Sohel Anwar, Ph.D., P.E.
Professor, Department of Mechanical and Energy Engineering
Purdue School of Engineering and Technology, IUPUI
Office: 723 W. Michigan Street, SL 260F, Indianapolis, IN 46202
Home: 4500 W. 126th Street, Zionsville, IN 46077
Phone: 317-443-0696 (Cell); E-mail: anwar.sohel@gmail.com; (sanwar@purdue.edu)

Summary

Sohel Anwar is a Full Professor in the Department of Mechanical and Energy Engineering (MEE) at IUPUI. He is also the director of Mechatronics and Autonomous Research Lab (MARL). He has over 27 years of combined academic and industry R & D experience in the general area of mechatronics, automation, and controls. His research program is focused on Hybrid and Electric vehicle powertrain control and optimization, Li-Ion battery diagnostics / prognostics / fast charging control, Autonomous vehicle simulation and control, novel sensor development and fusion, and smart novel medical devices. His research efforts directly resulted in founding a medical devices company and two patents (one pending). He is currently the CEO and vice president of the company which has received an NIH STTR Phase I grant. The company has innovated a new technology called QSTM (Quantifiable Soft Tissue Manipulation) which is poised to set a new paradigm in manual therapy with real-time analytics available to the practitioners during a treatment session. Professor Anwar has published more than 150 peer-reviewed journal, conference papers, book chapters, and eBook. He is also an inventor or co-inventor on 15 US patents (with 1 currently pending). He has supervised the research work of more than 60 current/former graduate students (12 PhD, 49 MS). Of his 51 former graduate students (4 PhD, 47 MSME), most are now working in the industry, and one is a tenure-track faculty. Dr. Anwar's past and recent research projects were supported by the grants from National Science Foundation (NSF), National Institute of Health (NIH), Department of Defense (US Army), Department of Energy (DoE), Indiana Office of Energy and Defense Developments (IOEDD), Cummins Inc., and many other Industry partners. His external research funding to date from these agencies exceeds $3.7M of which $1.85M was awarded to him as the Principal Investigator (PI). He is also the recipient of a visiting faculty fellowship from the University of Melbourne, Australia. Dr. Anwar earned his PhD in Mechanical Engineering with specialization in Controls in 1995 from the University of Arizona. He received the highest distinction in his undergraduate BSME degree. His research is currently funded by US Army, NIH, and Cummins. He is a member of ASME (American Society of Mechanical Engineers) and a faculty advisor for SAE student chapter at IUPUI. He is on the editorial board of three international journals, including IEEE Transactions on Vehicular Technology.

RESEARCH / PROFESSIONAL EXPERIENCE

ACADEMIC

Institution	Rank / Title	Inclusive Dates
IUPUI	Professor (MEE)	2021 - Present
IUPUI	Director, Mechatronics & Auto Research Lab	2004 - Present
IUPUI	Member, Lugar Ctr for Renewable Energy (LCRE)	2007 – Present
IUPUI	Founding Member, Transportation Autonomous Systems Institute (TASI)	2006 – Present
IUPUI	Associate Professor (MEE)	2009 – 2021
IUPUI	Graduate Chair (MEE)	2010 - 2020

University of Melbourne	Visiting Faculty (ME)	02/13 – 06/13
IUPUI	Adjunct Associate Prof. (Motorsports Eng.)	2008 – 2013
IUPUI	Assistant Professor (ME)	2004 – 2009
U. of Michigan, Dearborn	Adjunct Faculty (ME)	2003 – 2004
University of Arizona	Research Associate (SIE)	11/94 – 04/95
Bangladesh Univ. of Eng.	Lecturer (ME)	1986 – 1988

NON-ACADEMIC

Institution / Entity	Title	Inclusive Dates
Raytheon Co.	Faculty Summer Intern	06/09 – 08/09
Ford Motor Co. / Visteon	Senior Research Engineer	1999 – 2004
Caterpillar, Inc.	Staff Consulting Engineer	1995 – 1999

LICENSURE, CERTIFICATION, SPECIALTY BOARD STATUS

State Licensing Board	Licensure	Inclusive Dates
Michigan	Registered Professional Engineer	2004 - Present

JOURNAL EDITORSHIP

Journal Name	Title	Inclusive Dates
• IEEE Trans. on Vehicular Tech.	Editorial Board	2007 – Present
• Int'l J. of Modeling and Simulation	Editorial Board	2016 – Present
• Vehicles (MDPI)	Editorial Board	2019 – Present
• SAE Int'l J. of Passenger Cars - Electronic & Electrical Systems	Associate Editor	2009 – 2019
• Advances in Automobile Eng.	Editorial Board	2012 - 2018

- 29th, 30th, 31st IEEE Intelligent Vehicles Symposium, June, 2018, 2019, 2020: Associate Editor.

AWARDS AND HONORS

2020	IUPUI Jaguars Favorite Professor Award, Fall, 2020.
2019	Student agBOT team won 2nd Place in the Fourth agBOT Challenge, West Lafayette, IN, May 16-18, 2019. Lead Mentor for autonomous systems.
2018	MSME research student Mr. Sohin Shah appeared in the "Faces of IUPUI" article on the 50th anniversary of the founding of IUPUI (https://50.iupui.edu/faces/features/shah-sohin.html), 2019.
2018	Student agBOT team won 2nd Place (out of 11 teams) in the 3rd agBOT Challenge, Rockville, IN, May 17-19, 2018. Lead Mentor for autonomous systems.
2018	PhD student Mr. M.N. Khan received IUPUI Graduate Travel Fellowship to attend and present paper at SAE World Congress in April, 2018, $650.
2017	Student agBOT team won 4th Place (out of 10 teams) in the 2nd agBOT Challenge, Rockville, IN, June 23-25, 2017. Mentor for autonomous navigation / systems.
2017	Identified as "A Favorite Outstanding Teacher" by students in the School of Engineering and Technology, IUPUI, in 2016-17 academic year.
2016	Student agBOT team won 4th Place in the first agBOT Challenge, Rockville, IN, June 25, 2016. Mentor for design of actuation systems.

2016	CTEE (Commitment to Engineering Excellence Research) Award given to supervised undergraduate student Adrienne Fairbanks, Mechanical Engineering, IUPUI.
2008	McNair Scholarship given to supervised BSME student Krishna Patel, 2008.
2008	"Student Supervisor of the Year" Nomination for Graduate Assistants, IUPUI Career & Employment Services
2005	Research Initiative Award, Engineering and Technology, IUPUI
2003	"Leading the Way" Award Nomination, Visteon Corporation
2001 – 2003	Rewards and Recognition Award, Visteon Corporation
1991 – 1992	Graduate Fellowship Award, University of Arizona
1987	Chancellor's Award, Government of Bangladesh
1986	Distinction of Honors in BSME, Bangladesh Univ. of Eng. & Tech.
1985 – 1986	University Grants Commission Scholarship, Government of Bangladesh

EDUCATION:

Institution	Degree	Date Awarded
University of Arizona	Ph.D. in Mechanical Engineering	1995
Florida State University	MS in Mechanical Engineering	1990
Bangladesh Univ. of Eng. & Tech.	MScE, Mechanical Engineering	1988
Bangladesh Univ. of Eng. & Tech.	BSME (with Highest distinction)	1986

PROFESSIONAL DEVELOPMENT

Course / Workshop Title	Provider	Date
Grant Writing Workshop	School of Eng. & Tech., IUPUI (NIH/NSF)	2014 - 2016
Grant Writing Workshop	COE, Purdue University (Dept. of Defense)	2010
NSF Proposal Workshop	National Science Foundation (NSF)	2007
Effective Teaching Workshop	National Effective Teaching Institute (NETI)	2006

TEACHING

TEACHING ASSIGNMENTS (Last three years – Does not include Thesis/Dissertation)

Semester	Course	Title	Credit Hours	Contact Hours	Enrollment
Fall, 2022	ME 48200	Control System Analysis and Design	3.0	3.0	85
Spring, 2022	ME 34001	Instrumentation and Measurement Systems	2.0	2.0	77
	ME 50400/ ECE 59500	Automotive Control	3.0	3.0	27
Fall, 2021	ME 50105	Hybrid and Electric Transportation	3.0	3.0	14
Spring, 2021	ME 34001	Instrumentation and Measurement Systems	2.0	2.0	101

	ME 50400/ ECE 59500	Automotive Control	3.0	3.0	39
Fall, 2020	ME 50105	Hybrid and Electric Transportation	3.0	3.0	17
	ME 57301	Air Pollution and Emission Control	3.0	3.0	8
Spring, 2020	ME 50400/ ECE 59500	Automotive Control	3.0	3.0	21
Fall, 2019	ME 50105	Hybrid and Electric Transportation	3.0	3.0	28
	ME 57301	Air Pollution and Emission Control	3.0	3.0	10
Spring, 2019	ME 50400/ ECE 59500	Automotive Control	3.0	3.0	50
Fall, 2018	ME 58901	Optimal Design of Mechatronic Systems	3.0	3.0	26
	ME 57301	Air Pollution and Emission Control	3.0	3.0	21
Summer, 2018	ME 57201	Analysis and Design of Robotic Manipulators	3.0	3.0	6
Spring, 2018	ME 50105	Hybrid and Electric Transportation	3.0	3.0	50

TEACHING ADMINISTRATION AND CURRICULUM DEVELOPMENT

1. Design Innovation Track in MSME: Developed a new specialization in "Design Innovation" at masters level, based on an ongoing NSF grant, August, 2018.
2. Engineering Design Innovation Graduate Certificate (EDIC): Initiated a new graduate certificate program in Engineering Design Innovation. Available starting Fall, 2019.
3. New Graduate Course Development ME 58901: Optimal Design of Mechatronic Systems: Robots and Interactive Structures: Developed and co-taught this new course in Fall, 2017.
4. New Graduate Course Development ME 57301: Air Pollution and Emission Control: Developed and co-taught this new course in Fall, 2017.
5. Hybrid Electric Vehicle Technology Graduate Certificate (HEVTC): Developed and implemented this new graduate certificate program in Fall, 2012.
6. New Graduate Course Development ME 50105: Hybrid and Electric Transportation – Developed and taught this new graduate course in Spring, 2012.
7. Member, Ad hoc Committee for Bachelor's curriculum development in Energy Engineering, Department of Mechanical Engineering, IUPUI, 2008 -2011
8. Motorsports Engineering B.S. Curriculum Development: Co-led the development of the nation's first BS curriculum in Motorsports Engineering at IUPUI, 2007-2009.
9. New Graduate Course Development ME 50104: Powertrain Integration: Developed and taught this new graduate course both at Purdue University and at IUPUI, 2008.
10. New Mechatronics Concentration in BSME: Developed and implemented this new concentration at undergraduate level at IUPUI, 2006 – 2007.
11. New Graduate Course Development ME 50400: Automotive Control: Developed and taught this new graduate course both at IUPUI and at Purdue University, 2005.

12. New MSME track in Mechatronics and Controls: Developed and implemented this new track at IUPUI, 2005 – 2006.

MENTORING

<u>VISITING SCHOLARS MENTORED</u>

1. Dr. Yinghui Fan, Associate Professor, Department of Electromechanical Engineering, Shantou University, Guangdong, China (Mechatronics Research Lab, IUPUI; March 6, 2017 – April 5 , 2018 and May – September, 2019). Research Topic: *Sensor Fusion Based Robust Control of Autonomous Vehicles*.
2. Dr. Zhao Liu, Associate Professor, Dept. of Mechanical Engineering, Wuhan University, Wuhan City, China (Mechatronics Research Lab, IUPUI; September 1, 2012 – August 31, 2013). Research Topic: *Lithium Ion Battery Diagnostics*.

