Led the establishment of several memorandum of understanding (MOU) articulation agreement for engineering, science and business programs between the University of Texas of Arlington and multiple international institutions including: Hashemite University, Jordan University of Science and Technology, Yarmouk University, Ministry for Higher Education & Scientific Research in Jordan, Tafila University, and The *American University of Ras Al Khaimah*. I served as the head advisory member of the Hashemite University for International Academic initiative to establish collaborative programs through student and faculty exchanges. I facilitated and led delegations in multiple international visitation which resulted in multiple accomplishment including exchange of dozens of the doctoral students to study abroad in UTA; a state-of-the-art civil engineering facility is established in Hashemite

University with partial support and supervision from US. Companies; and a joint program in civil engineering is created between AURK and UTA.

F. Regional Program Workforce Development, Funding and Implementation

i.

I played a major role in $1 *Million* winning proposal of the Northwest Ohio (NWO) Educational Partners Consortium (NORTH Consortium) for the Regional Aligned Priorities in Delivering Skills (RAPID 1.0), which is focused on economic growth through workforce development from Ohio Department of higher education. As a technical lead representing BGSU, I wrote proposal narrative for mechatronics and process control system; worked with equipment and logistic teams to identify, evaluate, and inquire two mobile trailers equipped with mechatronics and process control platforms to be used in regular basis in training sites including schools, industry, colleges, and universities. I actively initiated discussion with two years community colleges in the Northwest region to work together in consolidating and sharing resources, which will potentially result in encouraging associate degree students purse a bachelor degree in mechatronics in BGSU.

Currently, I am *leading* a workforce development proposal with the NORTH consortium to develop a "virtual to Real" intelligent and adaptive factories which aims at remotely training a highly-skilled workforce in the area of Robotics Cyber information, Cyber safety and security, big data analytics, virtual simulation, and process optimization, all implemented under the concept virtually interconnected manufacturing companies. This second phase proposal has been accepted through (RAPID) program from Ohio higher education, with $1million budget. $394k of the grant will be used to equip BGSU robotics facility with networking servers, periphery sensors, and additional automation components, and it will be used to reach out for a bigger student and trainee population through cyber world.

G. Curriculum Development, Review and Improvement

Chaired the Mechatronics engineering technology curriculum committee in BGSU for developing a 4 year curriculum including the course descriptions, structures, pre-requisites etc. The curriculum included the initial fundamental and introductory courses related to mechanical, electrical, electronic, computer engineering, and then followed by major foundation and core courses, later branch out to specialty courses focusing on integration of robotic systems, and finish with a capstone project. Served in reviewing, developing and teaching fundamental and senior engineering courses for mechanical engineering technology program. And also, I serve as graduate faculty in the technology management consortium which include five universities, where I developed graduate courses for engineering manufacturing technology management program in BGSU.

H. Program Review, Assessment and Accreditation

Played an active and leadership role in the ETAC|ABET accreditation of the engineering technology program of Bowling Green State University. Experience with development of program objectives, student outcomes, assessment and evaluation. Experience with identifying, analyzing and addressing the program concerns, weaknesses, deficiency and observations and strengths. Experience with development of self-study report, assessment materials, course materials, and support mechanisms. Experienced with accreditation commissions, policies, procedures, and processes.

I. Promotion, Outreach and Recruitment

Actively promoted the programs to various internal and external entities such as community members, middle and high schools, private industries, public organizations, university system, regional and state representatives. Served as the University of Texas at Arlington international liaison to Middle East institutions for student exchange. Served as a robotic division representative for demonstrations of technologies to industry partners, economic and community organizations. Coached and lead multiple training workshops programs for underrepresented students about to enter engineering college, focusing on Robotics, Nanotechnology, and Manufacturing and Microsystems areas. Developed and programmed robotic technology vehicles to attract perspective students in BGSU, such as swarming drones, autonomous Segway, participated as a judge in multiple STEM based robotic competitions including Science Olympiad, First Tech Challenge of Texas- Arlington, and FalconBEST in BGSU. Developed and instructed engineering workshops in BGSU for Tech Trek program to empower and encourage female students to think about themselves as future scientists, engineers, mathematicians, and computer specialists. I have recently developed technology based curricula for two summer camps; Toledo Art museum, and BGSU. The goal is to engage underrepresented student to purse STEM related degree through design and implementation of “fun” robotics project.

J. Student Retention and Attribution

Inside the senior level classroom, I play an active role in student centered pedagogical approaches that challenge their metacognitive and critical thinking skills and apply the concepts to real work applications. I have provided several means for student support beyond the class room through supplemental instruction, tutoring resources that resulted in improved student retention rates. In the freshmen level classroom, I provide students an array of skill-set through hands-on activities that invoke their curiosity to learn. Outside the classroom, I have actively led and served in number of student educational and experience activities that helped the retention rates for the program. Provided opportunities for undergraduate students to engage in undergraduate research projects, robotic competition, Coop opportunities, and professional activities that helped reducing student transfers and attrition rates. I play a major role in advising students from early beginning to engage themselves in entrepreneurship and innovation. One accomplishment is the improvement of engineering technology program reputation among international students, where the program was recognized to have one of the largest number of international students in BGSU.

K. Graduate and Undergraduate Instruction and Learning Enhancement

Actively involved in the design, development and execution of traditional face to face, flipped, fully-online modes, blended way of instruction for the courses that I have taught. Effectively integrated and executed high-impact practices in higher education including student centered, team based, and challenge based, guided inquiry based instruction. Able to relate to the millennial students and their expectations well and succeed with high student course performance and participation.