<u>CURRENT GRADUATE STUDENTS</u>

Doctoral

1. Benjamin Snyder (PhD, Current). PhD Research Topic: *Particle Swarm Optimization Based Multi-Objective Optimization of the Range Extended Electric Powertrain of a Commercial Vehicle.*
2. Adibuzzaman Rahi (DPhD, Current). PhD Research Topic: *Robust Perception for Autonomous Vehicles.*
3. Abhinaba Bhattacharjee (PhD, Current). PhD Research Topic: *Visual SLAM Based Dose Energy Estimation in a Quantifiable Soft Tissue Manipulation (QSTM) Treatment.*
4. Bibin Pattel (PhD, Current). PhD Research Topic: *State of Health Estimation for Li-Ion Batteries.*
5. Ammar E. Ali (PhD, Current). PhD Research Topic: *Hybrid Energy Storage Systems for Hydrostatic Drive Wind Turbines.*
6. Arun Chandra Shekar (PhD, Current). PhD Research Topic*: Modeling and Control of Fuel Cell Hybrid Powertrains*
7. Vikas Narang (PhD, Current). PhD Research Topic: *TBD*
8. Humaira Gul (PhD, Current). PhD Research Topic: TBD

Masters

9. Jonathan Bowyer (MSME, May, 2023). MS Thesis Research Topic*: Electrochemical Model Based Prediction of RUL of a Li-Ion Battery.*
10. Piyush Borole (MSME, December, 2023). MS Thesis Research Topic*: Fast Charging Algorithm for a Li-Ion Battery Module.*
11. Sri Sai Teja Vemulapalli (MSME, 2024). MS Research Topic: *Autonomous vehicle way point tracking optimization with spatial and temporal constraints.*

<u>PAST GRADUATE STUDENTS MENTORED</u>

Doctoral

1. Ahmed Alotaibi (PhD, August, 2021). Dissertation Advisor. PhD Research Topic: *Polymer Nanocomposite-Based Wide Band Strain Sensor for 3D Force Measurement using Piezoelectric and Piezoresistive Data Fusion.* Currently an Assistant Professor, University of Taif, Taif, Saudi Arabia.
2. Sourav Pramanik (PhD, May, 2021). Dissertation Advisor. PhD Research Topic: *A Study of Energy Management in Hybrid Class-8 Truck Platoon Using Multi Agent Optimization.* Currently with Argo AI, Palo Alto, CA.
3. Nazmuzzaman Khan (PhD, May, 2021). Dissertation Advisor. PhD Research Topic: *Novel Entropy Function Based Multi-Sensor Fusion in Space and Time Domain: Application in Autonomous Agricultural Robot.* Currently a Data Scientist with Kroger, Cincinnati, OH.
4. Majid Deldar (PhD, August 2016). Dissertation Advisor. PhD Research Topic: *Decentralized Multivariable Modeling and Control of Wind Turbine with Hydrostatic Drivetrain.* Currently a Senior Hydraulics Engineer, Bosch-Rexroth USA, Greenville, SC.
5. Stamat Stamatov (PhD, August 2008). Dissertation Committee Member, University of Detroit Mercy. PhD Research Topic: *Modeling and Control of Quarter Vehicle Suspension with a Semi-active Actuator.* Last known employer: dSPACE, Inc., Wixom, MI.

Masters

6. Rashed Doha (MSME, May, 2022). MS Thesis Research Topic: *Crop Row Identification for Autonomous Steering of Agricultural Sprayers via Deep Learning.*
7. Tayabali Kesury (MSME, May, 2022). MS Thesis Research Topic: *Radar Modeling for Autonomous Vehicle Simulation Environment Using Open Source.*
8. Iman Fakhari (MSME, December, 2021). MS Thesis Research Topic: *Computer Vision Based Robust Lane Detection via Multiple Model Adaptive Estimation Technique.*
9. Ashwin Kanap (MSME, May, 2022). MS Research Topic: *Lane Detection System Based on OpenCV.*
10. Omkar Parkar (MSME, May, 2021). MS Thesis Research Topic: *Optimization of the Total Cost of Ownership of a Range Extended Electric Vehicle.*
11. Harsh Saksena (MSME, August, 2021). MS Thesis Research Topic: *Robust Object Detection through a Fuzzy Logic based Fusion of Data from a 2D Lidar and a Stereo Camera.*
12. Abhishek Kupade (MSME, December, 2020). MS Research Topic: *Autonomous Vehicle Control Strategy Development via Scade Platform.*
13. Somasekharam Peri (MSME, May, 2020), MS Research Project: *Implementation of Robot Localization and Navigation Stack Simulation on IUPUI agBOT 2.0.*
14. Rushil Patel (MSME, December, 2020), MS Research Topic: *Electrochemical Model-Based Capacity Fade Prognosis of Li-Ion Battery Coupled with an Empirical Model by Supplying HPPC Current.*
15. Sanket V. Bhandari (MSME, December, 2019). MS Research Topic: *Battery Prognostics of a Lithium Ion Battery Using Various State Estimation Methods.*
16. Salah Hasan (MSME, May, 2019). MS Thesis Research Topic: *Design Optimization of a Diesel Engine Particulate Matter (PM) Filter Soot Load Sensor.*
17. Carolina Cardona (MSME, May, 2019). MS Research Topic: *Optimal design for Deployable structures using origami tessellations.*
18. Kathryn Oliver (MSME, May, 2019). MS Research Topic: *Topology optimization of plastic parts for injection molding.*

19. Raj J. Shah (MSME, May, 2019). MS Research Topic: *Modeling and Simulation of Autonomous Vehicles using GazeboSim*.
20. Sohin P. Shah, (MSME, December, 2018). MS Research Topic: *Modeling and Control of an Agricultural Robot*.
21. Arjun Ambasana, (MSME, December, 2018). MS Research Topic: *Robot Operating System Implementation on an Agricultural Robot*.
22. Aryan Asgharifard, (MSME, August, 2018). MS Thesis Research Topic: *Modeling and Control of Integrated Hydrostatic Drive Wind Turbine and CAES*.
23. Samson Rayi (MSME, December, 2018). MS Research Topic: *Human Knee Joint Analysis*.
24. Pratik Magar (MSME, December, 2018). MS Research Topic: *Virtual Sensor for Soot Load Estimation in a Diesel Particulate Filter.*
25. Sampad K. Panda (MSME, December, 2017). MS Research Topic: *Real-Time LIDAR and Digital Camera Data Fusion for Improved Accuracy in Obstacle Detection*.
26. Vinayak Mandavkar (MSME, December, 2017). MS Research Topic: *Sensor Fusion for Robust Obstacle Detection for Autonomous Vehicles*.
27. Arun C. Shekar (MSME, May 2017), Sr. Engineer, Cummins, Inc., Columbus, IN. MS Thesis Research Topic: *Real-Time Estimation of State-of-Charge Using Particle Swarm Optimization on Electro-Chemical Model of Single Cell*. Employer: Cummins, Inc.
28. Mohit Suri (MSME, December, 2017). MS Research Topic: *Force Quantification of IASTM and Validation through Test Rig.*
29. Sandeep Korupolu (MSME, August 2016), Design Engineer, Stryker, Inc., Kalamazoo, MI. MS Research Topic: *Development of an Under Actuated Robotic Device*. Employer: Stryker, Inc.
30. Sai Krishna Prabhala (MSME, August 2016), Product Development Engineer, AgenDx Biosciences, Inc., South Bend, IN. MS Research Topic: *Design of an Electro-Mechanical Device for Knee Loading Applications*. Employer: 3D Biogen, Inc.
31. Ahmed Alotaibi (MSME, May 2016), PhD Student, Purdue University, West Lafayette, IN. MS Thesis Research Topic: *Development of a Mechatronics Instrument Assisted Soft Tissue Mobilization (IASTM) Device to Quantify Force and Orientation Angles*. Employer: Doctoral student, Purdue University.
32. Ashiqur Rahman (MSME, August 2015), Controls Engineer, Caterpillar, Inc., Peoria, IL. MS Thesis Research Topic: *Electrochemical Model Based Fault Diagnosis of Lithium Ion Battery*. Employer: Caterpillar, Inc.
33. Sourav Pramanik (MSME, May 2015), Sr. Engineer, Cummins, Inc., Columbus, IN. MS Thesis Research Topic: *Charge Optimization of Lithium-Ion Batteries for Electric-Vehicle Application.* Employer: Cummins, Inc.
34. Bibin Patel (MSME, December 2014), Sr. Engineer, Cummins, Inc., Columbus, IN. MS Thesis Research Topic: *An Evaluation of the Moving Horizon Estimation Algorithm for Online Estimation of Battery State of Charge and State of Health*. Employer: Cummins, Inc.
35. Masoud Vaezi (MSME, August 2014), Specialist, Karma Automotive, Costa Mesa, CA. MS Thesis Research Topic: Modeling and Control of Hydraulic Wind Power Transfer Systems.
36. Ragibul Huq (MSME, August 2014), Senior Hardware Engineer, Cummins, Inc., Columbus, IN. MS Thesis Research Topic: Development of a Novel Sensor for Soot

Deposition Measurement in a Diesel Particulate Filter Using Electrical Capacitance Tomography. Employer: Cummins, Inc.

37. Vinay K.S. Muddappa (MSME, May 2014), Cummins, Inc., Columbus, IN. MS Thesis Research Topic: Electrochemical Model Based Condition Monitoring of a Li-Ion Battery Using Fuzzy Logic. Employer: Cummins, Inc.

38. Amardeep Singh Sidhu (MSME, December 2013), Caterpillar, Inc., Peoria, IL. MS Thesis Research Topic: Fault Diagnosis of Lithium Ion Battery Using Multiple Model Adaptive Estimation. Employer: Caterpillar, Inc.

39. Ayana Pusha (MSME, December 2012). MS Thesis Research Topic: Multiple Turbine Wind Power Transfer System Loss and Efficiency Analysis.

40. Daric E. Fitzwater (MSME, August 2012). MS Thesis Research Topic: Development of Portable Knee Rehabilitation Device Using Mechanical Loading.

41. Sina Hamzehlouia (MSME, May 2012), PhD Candidate, University of Toronto, Canada. MS Thesis Research Topic: Modeling and Control of Hydraulic Wind Energy Transfers. Employer: Doctoral student, University of Toronto.

42. Quazi Farooqi (MSME, August 2011), Senior Engineer, Ford Motor Company, Dearborn, MI. MS Thesis Research Topic: Injector Waveform Monitoring of a Diesel Engine in Real-Time on a Hardware in the Loop Bench. Employer: Ford Motor Company.

43. Emrah Yildiz (MSME, August 2010), Cummins, Inc., Columbus, IN. MS Research Topic: Nonlinear Constrained Component Optimization of a Plug-In Hybrid Electric Vehicle. Employer: Cummins, Inc.

44. Umut Tugsal (MSEE, December 2009), Cummins, Inc., Columbus, IN. MS Thesis Research Topic: Fault Diagnosis of Electronic Fuel Control (EFC) Valves via Dynamic Performance Test Method. Employer: Cummins, Inc.

45. Harpreetsingh Banvait (MSEE, December 2009), Ford Motor Company, Dearborn, MI. MS Thesis Research Topic: Optimal Energy Management System of Plug-In Hybrid Electric Vehicle. Employer: Ford Motor Company.

46. Wei Niu (MSME, August 2009), Caterpillar, Inc., Peoria, IL. MS Thesis Research Topic: Fault Tolerant Control of a Steer By Wire System Using Nonlinear Observer and Predictive Method on Hardware In Loop Bench. Employer: General Motors.

47. Delon Reyhart (MSME, May 2008), Caterpillar, Inc., Peoria, IL. MS Thesis Research Topic: Optimal Clutch Pressure Control of an On-Demand All Wheel Drive System (ODAWD) for Vehicle Traction Enhancement. Employer: Caterpillar, Inc.

48. James Worthing, Matthew Squire, and Peter Morgan, MSME, PUWL EPE Mechanical Engineering Projects, "Volumetric Efficiency and Air Per Cylinder Estimation of an Internal Combustion Engine Utilizing Engine Torque Estimation Models", December, 2007. Employer: General Motors.

49. M. Shariful Hasan (MSME, August 2007), Senior Engineer, Ford Motor Company, Dearborn, MI. MS Thesis Research Topic: Sliding Mode Observer and Long Range Prediction Based Fault Tolerant Control of a Steer-By-Wire (SBW) System. Employer: Ford Motor Company.

50. Benjamin Snyder (MSME, December 2006), Technical Advisor, Cummins, Inc., Columbus, IN. MS Thesis Research Topic: A Multi-Threaded Computing Algorithm for Pure Simulation of Complex Systems in Simulink. Employer: Cummins, Inc.

51. Yifeng Lin (MSE, December 2006), currently with Caterpillar, Inc., Peoria, IL. MS Thesis Research Topic: Optimal Design of an On-Demand All Wheel Drive Control System for Vehicle Traction Enhancement. Employer: Caterpillar, Inc.

UNDERGRADUATE STUDENTS MENTORED

1. ECE Team: Mohammadali Hashemian, Donovan Nalley, Cameron Heeke, Abdulla Alkaabi, Ahmed Almurshidi, BSEE May 2022 ("ROS Based Autonomous Guidance of an Agricultural Robot").
2. ECE Team 1: Sushmitha Shettar, Ashley Brewer, Olufisola Oladeinde, Steven Barry, BSEE, May 2021 ("Improving Wire Routing and Hardware for a Small Agricultural Robot").
3. ECE Team 2: Austin Van Haitsma, John Baker, Parth Patel, Ryan Knight, Trevor Baxter, BSEE, May 2021 ("Speed Signal Extraction from a Converted Agricultural Robot – Woverine").
4. Team: Lavina Ashok Pillai, Saif Aiman Bin Sharil Muha, Makenzie D'Elia, Robert Haluska, Muhammad Hanif Bin Norhisham, BSME, May, 2020 ("Soft Tissue Manipulation Calibration Test Rig").
5. Team: Michael Miller, Trevor Hansen, Joaquin Garcia, Roger Biak, Peter Tsa, BSECE, 2019 ("Self-Navigation Agricultural Robot with Autonomous Mining for Microflora & Microfauna System - AgBot Challenge 2019").
6. Team: Mounir Karmada, Mohamed El-Merry, Ibrahim Momoh, Rebecca Udong, BSECE, 2018 ("Autonomous Navigation of an Agricultural Robot and Control of On-Board Weed & Feed Actuation System - AgBot Challenge 2018").
7. Team: Hunter Tobe, Gregory Medlock, Scott Graves, Hamzah Al Najim, BSECE, 2017 ("Electronic Hardware and Software Design and Implementation of the Agricultural Robot for AgBot Challenge 2017").
8. Zach Grounds, BSME, 2017 ("Design and Build of an Agricultural Robot for AgBot Challenge 2017")
9. de Carvalho, Mateus Gonzalez (Exchange Student from Brazil), "Identification of Electrochemical Model Parameters for a Li-Ion Battery using RLS Method", Completed. (May 15, 2016 - August 15, 2016).
10. Ceccon Libardi, Nicholas (Exchange Student from Brazil Brazil), "Modeling of Compressed Air Energy Storage System for Wind Turbines", Completed. (May 15, 2016 - August 15, 2016).
11. Team: Joshua Brown, Linlin Cai, Omar El-Mounayri, Bryan Kirk, and Casey Woods, BSME, 2016 ("Prototype Build of an Agricultural Robot for Agbot Challenge 2017").
12. Team: Kristin LaBounty, Richard Lindsay, Marko Saad, BSME, Kazuaki Tamura, Jacob Waugh, BSME, 2016 ("Design of an Agricultural Robot for AgBot Challenge 2016")
13. Adrienne Fairbanks, BSME, 2016 ("In-vivo catheter visualization")
14. Nasser Alvi, BSME, 2016 ("Soot load sensing for Diesel Particulate Filter")
15. Krishna Patel, BSME, 2008 ("Impact of Plug-In Hybrid Vehicle Technology on Motorsports Industry").

16. Team: Jessica Nees, Michael Li, and Keenan Hecht (BSME 2009), MURI Project: Force Loading Device.
17. Caleb Audu and Monis Rahman (BSME 2008), MURI Project: Analytical Redundancy Based Fault Tolerant Control of Steer-By-Wire Systems.
18. Pratik Sheth (BSME 2008), MURI Project: Feasibility Study of Non-Invasive Optical Sensor for Measuring Blood Alcohol to Detect Drunk Driver.
19. Team: John Snodgrass (BSME 2007) and Gaston Tamboura (BSECE 2007), MURI Project: Experimental Verification of an Optimal On-Demand All-Wheel-Drive Control System.
20. Team: Josh Collins, Elizabeth Dick, Vijay Patel, Trish Pham, Breanne Walters, BSME 2007 (Design of the Steering System Interface for a Steer-By-Wire Test Bench").
21. Team: Javier Angulo, Alan Benedict, Amber Russell, Kurush Savabi, BSME 2006 ("Design and Prototype Build of a Steer-By-Wire Hardware-in-the-Loop Bench.

HIGH SCHOOL STUDENTS MENTORED

1. Aqib Abdullah, High School Sophomore, Eman Schools, Fishers, IN, Summer 2022 ("Autonomous Vehicle Simulation")
2. Brian Li, Senior, Park Tudor High School, Summer, 2016 ("Li-Ion battery diagnostics").
3. Samuel Dattilo, Senior, Park Tudor High School, Summer, 2016 ("Li-Ion battery diagnostics").
4. Raihan Saifuddin, 9th grade student, Eman School, Summer, 2016 ("Hydrogen production from brackish water via low-cost electrolysis").
5. Mohammad Rashid, 9th grade student, Eman School, Summer, 2011 ("Hydrostatic wind turbine").

RESEARCH / CREATIVE ACTIVITY

EXTERNAL GRANTS

1. *Development of an Autonomous Off-Road Ground Vehicle Simulator,* US Army Research Lab, Small Business Technology Transfer (STTR) Program, Phase II, IUPUI share $330,027 (Through Advanced Science and Automation Corp, Total award Amount $1,100,000), March, 2022 – February, 2024, Principal Investigator (IUPUI).
2. *Development of Innovative Medical Device Technology for Quantifying Forces during Soft Tissue Manipulation Assessment and Intervention,* National Institute of Health (NIH), STTR grant awarded to Health Smart Technologies (HST), Inc. (an IURTC company), $256,562 (IU subcontract $85,000), April 1, 2021 – September 30, 2022, Principal Investigator (HST).
3. *Development of Innovative Medical Device Technology for Quantifying Forces during Soft Tissue Manipulation Assessment and Intervention,* Matching Grant – Elevate Ventures, Indiana Economic Development Corp (IEDC) for the National Institute of Health (NCCIH), STTR grant awarded to Health Smart Technologies (HST), Inc. $50,000, April 1, 2021 – March 31, 2022, Principal Investigator (HST).
4. *Development of an Autonomous Off-Road Ground Vehicle Simulator*, US Army Research Lab, Small Business Technology Transfer (STTR) Program, Phase I, IUPUI share $50,139 (Through Advanced Science and Automation Corp, Total award Amount $166,000),

November, 2020 – June 30, 2021, Principal Investigator (IUPUI).

5. *Crop row identification for autonomous steering of Agricultural sprayers,* ET Sprayers, Inc., $ 109,950, October 1, 2019 – September 30, 2021, Principal Investigator.

6. *Multi-Objective Optimization of Range Extended Electric Vehicle for Powertrain Design and Energy Management,* Cummins, Inc., $153,787, July 1, 2018 – September 30, 2020, Principal Investigator.

7. *NRT-IGE: Promoting Creativity in Engineering and Technology Graduate Education through Integration of Arts, Design and Experiential Learning in the Curriculum*, National Science Foundation (NSF), National Research Traineeship, $452,958, 9/1/2016 - 8/31/2021, Principal Investigator.

8. *Development of a Mechatronic Quantifiable Soft Tissue Manipulation Medical Device for the Treatment of Musculoskeletal Conditions*, 2017 Indiana Center for Biomedical Innovation (ICBI) & Indiana CTSI Medical Device Development Award (MDDA), $18,000, 07/2017 – 06/2018, Co-PI.

9. *Industry Assessment Center,* US Department of Energy, $1.3M, 08/2011 – 07/2016, Co-PI.

10. *Indiana Advanced Electric Vehicle Training and Education Consortium*, US Department of Energy, $ 600,000, 01/2010 – 12/2012, Co-PI.

11. *Monitoring Injector Waveforms from Engine Control Module with Field Programmable Gate Arrays in Closed Loop Test Bench*, Cummins, Inc., Columbus, IN, USA, $21,446, 09/2010 – 04/2011, Principal Investigator.

12. *Advanced Control Algorithms for Hybrid Powertrain in Earthmoving Machines*, Servo Tech Inc., Chicago, IL, $24,050, 08/2010 – 07/2011, Principal Investigator.

13. *Plug-in Hybrid Electric Vehicle (PHEV) Development*, Indiana Office of Energy and Defense Development, $ 132,392, 08/2007 – 03/2009, Principal Investigator.

14. *Electronic Fuel Control (EFC) Dynamic Performance Test Method*, Cummins, Inc., Columbus, IN, USA, $ 49,357, 1/2008 – 12/2008, Principal Investigator.

15. *Advanced Control Algorithms for Improved Navigation of Autonomous Machines*, Servo Tech, Inc., Chicago, IL, $ 40,001, 1/2008 – 12/2008, Principal Investigator.

16. *Sensing and Computer Algorithms for Autonomous Machines – Phase I and II*, Servo Tech Inc., Chicago, IL, $84,633, 05/2006 – 10/2008, Principal Investigator.

17. *Simulator Driving Data Collection on Headrest Driver Monitor,* Delphi Corporation, $ 24,146, 06/2007 – 11/2007, Principal Investigator.

18. *Multi-Rate Modeling and Simulation of Engine Systems*, Cummins, Inc., $53,359, 5/2005 – 05/2006, Principal Investigator.

EQUIPMENT GRANTS / CASH PRIZES

1. *Cummins 6.7 L Diesel Engine with After-Treatment System*, Equipment grant, Cummins, Inc., Estimated value $14,000, 6/15/2018 – 6/14/2020, Principal Investigator.

2. *Agricultural Robot Weed and Feed Challenge 2019 – 2nd Prize,* agBOT Challenge Competitions, $15,000, May 17, 2019, Lead Mentor for autonomous systems.

3. *Agricultural Robot Weed and Feed Challenge 2018 – 2nd Prize,* agBOT Challenge Competitions, $ 10,000, May 18, 2018, Lead Mentor for autonomous systems.

4. *AgBot Challenge Vehicles: Yamaha Side By Side and Climate Corporation Rover*, Yamaha and Climate Corp, ~$15,000 (Equipment grant), 10/2016 – 05/2017, Co-PI.

5. *The Development of a Mechatronic Quantifiable Soft Tissue Manipulation Medical Device*, Rose Hulman Ventures–Indiana University Research and Technology Corporation Award, In-Kind Grant $15,000, 5/15/2017 – 12/15/2017, Co-PI.

6. *Quantifiable Instrument Assisted Soft Tissue Manipulation Device Prototyping via 3D Printing Technology*, Rose-Hulman Ventures, In-Kind Grant $10,000, 5/15/2016 – 9/15/2016, Principal Investigator.

7. *University of Melbourne visiting faculty fellowship,* Department of Mechanical Engineering, University of Melbourne, Parkville, Victoria, Australia, AUD$15,000, 02/2013 – 06/2013.

8. "*Precision Cartesian Robot System",* NSK Precision America, Indianapolis, IN, Equipment Grant, $ 32,600, 1/07 – 12/07, Principal Investigator.

9. *"Traction Enhanced On Demand All Wheel Drive System for Hybrid Vehicles",* Visteon Corporation, Van Buren Twp, MI, Equipment Grant, $20,000 (original cost), 1/06–12/06, Principal Investigator.

Internal Grants

1. *Development and Validation of a Quantifiable Soft Tissue Manipulation Device for Discrete Force Application,* IUPUI BBRC grant, $5,000, 06/01/2020 – 03/31/2021, Principal Investigator.

1. *A Novel Medical Device for Quantifying Dispersive Forces during Soft Tissue Manipulation,* IUPUI FORCES grant, Office of the Vice Chancellor for Research, $ 35,000, 05/01/2019 – 04/30/2020, Co-PI.

2. *Creating a vibrant and inclusive student experience through multidisciplinary design projects and participation in intercollegiate competitions*, IUPUI Welcoming Campus Innovation Fund, $ 50,000 (including matching fund), 07/01/2018 – 06/30/2019, Co-PI.

3. *Small 3D Force Sensors with Built-in Amplifier for a Quantifiable Soft Tissue Manipulation Medical Device*, Promoting External Applications for Research (PEAR) Program Category D – Equipment Support, IU School of Health and Rehabilitation Science (SHRS), $2785.27. 05/2017 – 08/2017, Co-PI.

4. *Development of a Mechanical Knee Loading Device for Clinical Use*, Biomechanics and Biomaterials Research Center (BBRC), IUPUI, $10,000, 04/01/2014 – 03/31/2015, Principal Investigator.

5. *Electrical Capacitance Based Soot Load Sensor for Diesel Particulate Filter*, Funding Opportunities for Research Commercialization and Economic Success (FORCES), IUPUI Office of the Vice Chancellor for Research, $25,000, 01/2014 – 06/2014, Principal Investigator.

6. *Development of a Soft Tissue Manipulation Force Quantification Device for Clinical Use*, Funding Opportunities for Research Commercialization and Economic Success (FORCES), IUPUI Office of the Vice Chancellor for Research, $ 33,314, 11/01/2015 – 10/31/2016, Co-Principal Investigator.

7. *Quantification of Force during Soft Tissue Massage for Research and Clinical Use*, Biomechanics and Biomaterials Research Center (BBRC), IUPUI, $10,000, 01/01/2015 – 12/31/2015, Co-Principal Investigator.

8. *Development of a Robotic Massaging Device (RMD)*, Funding Opportunities for Research Commercialization and Economic Success (FORCES), IUPUI Office of the Vice Chancellor for Research, $35,000, 06/01/2014 – 05/31/2015, Co-PI.

9. *Analytical Redundancy Based Fault Tolerant Control of Steer-By-Wire Systems,* Multidisciplinary Undergraduate Research Institute (MURI), $7,500, 9/2007 – 5/2008, Principal Mentor.

10. *Development of a Joint Loader*, Multidisciplinary Undergraduate Research Institute (MURI), $5,250, 2/2008 – 8/2008, Principal Mentor.

11. *Feasibility study of a Noninvasive Optical Sensor for Measuring Blood Alcohol Concentration to Detect Drunk Driver*, Multidisciplinary Undergraduate Research Institute (MURI), $5,250, 9/2007 – 8/2008, Principal Mentor.

12. *"Android Science Center"*, IUPUI Signature Center, $ 125,000, 2007, Co-Principal Investigator.

13. *"Transportation Active Safety Institute (TASI)"*, IUPUI Signature Center, $ 300,000, 2006, Co-Principal Investigator.

14. *"Transportation Accident Data Analysis for Active Safety Measures"*, internally funded by IUPUI Multidisciplinary Undergraduate Research Institute (MURI), $ 5,250, 9/06 – 5/07, Co-Mentor.

15. *Analytical Redundancy Based Fault Tolerant Control of Drive-By-Wire Systems*, Research Support Funds Grant, IUPUI, $ 27,750, 06/2006 – 05/2007, Principal Investigator.

16. *Experimental Verification of an Optimal On-Demand All-Wheel-Drive Control System,* Multidisciplinary Undergraduate Research Institute (MURI), $5,250, 9/2006 – 8/2007, Principal Mentor.

17. *Research Initiative Award,* Purdue School of Engineering & Technology, IUPUI, $5,000, 08/2005 – 12/2005.

18. *"International Travel Grant",* Purdue Research Foundation, $ 1,000, March, 2017.

19. *"International Travel Grant",* Purdue Research Foundation, $ 1,000, August, 2014.

20. *"International Travel Grant",* Purdue Research Foundation, $ 1,000, March, 2010.

21. *"International Travel Grant",* Purdue Research Foundation, $ 1,000, 2007.

INVITED LECTURES (IN RANK)

1. S. Anwar, "Autonomous Agricultural Robot Design for AgBot Challenge Competition", MEAP Accelerated College Engagement (ACE) Program, School of Engineering and Technology, IUPUI, Indianapolis, IN, June 24, 2019.

2. S. Anwar, "Autonomous Agricultural Robot Research at IUPUI", MEAP Accelerated College Engagement (ACE) Program, School of Engineering and Technology, IUPUI, Indianapolis, IN, June 12, 2018.

3. S. Anwar, "The Engineering, Technology, and Arts (ETA) Curriculum", Problem Solving Techniques for Security related Products Seminar, Allegion Security Company, Carmel, IN, January 23, 2018.

4. S. Anwar, "Autonomous Agricultural Robot (AgBot)", IPL Drone Conference, Indianapolis Power and Light Company, Indianapolis, IN, November 8, 2017.

5. S. Anwar, "Mechatronics Teaching and Research in the Age of Machines", School of Chemistry, Physics, and Mechanical Engineering, Queensland University of Technology, Brisbane, Australia, January 30, 2017.

6. S. Anwar, On-Air TV Interview with Gerry Dick of INSIDE INDIANA BUSINESS in the "Eye on Education" segment, January 9, 2017.

7. S. Anwar, "Background, History, and Technology of Autonomous Vehicles", Institute of Electrical and Electronic Engineers (IEEE), Power & Energy Society Conference, IEEE Central Indiana Section, Indianapolis, IN, November 5, 2016.

8. S. Anwar, Panelist in "Emerging Energy Technologies – Indiana Focus", Lugar Center for Renewable Energy Annual Spring Forum "Diversification of Energy in Indiana", IUPUI Campus Center, Indianapolis, IN, May 13, 2015.

9. S. Anwar, "Optimal Design of Plug-in Hybrid Electric Vehicles (PHEV) and Li-Ion Battery Diagnostics", Fluid and Thermal Sciences Seminar, Department of Mechanical Engineering, The University of Melbourne, Parkville, Victoria 3010, Australia, March 14, 2013.

10. S. Anwar, "Fault Tolerant Drive By Wire Systems: Impact on Vehicle Safety and Reliability", **<u>Keynote Speech</u>**, Second International Conference on Mechanic Automation and Control Engineering (MACE 2011), Hohhot, Inner Mongolia, China, July 15-17, 2011.

11. S. Anwar, "Plug-in Hybrid Electric Vehicles", IEEE Power & Energy Society Meeting, IEEE Central Indiana Section, Indianapolis, IN, January 12, 2010.

12. S. Anwar, "Further Developments in Plug-in Hybrid Electric Vehicle Technology", *Presentation at the Indiana Summer Transportation Institute*, IUPUI, Indianapolis, IN, June 9, 2009.

13. S. Anwar, "Plug-in Hybrid Electric Vehicle Technology", *Presentation at the Indiana Summer Transportation Institute*, IUPUI, Indianapolis, IN, June 11, 2008.

14. S. Anwar, "Robust Steer By Wire Systems: Impact on Vehicle Safety and Performance", *Automotive Steering Systems Conference, International Quality and Productivity Center*, Dearborn, MI, September 22-24, 2008.

15. S. Anwar, "Hybrid Electric Vehicle Technology and Safety Issues", *Keynote Presentation, First Responder Safety Training – Hybrid Electric Vehicles*, organized by Central Indiana Clean Cities Alliance, Indianapolis, IN May 6, 2008.

16. S. Anwar and Mike Dvorak, "Plug-in Hybrid Electric Vehicle Research and Development at IUPUI", *Dean's Industrial Advisory Committee Meeting*, School of Engineering and Technology, IUPUI, Indianapolis, IN, April 10, 2008

17. S. Anwar, "Fault Tolerant Steer By Wire Systems: Improved Reliability via Analytical Redundancy", *Automotive Steering Systems Conference, International Quality and Productivity Center*, Dearborn, MI, September 24-26, 2007.

18. S. Anwar, "Analytical Redundancy Based Fault Detection and Isolation Algorithms for Drive-By-Wire Systems", *Graduate Seminar Series, Department of Mechanical Engineering, University of Louisville*, Louisville, KY, April, 2007.

19. S. Anwar, "Model Based On-Board Diagnostics (OBD) for Military Vehicles for Improved Performance", *In the Archives of 6th Annual Vetronics Institute Workshop Series*, Tank

Automotive Research Development Engineering Center (TARDEC), US Army, Warren, MI, January 8, 2007.

20. S. Anwar and B. Zheng, "Fault Tolerant Control of Drive-By-Wire Systems in Automotive / Combat Ground Vehicles for Improved Performance and Efficiency", *In the Archives of 5th Annual Vetronics Institute Workshop Series*, Tank Automotive Research Development Engineering Center (TARDEC), US Army, Warren, MI, January 12, 2006.

PATENTS (14 issued US patents and 1 currently pending)

Pending

1. M. Terry Loghmani, Abhinaba Bhattacharjee, **S. Anwar**, S. Chien, "QSTM Technology to quantify volitionally applied soft tissue manipulation with haptic force-motion feedback", Invention disclosure filed with ICO office in September, 2021.

Issued

2. M. Terry Loghmani, **S. Anwar**, A. Alotaibi, S. Chien, and K. March, "Quantification of Force during Soft Tissue Massage for Research and Clinical use", US Patent Application No. 62/219,264, Notice of Allowance, August 22, 2022.

3. R.Huq and **S. Anwar**, "Real-Time Soot Measurement in a Diesel Particulate Filter". US Patent No. 9,151,205; Issued: October 6, 2015.

4. **S. Anwar**, "Vehicle yaw stability system and method", United States Patent Number 7,137,673, November 21, 2006.

5. N. Duan, L. Macklem, M. Rahaim, **S. Anwar**, G. Monkaba, W.P. Perkins, D. Wisniewski, T. Kendall, and J. Palazzolo, "Hydraulic coupling system", United States Patent Number 7,059,460, June 13, 2006.

6. **S. Anwar**, C. Klaes, and K. Pavlov, "Method and Apparatus for Power Management of a Regenerative Braking System", United States Patent Number 7,029,077, April 18, 2006.

7. **S. Anwar**, D. Wisniewski, N. Szalony, N. Duan, H. Tan, S. Shen, C. McKenzie, and H. Lee, "Control of a Hydraulic Coupling System", US Patent Number 7,007,782, March 7, 2006.

8. **S. Anwar**, "Control Algorithm for a Yaw Stability Management System", US Patent Number 6,885,931, April 26, 2005.

9. **S. Anwar**, C. Klaes, and K. Pavlov, "Method and Apparatus for Power Management of a Braking System", US Patent Number 6,871,919, March 29, 2005.

10. **S. Anwar**, "A Predictive Control Algorithm for an Anti-Lock Braking System", US Patent Number 6,728,620, April 28, 2004.

11. **S. Anwar** and K. Pavlov, "A Control Algorithm for a Hybrid Electromagnetic/Friction Brake System for Automobiles", US Patent Number 6,702,404, March 9, 2004.

12. **S. Anwar**, "A Closed Loop Control Algorithm for an Eddy Current Brake System", US Patent Number 6,619,760, September, 2003.

13. C. Chen, **S. Anwar**, R. Ingram, K. Bates, and S. Cetinkunt, "Method and System for Controlling Steady-State Speed of Hydraulic Cylinders in an Electrohydraulic System", US Patent Number 6,459,976, Oct. 1, 2002. Also DE 10122671.

14. **S. Anwar**, S. Cetinkunt, C. Chen, R. Ingram, and U. Pinsopon, "Methods for Performing Automated Work Machine Functions", US Patent Number 6,371,214, April 16, 2002. Also DE 10028606.

15. **S. Anwar**, "Full Throttle Directional Shift", US Patent Number 6,019,202, February 1, 2000.

Invention Disclosure

1. A. Izadian, P. Magar, and **S. Anwar**[†], "A Sensorless Soot Load Detection Technique", IU Reference Number: 2018-142-01, Application Number: US 62/675,346, Filing Date: May 24, 2018.
2. J. Huser, D. Franzen, S. Chittenden, and **S. Anwar**[†], "End Stop Mechanism for a Steer By Wire System", Provisional Patent Filing – IURTC Tech No. 1186931, September, 2007.
3. Y. Lin and **S. Anwar**[†], "Optimized Control of All Wheel Drive System", Provisional Patent Filing – IURTC Tech No. 07096, January, 2007.
4. **S. Anwar**[†] and L. Chen, "Algorithm for Steer By Wire System", Provisional Patent Filing – IURTC Tech No. 07097, January, 2007.
5. **S. Anwar**, "Slip regulation algorithm for an automotive vehicle using a normal force estimate and a predetermined peak wheel slip value", United States Patent Application Number 20050082911, April 21, 2005.

PEER-REVIEWED PUBLICATIONS

(1 e-Book, 3 Book chapters, 60 Refereed journal papers and 98 Peer-reviewed conference papers; includes papers currently in the pipeline)

E-BOOK

1. **S. Anwar** (Ed), "Fault Tolerant Drive By Wire Systems: Impact on Vehicle Safety and Reliability", Bentham Science Publishers, Sharjah, UAE, April, 2012.

BOOK CHAPTER

2. R. Huq and **S. Anwar**[†], "Soot Load Sensing in a Diesel Particulate Filter Based on Electrical Capacitance Tomography", A chapter in the book "Advanced Mechatronics and MEMS Devices II" edited by Dan Zhang and Bin Wei, Springer Publishing, AG, 2016, pp 217-252.
3. **S. Anwar**, "Fault Detection, Isolation, and Control of Drive By Wire Systems", A chapter in the book "Fault Detection", Edited by Wei Zhang, In-Tech Publishing, Vukovar, Croatia, March, 2010, pp 231-254.
4. **S. Anwar**, "Drive By Wire Systems: Impact on Vehicle Safety and Performance", A chapter in the Book *"Automotive Informatics and Communicative Systems: Principals in Vehicular Networks and Data Exchange"*, Ed. Prof. Huaqun Guo, IGI Global Publishing, Hershey, Pennsylvania, April, 2009, pp 12-47.

IN JOURNALS

1. Omkar Parker, Benjamin Snyder, and **Sohel Anwar**, "Modified Particle Swarm Optimization based Powertrain Energy Management for Range Extended Electric Vehicles", *Vehicles*, (to be submitted).
2. Tayabali Kesury, Chris Cardoza, and Sohel Anwar, "Clustering based Radar Modeling for Autonomous Vehicle Simulation in Open Source Platforms", *Vehicles (to be submitted)*.

3. Harsh Saksena and **Sohel Anwar**, "A Novel Fusion Technique for 2D Lidar and Stereo Camera Data Using Fuzzy Logic for Improved Depth Perception", *Int'l J. Automotive Tech.* (to be submitted).

4. Sourav Pramanik and **Sohel Anwar**, "Multi-Agent Energy Optimization of a Class 8 Truck Hybrid Electric Powertrain for a given Trajectory", *IEEE Access* (In review).

5. Sourav Pramanik and **Sohel Anwar**, "Predictive Speed, Coast, Gear & SOC Management in Class 8 Mild Hybrid Truck using Multi-Objective Optimization", *Journal of Engineering* (In review).

6. Md. Nazmuzzaman Khan, Mohammad A-Hasan, and **Sohel Anwar**, "Decision level multi-sensor fusion to improve limitations of single camera based CNN classification: application in precision farming", *Int'l J. Automotive Tech.* (In review).

7. Abhinaba Bhattacharjee, **Sohel Anwar**, Stanley Y.P. Chien, M. Terry Loghmani, "A novel dispersive manual therapy medical device quantifying real-time dynamic force-motions for treatment characterization of clinical Quantifiable Soft Tissue Manipulation (QSTM^{TM})", *IEEE Transactions on Biomedical Engineering* (Second revision in review).

8. Iman Fakhari and **Sohel Anwar**, "Robust Lane Detection via Computer Vision Based Model via Multiple Model Adaptive Estimation Methodology", *Vehicles* (Second revision in review).

9. Alotaibi, Ahmed, and **Sohel Anwar**. "Direct and Extended Piezoresistive and Piezoelectric Strain Fusion for a Wide Band PVDF/MWCNT-Based 3D Force Sensor." *IEEE Access* 9 (2021): 162156-162174.

10. Pramanik, Sourav and **Anwar, Sohel**, "Robust Controller Design for Rotary Inverted Pendulum using H∞ and μ-Synthesis Technique", *Journal of Engineering*, 2021, pp. 1-12, DOI: 10.1049/tje2.12078.

11. Ammar Ali, Majid Deldar, and **Sohel Anwar**, "Optimal Control of Hydrostatic Drive Wind Turbines for Improved Power Output in Low Wind Speed Regions", *Energies*, Vol. 14, 5001. https://doi.org/10.3390/en14165001 2021.

12. Khan, Nazmuzzaman, Al-Hasan, Mohammad, and **Anwar, Sohel**, "Improving the Robustness of Object Detection through a Multi-camera based Fusion Algorithm using Fuzzy Logic", *Frontiers in Artificial Intelligence*, Vol. 4, 2021.

13. A. Alotaibi and **S. Anwar**, "A Fuzzy Logic Based Piezoresistive/Piezoelectric Fusion Algorithm for Carbon Nanocomposite Wide Band Strain Sensor," in *IEEE Access*, vol. 9, pp. 14752-14764, 2021, doi: 10.1109/ACCESS.2020.3049081.

14. Sourav Pramanik and **Sohel Anwar**, "Look Ahead Based Control Strategy for Hydro-Static Drive Wind Turbine Using Dynamic Programming", *Energies*, Vol. 13, Special Issue on Hydrokinetic Conversion, 2020, 20 pages.

15. Majid Deldar, Afshin Izadian, and **Sohel Anwar**, "A Decentralized Multivariable Control of Hydrostatic Wind Turbine Drivetrain", *Asian Journal of Control*, Vol. 22, No. 3, 2020, pp. 1038-1051.

16. Khan, Nazmuzzaman, and **Sohel Anwar**. "Time-Domain Data Fusion Using Weighted Evidence and Dempster–Shafer Combination Rule: Application in Object Classification." *Sensors* 19, no. 23 (2019): 5187.

17. M.N. Khan and **S. Anwar**, "Paradox Elimination in Dempster–Shafer Combination Rule with Novel Entropy Function: Application in Decision-Level Multi-Sensor Fusion", *Sensors*, *19* (21), 2019, 4810; https://doi.org/10.3390/s19214810.

18. S. Rayi, H. Yokota, and **S. Anwar**, "Analysis of Force Transmission in a Human Knee Joint using a Finite Element Analysis", *J. Biomedical Science and Engineering*, Vol. 12, No. 6, 2019.

19. Arun C. Shekar and **Sohel Anwar**, "Particle Swarm Optimization Based SOC Estimation using Electrochemical Model for a Li Ion Battery", *batteries*, Vol. 5, No. 1, 2019.

20. M. Deldar, A. Izadian, and S. Anwar, "Analysis of a hydrostatic drive wind turbine for improved annual energy production", *AIMS Energy,* Vol. 6, No. 6, 2018, pp. 926-948.

21. Ahmed Alotaibi, **Sohel Anwar**, and M. Terry Loghmani, "Skin Modeling Analysis of a Force Sensing Instrument-Assisted Soft Tissue Manipulation Device", *ASME Journal of Engineering and Science in Medical Diagnostics and Therapy*, Vol. 1, No. 3, pp. 031002-1-11, April, 26, 2018.

22. Ammar E. Ali, Nicholas C. Libardi, **Sohel Anwar**, and Afshin Izadian, "Design of a compressed air energy storage system for hydrostatic wind turbines*", AIMS Energy,* Vol. 6, No. 2, pp. 229-244, 2018 (doi: 10.3934/energy.2018.2.229).

23. S. Korupolu, S. Chien, H. Yokota, and **Sohel Anwar**, "Development of an Artificial Finger-Like Knee Loading Device to Promote Bone Health", *J. Biomedical Science and Engineering*, Vol. 10, No. 11, pp 550-561, 2017 (https://doi.org/10.4236/jbise.2017.1011041).

24. Md. Ashiqur Rahman, **Sohel Anwar**, and Afshin Izadian, "Electrochemical Model-Based Condition Monitoring via Experimentally Identified Li-Ion Battery Model and HPPC", *Energies,* Vol. 10, No. 9, pp 1266:1-16, August, 2017.

25. Ahmed Alotaibi, **Sohel Anwar**, Stanley Chien, and M. Terry Loghmani, "Force Measurement System for an IASTM Device: Design and Implementation", *ASME Journal of Medical Devices,* Vol. 11, No. 3, pp. 031012-1-11, September, 2017.

26. M. Terry Loghmani, Bruce Neff, Ahmed M. Alotaibi, **Sohel Anwar**, Stanley Chien, and Keith March, "Quantifiable Soft Tissue Manipulation (QSTM): A Requisite to Advance the Field of Manual Therapy", *J. Novel Physiotherapies*, 7(1), pp 1-3, 2016.

27. M. A. Rahman, **Sohel Anwar**, and A. Izadian, "Electrochemical Model Based Fault Diagnosis of Lithium Ion Battery", *Advances in Automobile Engineering,* Volume 5, Issue 2, No. 159, DOI: 10.4172/2167-7670.1000159, 2016.

28. S.K. Prabhala, S. Chien, H. Yokota, and **S. Anwar**, "A Mechatronic loading device to stimulate bone growth via a human knee", *Sensors*, 16, Issue 10, 1615; 2016. doi:10.3390/s16101615.

29. Sourav Pramanik and **Sohel Anwar**, "Electrochemical Model Based Charge Optimization for Lithium-Ion Batteries", *Journal of Power Sources*, Volume 313, 2016, pp. 164-177.

30. Jiangmei Wu and **Sohel Anwar**, "Ruga Architectural Skin (RAS): Towards Building Smart Self-Folding Topology", *The International Journal of the Constructed Environment*, Volume 7, Issue 3, pp.17-30, 2016.

31. Md. Ashiqur Rahman, **Sohel Anwar**, and Afshin Izadian, "Electrochemical Model Parameter Identification of a Lithium-Ion Battery using Particle Swarm Optimization Method", *Journal of Power Sources*, 307 (2016) 86-97.

32. Han Ling, An Ying, Dong Bo, Tian Liyuan, and Sohel Anwar, "Optimal Strategy of Clamping Force for Continuously Variable Transmission Based on Slip Ratio Feedback Control", *Journal of Southwest Jiaotong University*, Vol 51, No. 6, 2016, pp. 1073-1079.

33. R. Huq and **S. Anwar**, "Development of a Soot Load Sensor using Electrical Capacitance Imaging", *ASME Journal of Dynamic Systems, Measurement and Control*, Vol 137, No. 11, 2015, pp. 111009-111009-10.

34. Amardeep Sidhu, Afshin Izadian, and **Sohel Anwar**, "Adaptive Nonlinear Model-Based Fault Diagnosis of Li-ion Batteries", *IEEE Transactions on Industrial Electronics*, Vol 62, No. 2, February, 2015, pp. 1002-1011.

35. Majid Deldar, Afshin Izadian, Masoud Vaezi, and **Sohel Anwar**, "Modeling of a Hydraulic Wind Power Transfer System Utilizing a Proportional Valve", *IEEE Transactions on Industry Applications,* Vol 51, No. 2, March/April, 2015, pp. 1837-1844.

36. Zhao Liu and **Sohel Anwar**, "Application of MMAE to the Fault Detection of Lithium-Ion Battery", *Applied Mechanics and Materials*, Vol 598, 2014, Trans Tech Publications, Switzerland, pp 342-346.

37. Amardeep Sidhu, Afshin Izadian, and **Sohel Anwar**, "Model Based Condition Monitoring in Lithium-Ion Batteries", *Journal of Power Sources*, Vol 268, 2014, pp 459–468.

38. Umut Tugsal and **Sohel Anwar**, "Fuzzy Pattern Classification Based Detection of Faulty Electronic Fuel Control (EFC) Valves Used in Diesel Engines", *Machines,* Vol 2, 2014, pp. 99-119.

39. Afshin Izadian, Sina Hamzehlouia, Majid Deldar, **Sohel Anwar**, "Hydraulic Wind Power Transfer System: Operation and Modeling", *IEEE Transactions on Sustainable Energy*, Vol 5, No. 2, 2014.

40. **S. Anwar** and W. Niu, "A Nonlinear Observer Based Analytical Redundancy for Predictive Fault Tolerant Control of a Steer-By-Wire System", *Asian Journal of Control,* Vol 16, No. 2, 2014, pp. 321-334.

41. Daric E. Fitzwater, Todd Dodge, Stanley Chien, Hiroki Yokota, and **Sohel Anwar**, "Development of a Portable Knee Rehabilitation Device Using Mechanical Loading*", ASME Journal of Medical Devices*, Vol 7, No 4, December, 2013, pp 041007-1-10.

42. Sina Hamzehlouia, Afshin Izadian, and **Sohel Anwar**, "Modeling and Control of a Hybrid-Hydraulic Electric Vehicle", *Advances in Automobile Engineering*, Vol 2, No. 1, 2013. doi: 10.4172/2167-7670.1000102.

43. Q. R. Farooqi, B. Snyder, and **Sohel Anwar**, "Real Time Monitoring of Diesel Engine Injector Waveforms for Accurate Fuel Metering and Control", *Journal of Control Science and Engineering,* Vol 2013 (2013), Article ID 973141, 9 pages http://dx.doi.org/10.1155/2013/973141.

44. E. Yildiz, Q. Farooqi, **Sohel Anwar**, Y. Chen, A. Izadian, "Nonlinear Constrained Component Optimization of a Plug-in Hybrid Electric Vehicle", *Journal of Automotive Safety and Energy,* Vol. 3, No. 1, 2012.

45. D. Reyhart and **Sohel Anwar**, "Optimal Control of an On-Demand All Wheel Drive System (ODAWD) for Vehicle Traction Enhancement", *International Journal of Vehicle Design*, Vol. 56, No.1-4, 2011, pp.270-298.

46. **S. Anwar** and R. Stevenson, "Torque Characteristics Analysis for Optimal Design of A Copper-Layered Eddy Current Brake System", *Int. J. Automotive Technology*, Vol. 12, No. 4, August, 2011, Pages 497-502.

47. B. Zheng and **S. Anwar**, "Yaw Stability Control of a Steer-By-Wire Equipped Vehicle via Active Front Steering", *Mechatronics*, Volume 19, Issue 6, September 2009, Pages 799-804.

48. X. Lin, H. Banvait, **S. Anwar**, and Y. Chen, and, "Optimal Energy Management for a Plug-in Hybrid Electric Vehicle using Particle Swarm Optimization", WEVA Journal, Vol. 3, ISSN 2032-6653, December, 2009.

49. B. Zheng and **S. Anwar**, "Fault Tolerant Steer-By-Wire Road Wheel Control System", *International Journal of Vehicular Technology*, v. 2008, article ID 59571, 2008.

50. **S. Anwar** and L. Chen, "An Analytical Redundancy Based Fault Detection and Isolation Algorithm for a Road-Wheel Control Subsystem in a Steer-By-Wire System", *IEEE Transaction on Vehicular Technology*, Vol. 56, No. 5, 2007, pp. 2859-2869.

51. **S. Anwar** and B. Zheng, "An Anti-Lock Braking Algorithm for an Eddy current based Brake-By-Wire System", *IEEE Transactions on Vehicular Technology*, Vol. 56, No. 3, 2007, pp. 1100-1107.

52. **S. Anwar**, "Anti-Lock Braking Control of a Hybrid Brake-By-Wire System", *Journal of Automobile Engineering – IMechE Proceedings Part D*, v 220, n 8, 2006, pp 1101-1117.

53. **S. Anwar**, "Generalized Predictive Control of Yaw Dynamics of a Hybrid Brake-By-Wire Equipped Vehicle", *Mechatronics*, v 15, Nov., 2005, pp. 1089-1108.

54. S. Cetinkunt, U. Pinsopon, C. Chen, A. Egelja, and **S. Anwar**, "Positive Flow Control of Closed Center Electrohydraulic Implement-By-Wire Systems for Mobile Equipment Application", *Mechatronics*, Vol. 14, 2004, pp.403-420.

55. **S. Anwar**, "A Parametric Model of an Eddy Current Electric Machine for Automotive Braking Applications", *IEEE Transactions on Control Systems Technology*, Vol. 12, Issue 3, May, 2004, pp. 422-427.

56. **S. Anwar**, "Brake Based Vehicle Traction Control via Generalized Predictive Algorithm", *SAE Transactions Journal of Passenger Cars: Mechanical Systems*, v 112, n 6, 2003, pp. 296-303.

57. **S. Anwar**, "A Predictive Control Algorithm for Vehicle Yaw Stability Management", *SAE Transactions Journal of Passenger Cars: Mechanical Systems,* v 112, n 6, 2003, pp. 1325-1334.

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60. **S. Anwar**, "Mechanical Behavior of Jute-Glass Fiber Reinforced Composite Laminates", *Journal of Mechanical Engineering Research & Developments*, Vol. 17, December, 1994, pp. 13-29.

IN CONFERENCE PROCEEDINGS

1. Jonathan Bowyer and Sohel Anwar, "Prediction of Remaining Useful Life of Lithium-Ion Batteries through Physics Based Modeling of SEI Decomposition", *SAE World Congress and Exposition,* April 18-20, 2023 (To be submitted).

2. Yousif Hag Ahmed and Sohel Anwar, "Real-Time Detection of Negative Obstacles for Autonomous Vehicles to Improve Safety", *SAE World Congress and Exposition,* April 18-20, 2023 (To be submitted).

3. Adibuzzaman Rahi, Nazmuzzaman Khan, and Sohel Anwar, "Sensor fusion to improve limitations of single camera based CNN classification on an Agricultural Vehicle", *SAE World Congress and Exposition,* April 18-20, 2023 (To be submitted).

4. Ammar E. Ali, Shawn Wei, and Sohel Anwar, "A Novel Approach to Modeling ReDox Flow Batteries with High Energy Capacity", *SAE World Congress and Exposition,* April 18-20, 2023 (To be submitted).

5. Arun Chandra Shekar and Sohel Anwar, "Physics Based Modeling of a PEM Fuel Cell Hybrid Powertrain", *SAE World Congress and Exposition,* April 18-20, 2023 (To be submitted).

6. Abhinaba Bhattacharjee, M. Terry Loghmani, and Sohel Anwar, "An AI-Based Dose Energy Estimation Methodology for a Quantifiable Soft Tissue Manipulation (QSTM) Device", *ASME International Mechanical Engineering Congress and Exposition,* October 30 – November 3, 2022.

7. Harsh Saksena and Sohel Anwar, "Fuzzy Logic Based Fusion of Stereo Camera and 2D Lidar Data for Improved Depth Perception", *ASME International Mechanical Engineering Congress and Exposition,* October 30 – November 3, 2022.

8. Iman Fakhari and Sohel Anwar, "A Multiple Model Estimation Approach to Robust Lane Detection via Computer Vision Based Model", *IEEE International Symposium on Industrial Electronics*, Anchorage, Alaska, June 1-3, 2022.

9. Terry Loghmani, Abhinaba Bhattacharjee, Grace Comerford, Sarah Morgan, Rachel Powell, Kinsey Muhlenkamp, Sohel Anwar, Stanley Chien, "Instrument-Assisted Soft Tissue Manipulation Stroke Pattern Analysis Using Digital Technology with Objective Metrics", *Combined Sections Meeting, American Physical Therapy Association* (APTA), San Antonio, TX, Feb 2-5, 2022.

10. A. Bhattacharjee, S. Chien, S. Anwar, and M.T. Loghmani, "Quantifiable Soft Tissue Manipulation (QSTM) – A novel modality to improve clinical manual therapy with objective metrics", *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, October 31 – November 4, 2021, Virtual.

11. Omkar Parker, Benjamin Snyder, and Sohel Anwar, "Optimization of Powertrain Energy Management for Range Extended Electric Vehicle using modified Particle swarm algorithm", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Virtual Conference, Nov. 1-5, 2021.

12. Tayabali Kesury, Chris Cardoza, and Sohel Anwar, "Radar Modeling for Autonomous Vehicle Simulation Environment with Open-Source Utilities", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Virtual Conference, Nov. 1-5, 2021.

13. Dvij Kalaria, Parv Maheshvari, Animesh Jha, Arnesh Issar, Debashish Chakravarty, Sohel Anwar and Andres Tovar, "Local NMPC on Global Optimised Path for Autonomous Racing", *ICRA 2021 workshop on "Opportunities and Challenges with Autonomous Racing"*, Indianapolis, IN, May 31, 2021.

14. Rashed Doha, Veera Rajendran, Mohammad Al-Hasan, and Sohel Anwar, "Cascading clustering based crop row detection with online domain adaptation", Virtual Conference, 27th SIGKDD Conference on Knowledge Discovery and Data Mining August 14 - 18, 2021 – Singapore, 2021.

15. Nazmuzzaman Khan, Veera Rajendran, Mohammad Hasan, and Sohel Anwar, "Clustering Algorithm Based Straight and Curved Crop Row Detection using Color Based Segmentation", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Virtual Conference, Nov. 16-19, 2020.

16. Sohel Anwar, "Capacity Fade Estimation of a Lithium-Ion Battery through an Integrated Electrochemical Battery Model and Empirical Cycle Aging Model", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Virtual Conference, Nov. 16-19, 2020.

17. Nazmuzzaman Khan and Sohel Anwar, "Robust weed recognition through color based image segmentation and convolution neural network based classification", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, UT, Nov. 11-14, 2019.

18. Carolina Cardona, Andres Tovar, and Sohel Anwar, "Optimal design for Deployable structures using origami tessellations", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, UT, Nov. 11-14, 2019.

19. Ahmed Alotaibi and Sohel Anwar, "Analysis of Bio-Inspired Structures for 3D Force Sensing Using Virtual Prototyping", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, UT, Nov. 11-14, 2019.

20. Kathryn Oliver, Sohel Anwar, and Andres Tovar, "Topology optimization of plastic parts for injection molding", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, UT, Nov. 11-14, 2019.

21. Salah Hassan and Sohel Anwar, "Soot Mass Estimation from Electrical Capacitance Tomography Imaging for a Diesel Particulate Filter", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Salt Lake City, UT, Nov. 11-14, 2019

22. M.N. Khan and S. Anwar, "Improved Dempster-Shafer Sensor Fusion Using Distance Function and Sensor Accuracy: Application in Object Detection", *Proceedings of the 16th International Conference on Informatics in Control, Automation and Robotics (ICINCO),* Prague, Czech Republic, July 29-31, 2019.

23. Khunsa Hisham, Jaime Arcos-Legarda, Andres Tovar, and **Sohel Anwar**[†], "Optimal mechatronic design of a quadruped robot with compliant legs", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Pittsburgh, PA, Nov 2018.

24. Pratik Magar, Afshin Izadian, and **Sohel Anwar**[†], "Virtual Sensor for Soot Load Estimation in a Diesel Particulate Filter", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Pittsburgh, PA, Nov 2018.

25. Yinghui Fan, **Sohel Anwar**, and Litao Wang, "Multi-agent Framework of Assembly-oriented Planning and Scheduling for Discrete Manufacturing Enterprise", ICCA, Anchorage, AK, 2018.

26. M.N. Khan, Gregory Medlock, Scott Graves, and **Sohel Anwar**[†], "GPS Guided Autonomous Navigation of a Small Agricultural Robot with Automated Fertilizing System", *SAE World Congress and Exposition*, Detroit, April, 2018.

27. Mohammed Khattab, Neal Katterjohn, Ammar Ali, Karansingh Patil, and **Sohel Anwar**[†], "Analysis of Soot Load Detection Capability via Electrical Capacitance Tomography in a Diesel Particulate Filter", *SAE World Congress and Exposition*, Detroit, April, 2018.

28. Ahmed Alotaibi, **Sohel Anwar**[†], and M. Terry Loghmani, "A Force Sensing Instrument Assisted Soft Tissue Mobilization Device", ASME Dynamic Systems and Control Conference (DSCC), October 2017, Tysons, VA, USA.

29. Majid Deldar and **Sohel Anwar**[†], "Optimal Control of a Hydrostatic Wind Turbine Drivetrain for Efficiency Improvements", ASME Dynamic Systems and Control Conference (DSCC), October 2017, Tysons, VA, USA.

30. Amardeep Sidhu, Afshin Izadian, and **Sohel Anwar**[†], "Model-Based Adaptive Fault Diagnosis in Lithium Ion Batteries: A Comparison of Linear and Nonlinear Approaches", *SAE World Congress and Exposition,* Detroit, MI, April 4-6, 2017.

31. Raja Dheekond, Sampad K. Panda, Md. N. Khan, Mohammad Hasan, and **Sohel Anwar**[†], "Moving object detection from a vehicle using sensor fusion and deep learning", *SAE World Congress and Exposition,* Detroit, MI, April 4-6, 2017.

32. M.A. Rahman, **S. Anwar**[†], A. Izadian, "Fault Diagnosis of a Lithium Ion Battery via Electrochemical Model and MMAE", *European Battery, Hybrid & Fuel Cell Electric Vehicle Congress (EEVC 2017)*, Geneva, March 14-16, 2017.

33. A.C. Shekar and **S. Anwar**[†], "PSO Based Real-Time Estimation of SOC of a Lithium Ion Battery Cell", *European Battery, Hybrid & Fuel Cell Electric Vehicle Congress (EEVC 2017)*, Geneva, March 14-16, 2017.

34. Sai Krishna Prabhala, **Sohel Anwar**[†], Hiroki Yokota, and Stanley Chien, "Finite Element Analysis of an electro-mechanical knee loading device", *ASME International Mechanical Engineering Congress and Exposition,* Phoenix, AZ, Nov. 11-17, 2016.

35. Sandeep Korupolu, **Sohel Anwar**[†], Hiroki Yokota, and Stanley Chien, "Analysis of an Under-Actuated Robotic Knee Loading Device", *ASME International Mechanical Engineering Congress and Exposition,* Phoenix, AZ, Nov. 11-17, 2016.

36. Ahmed Alotaibi, **Sohel Anwar**[†], S. Chien, and M. Terry Loghmani, "Development of a Force Sensing Instrument Assisted Soft Tissue Mobilization Device", *ASME International Mechanical Engineering Congress and Exposition,* Phoenix, AZ, Nov. 11-17, 2016.

37. Majid Deldar, Afshin Izadian, and **Sohel Anwar**[†], "System Configuration and Component Sizing Methodology of a Hydrostatic Transmission for a Wind Power Plant", *ASME International Mechanical Engineering Congress and Exposition,* Phoenix, AZ, Nov. 11-17, 2016.

38. Bruce Neff, Ahmed Alotaibi, Mohit Suri, **Sohel Anwar**, M. Terry Loghmani, "Quantification of Force during Soft Tissue Manipulation for Research and Clinical Use", 4th International Fascia Research *Congress*, Washington, DC, September 18-20, 2015.

39. Sourav Pramanik and **Sohel Anwar**[†], "An Electrochemical Model Based Optimal Charging Algorithm for Lithium-Ion Batteries", *ASME International Mechanical Engineering Congress and Exposition, Houston*, TX, Nov. 13-19, 2015.

40. Sai Krishna Prabhala, **Sohel Anwar**[†], Hiroki Yokota, and Stanley Chien, "An electro-mechanical loading device for Knee Loading Application", *ASME International Mechanical Engineering Congress and Exposition,* Houston, TX, Nov. 13-19, 2015.

41. Sandeep Korupolu, **Sohel Anwar**[†], Hiroki Yokota, and Stanley Chien, "Development of an under-actuated Robotic Massaging Device for Knee Loading Applications", *ASME International Mechanical Engineering Congress and Exposition*, Houston, TX, Nov. 13-19, 2015.

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43. A. Rahman, **S. Anwar**[†], and A. Izadian, "Electrochemical Model Based Fault Diagnosis of a Lithium Ion Battery using Multiple Model Adaptive Estimation Approach", *Proceedings of the IEEE International Conference on Industrial Technology*, Seville, Spain, March 17-19, 2015.

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45. Vinay K S Muddappa and **Sohel Anwar**[†], "Fault Diagnosis Of Li-Ion Battery Using Electrochemical Model Based Observer And Fuzzy Logic", *Proceedings of the ASME IMECE 2014*, Montreal, Canada.

46. B. Pattel, H. Borhan, and **S. Anwar**[†], "An Evaluation of the Moving Horizon Estimation Algorithm for Online Estimation of Battery State of Charge and State of Health", *Proceedings of the ASME IMECE 2014*, Montreal, Canada.

47. Ragibul Huq and **Sohel Anwar**[†], "An Electrical Capacitance Based Measurement Method for Soot Load Estimation in a Diesel Particulate Filter", *Proceedings of the IFAC World Congress*, Cape Town South Africa, August 24-29, 2014.

48. **Sohel Anwar**[†], Changfu Zou, and Chris Manzie, "Distributed Thermal-Electrochemical Modeling of a Lithium-Ion Battery to Study the Effect of High Charging Rates", *Proceedings of the IFAC World Congress*, Cape Town South Africa, August 24-29, 2014.

49. Amardeep Singh, Afshin Izadian, **Sohel Anwar**[†], "Nonlinear Model Based Fault Detection of Lithium Ion Battery Using Multiple Model Adaptive Estimation", *Proceedings of the IFAC World Congress*, Cape Town South Africa, August 24-29, 2014.

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52. Amardeep Singh, Afshin Izadian, and **Sohel Anwar**[†], "Fault Diagnosis of Li-Ion Batteries Using Multiple-Model Adaptive Estimation", *Proceedings of the IECON,* Vienna, Austria, November, 2013.

53. A. Singh, A. Izadian, and **S. Anwar**[†], "Model Predictive Control of MEMS LCR", *Proceedings of the IECON,* Vienna, Austria, November, 2013.

54. M. Deldar, A. Izadian, and **S. Anwar**[†], "Modeling of a Hydraulic Wind Power Energy Transfer System Utilizing a Proportional Valve", *Proceedings of the IEEE Energy Conversion Congress and Exposition* (ECCE 2013), Denver, CO, September, 2013.

55. S. Hamzehlouia, A. Izadian, and **S. Anwar**[†], "An Energy Storage Technique for Gearless Wind Power Systems", *Proceedings of the 2013 IEEE International Conference on Electro/Information Technology (EIT)*, SD, 2013.

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58. S. Hamzehlouia, A. Izadian, and **S. Anwar**[†], "Feasibility Study via Modeling and Control of a Hybrid-Hydraulic Electric Vehicle Drivetrain", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Houston, TX, 2012.

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61. A. Izadian, S. Hamzehlouia, and **S. Anwar**[†], "Controls of Hydraulic Wind Power Transfer", *Proceedings of the 37th Annual Conference of the IEEE Industrial Electronics Society (IECON 2011)*, Melbourne, Australia from November 7-10, 2011.

62. A. Izadian, A. Pusha, N. Girrens, and **S. Anwar**[†], "Modeling of Gearless Wind Power Transfer", *Proceedings of the 37th Annual Conference of the IEEE Industrial Electronics Society (IECON 2011)*, Melbourne, Australia from November 7-10, 2011.

63. U. Tugsal and **S. Anwar**[†], "Fault Diagnosis of Electronic Fuel Control (EFC) Valves via Dynamic Performance Test Method", *Proceedings of the ASME 2011 International Mechanical Engineering Congress & Exposition*, Denver, Colorado, November 11-17, 2011.

64. E. Yildiz, Q. Farooqi, **S. Anwar**[†], Y. Chen, and A. Izadian, "Nonlinear Constrained Component Optimization of a Plug-in Hybrid Electric Vehicle", *Proceedings of the 25th Electric Vehicle Symposium (EVS-25)*, Shenzhen, China, November 5-9, 2010.

65. Xiao Lin, Harpreetsingh Banvait, **Sohel Anwar**[†], and Yaobin Chen, "Optimal Energy Management for a Plug-in Hybrid Electric Vehicle: Real-time Controller", *Proceedings of the American Control Conference*, Baltimore, MD, June 30 – July 2, 2010 (Invited Paper).

66. **Sohel Anwar**[†] and Wei Niu, "Analytical Redundancy Based Predictive Fault Tolerant Control of Steer By Wire Systems", *Proceedings of the 2010 - IEEE International Conference on Industrial Technology*, Vina del Mar, Valparaiso, Chile, March 14 – 17, 2010.

67. H. Banvait, **S. Anwar**[†], and Y. Chen, "Plug-In Hybrid Electric Vehicle Energy Management System Using Particle Swarm Optimization", *Proceedings of the 24th Electric Vehicle Symposium (EVS-24)*, Stavanger, Norway, May 13-17, 2009.

68. H. Banvait, X. Lin, **S. Anwar**[†], and Y. Chen, "A Rule-Based Energy Management Strategy for Plug-In Hybrid Electric Vehicle (PHEV)", Invited Paper, *Proceedings of the 2009 American Control Conference*, St. Louis, MO, June 10-12, 2009.

69. D. Reyhart and **S. Anwar**[†], "Optimal Control of an On-Demand All Wheel Drive System", *Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Boston, MA, November, 2008.

70. M.S. Hasan and **S. Anwar**[†], "Sliding Mode Observer and Prediction Based Fault Diagnosis of a Steer-By-Wire System", *Proceedings of the International Federation on Automatic Control (IFAC) World Congress*, Seoul, Korea, July, 2008.

71. D. Reyhart and **S. Anwar**[†], "A Fuzzy Distributed Control Algorithm for Intelligent Ground Speed Control of an Automotive Vehicle", *Proceedings of the SAE World Congress and Exposition*, Detroit, MI, 2008.

72. M.S. Hasan and **S. Anwar**[†], "Sliding Mode Observer and Long Range Prediction Based Fault Tolerant Control of a Steer-By-Wire Equipped Vehicle", SAE paper Number 2008-01-0903, *Proceedings of the SAE World Congress and Exposition*, Detroit, MI, April 14-17, 2008.

73. Y. Lin and **S. Anwar**[†], "Design of an On-Demand All Wheel Drive Control System for Improved Autonomous Navigation*", Proceedings of the 6th IFAC Symposium on Intelligent Autonomous Vehicles*, Toulouse, France, September 3-5, 2007.

74. **S. Anwar**, "Predictive Yaw Stability Control of a Brake-By-Wire Equipped Vehicle via Eddy Current Braking", *Proceedings of the American Control Conference*, New York City, New York,, July 11-13, 2007. Invited paper.

75. Y. Lin and **S. Anwar**[†], "A Traction Enhanced On-Demand All Wheel Drive Control System for a Hybrid Electric Vehicle", SAE Paper No. 2007-01-0299, *Proceedings of the SAE World Congress*, Detroit, MI, 2007.

76. B.C. Snyder and **S. Anwar**[†], "A Multi-threaded Computing Algorithm for Pure Simulation of Complex Systems in SIMULINK", SAE Paper No. 2007-01-1632*, Proceedings of the SAE World Congress*, Detroit, MI, 2007.

77. **S. Anwar**[†] and L. Chen, "Analytical Redundancy Based Fault Tolerant Control of a Steer-By-Wire System", *Proceedings of the 2006 ASME International Mechanical Engineering Congress and Exposition*, Chicago, IL, Nov. 5-10, 2006.

78. B. Zheng, M. Huang, B. Daugherty, and **S. Anwar**, "Integrated Steer-By-Wire control and diagnostic system", *Proceedings of the American Control Conference*, Minneapolis, Minnesota, June 14-16, 2006. Invited paper.

79. **S. Anwar** and R.C. Stevenson, "Torque Characteristics Analysis of an Eddy Current Electric Machine for Automotive Braking Applications", *Proceedings of the American Control Conference*, Minneapolis, Minnesota, June 14-16, 2006. Invited paper.

80. M.S. Hasan and **S. Anwar**[†], "Yaw Stability Control System for An Automobile Via Steer-by-Wire", *Proceedings of the 4th International Conference on Electrical & Computer Engineering*, Dhaka, Bangladesh, December 19-21, 2006.

81. **S. Anwar**, "Yaw Stability Control of an Automotive Vehicle via Generalized Predictive Algorithm", *Proceedings of the American Control Conference*, Portland, Oregon, June 8-10, 2005.

82. B. Zheng, C. Altemare, and **S. Anwar**, "Fault Tolerant Steer-By-Wire Road Wheel Control System", *Proceedings of the American Control Conference*, Portland, Oregon, June 8-10, 2005.

83. **S. Anwar**, "Modeling and Analysis of Steady-State Torque Characteristics for a Miniature Electromagnetic Retarder", P*roceeding of the American Control Conference*, Portland, Oregon, June 8-10, 2005. Invited paper.

84. **S. Anwar**, "Anti-Lock Braking Control of an Electromagnetic Brake-By-Wire System", Proceedings of 2005 *ASME International Mechanical Engineering Congress and Exposition*, November 5-11, 2005, Orlando, Florida, USA, IMECE2005-79149.

85. **S. Anwar**, "A Torque based Sliding Mode Control of an Eddy Current Braking System for Automotive Applications", *Proceedings of 2005 ASME International Mechanical Engineering Congress and Exposition*, November 5-11, 2005, Orlando, Florida, USA, IMECE2005-79148.

86. **S. Anwar**, "An Anti-Lock Braking Control System for a Hybrid Electromagnetic/ Electrohydraulic Brake-By-Wire System", *Proceedings of the American Control*

Conference, Boston, MA, June 30-July 2, 2004.

87. **S. Anwar**, "Brake Based Vehicle Traction Control Via Generalized Predictive Algorithm", SAE Paper No. 2003-01-0323, *Proceeding of the SAE World Congress and Exposition*, Detroit, March 3-6, 2003.

88. **S. Anwar**, "A Predictive Control Algorithm for Vehicle Yaw Stability Management", SAE Paper No. 2003-01-1284, *Proceedings of the SAE World Congress and Exposition*, Detroit, March 3-6, 2003.

89. S. Cetinkunt, U. Pinsopon, C. Chen, A. Egelja, and **S. Anwar**, "Implement-by-Wire Control of Electrohydraulic Closed Center Systems for Mobile Equipment Applications", *Proceedings of the IASTED International Conference on Robotics and Applications,* Salzburg, Austria, June 25-27, 2003, p 24-28.

90. **S. Anwar** and B. Ashrafi, "A Predictive Control Algorithm for an Anti-Lock Braking System", SAE Paper No. 2002-01-0302, *Proceedings of the SAE World Congress and Exposition*, Detroit, March 4-7, 2002.

91. **S. Anwar**, "Unidirectional Active Noise Attenuation through Generalized Predictive Algorithm", SAE Paper No. 2001-01-2224, *Proceedings of the 31st International Conference on Environmental Systems*, Orlando, Florida, July 9-12, 2001.

92. **S. Anwar**, and A. Chandra, "Generalized Predictive Kinetic Energy Controller for Vibration Suppression in Turning", Paper No. 1999-01-1873, *Proceedings of the SAE Annual Earthmoving Conference & Exposition*, Peoria, IL, April 14-15, 1999.

93. **S. Anwar**, "Sliding Mode Control of Large Wheel Loader Powertrain for Full Throttle Directional Shifts", SAE paper no. 981482, *Proceedings of the SAE Annual Earthmoving Industry Conference and Exposition*, April 1998.

94. D. DeMott and **S. Anwar**, "A Hybrid Approach to Ground Speed Control of Large Wheel Loaders with Engine at Full Throttle", SAE Paper No. 971562, *Proceedings of the SAE Annual Earthmoving Industry Conference and Exposition,* Peoria, IL, April 1997.

95. **S. Anwar**, A. Chandra, and K. B. Ousterhout, "Predictive Control of Chatter Instabilities in Single Point Turning", *The Intelligent Machine Tools Systems Symposium, Proceedings of the ASME International Mechanical Engineering Congress and Exposition*, Chicago, Nov. 6-11, PED vol. 68-2, pp. 767-782, 1994.

96. **S. Anwar** and P.J. Hollis, "An Adaptive Control System for Active Attenuation of Wind Tunnel Noise", *Proceedings of the Conference on Recent Advances in Active Control of Sound & Vibration*, VPI & SU, Blacksburg, Virginia, April 15-17, pp. 118-132, 1991.

97. Justin Hess, Anusha Rao, Grant Fore, Andres Tovar, Jiangmei Wu, and **Sohel Anwar**, "Quantifying Changes in Creativity: Findings from a Course that Integrates Engineering Technology and the Arts", *2018 ASEE Annual Conference and Exposition*, American Society of Engineering Education, Salt Lake City, UT, June 24-27, 2018.

98. Andres Tovar, Joel C. Najmon, Anusha S. Rao, Justin L. Hess, Grant A. Fore, Jiangmei Wu, and **Sohel Anwar**, "Integration of Art Pedagogy in Engineering Graduate Education", *ASEE Illinois-Indiana Section Conference*, West Lafayette, IN, March 24, 2018.

POSTERS

1. Cardona, C., S. Anwar, and A. Tovar. Optimal design of self-unfolding origami structures. SHPE 2018 National Convention, Cleveland, Ohio, Nov 7-11, 2018.

2. Sohin Shah, M.D. Khan, Arjun Ambasana, Sohel Anwar, "Self Navigating Agricultural Robot with Autonomous Weed and Feed Functions", Joint Transportation Research Program (JTRP) Meeting, Stutz II, Indianapolis, IN, October 16, 2018.
3. Josh Roy, Abhinabha Bhattacharjee, Stanley Chen, Sohel Anwar, M. Terry Loghmani, "Mechatronic QSTM device for standardizing manual therapy", IUPUI Research Day, Indianapolis, IN, April 6, 2018.
4. Hunter Tobe, Greg Medlock, Scott Graves, Hamzah Najm, and **Sohel Anwar**[†], "Autonomous Agricultural Vehicle", *ECE Capstone Design Poster Event*, IUPUI, Indianapolis, IN, April 28, 2017.
5. Ragibul Huq and **Sohel Anwar**[†], "Development of a Soot Load Sensor using Electrical Capacitance Imaging", *IUPUI Innovation to Enterprise Forum & Showcase*, Indianapolis, IN, USA, November 20, 2014.
6. Ragibul Huq and **Sohel Anwar**[†], "An Electrical Capacitance Tomography Based Soot Load Estimation Method for a Diesel Particulate Filter", *IUPUI Research Day*, Indianapolis, IN, USA, April 11, 2014.
7. A. Singh, A. Izadian, and **S. Anwar**[†], "Nonlinear Model Based Fault Detection of Lithium Ion Battery Using Multiple Model Adaptive Estimation", *IUPUI Research Day*, Indianapolis, IN, USA, April, 2013.
8. **S. Anwar**[†] and W. Niu, "Analytical Redundancy Based Predictive Fault Tolerant Control of a Steer By Wire System Using Nonlinear Observer", *IUPUI Research Day*, Indianapolis, IN, USA, 2011.
9. Caleb Audu, Monis Rahman, and **Sohel Anwar**[†], "Analytical Redundancy Based Fault Tolerant Control of Steer By Wire System", MURI Research Project, September, 2008.
10. Kirshna Patel and **Sohel Anwar**[†], "Impact of Plug-In Hybrid Vehicle Technology on Motorsports Industry", Undergraduate Research Opportunities Program (IUPUI), August, 2008.
11. Krishna Patel and **Sohel Anwar**[†], "Impact of Drive-By-Wire System on Motorsports Industry", IUPUI McNair Scholars Program Day, March, 2008.
12. Pratick Seth and **Sohel Anwar**[†], "A Noninvasive Optical Sensor for Measuring Blood Alcohol Level to Detect Drunk Driver, IUPUI MURI Project, January, 2008.
13. John Snodgrass and **Sohel Anwar**[†], "Design of an On-Demand AWD Control System", SAE Design Competition, Greedwood, IN, Feb. 22, 2007.
14. Gaston Tamboura, John Snodgrass, and **Sohel Anwar**[†], "Optimal Control of an On-Demand All Wheel Drive System for Traction Enhancement", IUPUI MURI Research Showcase, 2006.

SERVICE ACTIVITIES

UNIVERSITY SERVICE

DEPARTMENT

2020 – Present	Member, Graduate Education Committee, Department of Mechanical and Energy Engineering, IUPUI.
2010 – 2020	Member, Graduate Education Committee, School of Mechanical Engineering, Purdue University, West Lafayette, IN.

2010 – 2020	Chair, Graduate Education and Research Committee, Department of Mechanical Engineering, IUPUI.
2008 – Present	Member / Chair, Various Search and Screen Committee, Department of Mechanical Engineering and Motorsports Engineering Program, IUPUI
2005 – Present	Laboratory Equipment and Safety Committee, Department of Mechanical Engineering, IUPUI.
2006 – 2009	Seminar Chair, Department of Mechanical Engineering, IUPUI
2005 – 2009	Member, Undergraduate Education and Assessment Committee, Department of Mechanical Engineering, IUPUI.

SCHOOL

2010 – Present	Member, Graduate Education Committee, School of Engineering and Technology, IUPUI.
2007 – 2010	Co-developer, Curriculum Development, Motorsports Engineering Bachelor's program, School of Engineering and Technology, IUPUI.
2006 – Present	Member, Faculty Senate, School of Engineering and Technology, IUPUI.

CAMPUS / UNIVERSITY

2004 – Present	Faculty Advisor, SAE Student Club, IUPUI Chapter, Indianapolis, IN
2017 – 2020	Member, Center for the Integration for Research, Teaching, and Learning (CITRL) Programming Committee, IUPUI.

PROFESSIONAL ORGANIZATION MEMBERSHIPS

08/04 – Present	Faculty Advisor, Society of Automotive Engineers (SAE) – IUPUI Chapter
05/95 – Present	Member, American Society of Mechanical Engineers (ASME)
05/95 – 2016	Member, Society of Automotive Engineers (SAE) International
08/00 – 2017	Member, Institute of Electrical and Electronic Engineers (IEEE)

PROFESSIONAL SERVICE

2007 – Present	Proposal Reviewer: National Science Foundation (NSF) (NRT/IGE, IGE-HUB, NRI, SCH), , US Department of Energy (DoE) (ARPA-E / EERE / TCF), Bonneville Power Administration (BPA), US Environmental Protection Agency (EPA), US Department of Agriculture (USDA) / National Institute of Food and Agriculture (NIFA), Department of Defense (DoD), Natural Sciences and Engineering Research Council of Canada (NSERC), Canada First Research Excellence Fund (CFREF).
1991 – Present	Member, American Society of Mechanical Engineers (ASME)
2005 – Present	Session Organizer / Chair, ASME International Mechanical Engineering Congress and Exposition
1996 – Present	Reviewer of Technical Articles, Various national and international journals and conference proceedings.

2014	Session Chair, 2 Technical Sessions, 19th World Congress of the International Federation of Automatic Control (IFAC), Cape Town, South Africa. 24-29 August 2014.
2007 – 2012	Member, Industrial Advisory Committee, Mechanical Engineering Technology Program, Indiana State University, Terre Haute, IN
2005 – 2009	Session Organizer / Chair, American Control Conference
2007	Workshop Instructor, *Model Based On-Board Diagnostics (OBD) for Military Vehicles for Improved Performance*, Tank Automotive Research Development Engineering Center (TARDEC), US Army, Warren, MI.
2006	Workshop Instructor, *Fault Tolerant Control of Drive-By-Wire Systems in Automotive / Combat Ground Vehicles,* Tank Automotive Research Development Engineering Center (TARDEC), US Army, Warren, MI.
2005	Session Co-Chair, American Control Conference, Portland, Oregon.
2004	Guest Lecturer, Introduction to Mechatronics, University of Detroit Mercy, Detroit, MI
2003 – 2004	Member, Mechatronics Advisory Board, College of Engineering, University of Detroit Mercy, MI
1997 – 2008	Session Chair, Society of Automotive Engineers (SAE) World Congress, Detroit, MI.

OTHER INFORMATION

RESEARCH INTERESTS

- Autonomous Vehicle Control and X-By-Wire Systems
- Novel Sensor Development and Data Fusion
- Advanced Diagnostics / Management of Traction Batteries including Li-Ion
- Biomechatronics and Instrumentation
- Smart Self-folding Structures / Robotics
- Wind Turbine System Modeling and Control
- Power / Energy Management of Electrified Powertrains
- Micro-Electro-Mechanical System (MEMS)

CITIZENSHIP: US Citizen.

COMMUNITY ACTIVITIES

Organized voluntary projects for the construction work Habitat-For Humanity houses. Participated in other voluntary work such as meal packing and distribution to local food pantries, soup kitchen, etc.

OTHER: Married. Two children. Hobbies include biking, hiking, jogging, and community work.