AMERICAN UNIVERSITY OF BEIRUT

MAROUN SEMAAN FACULTY OF ENGINEERING & ARCHITECTURE

Mechanical Engineering Department
Faculty Booklet

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Contents

| Dany Abou Jaoude

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Dr. Abou Jaoude received his bachelor's degree in Mechanical Engineering from AUB with a minor in Engineering Management in May 2014. In December 2018, Dr. Abou Jaoude received his PhD from the Kevin T. Crofton Aerospace and Ocean Engineering Department at Virginia Tech, specializing in the dynamics and control track. Dr. Abou Jaoude then joined the Mechanical Engineering department at AUB as Assistant Professor. The research of Dr. Abou Jaoude is grounded in robust control theory, and is aimed at using sophisticated mathematical tools to rigorously analyze complex control systems to provide guarantees and proofs for stability and performance.

Courses

MECH 430 (Process Instrumentation and Measurements), MECH 432 (Dynamic System Analysis), MECH 436 (Control Systems), MECH 691 (Convex Optimization)

Research Interests

Robust Control

Model Reduction

Distributed Control

Computational Tools for Convex Optimization

| Daniel Asmar

| Ph.D, University of Waterloo

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Daniel Asmar is a Professor in Mechanical Engineering at the American University of Beirut. He is also currently serving as the Associate Dean for Research and Faculty Development at the Maroun Semaan Faculty of Engineering and Architecture. Daniel received his Ph.D. in Systems Design Engineering from the University of Waterloo in 2006. Daniel's research is in Robotics and Computer Vision. He has interests in visual perception, autonomous robot navigation and mapping, digital twins, and digital cultural heritage. He has over one hundred publications in these areas in refereed journals and conference proceedings. Daniel is an ASME member, a senior member in IEEE, and was the founder of the joint IEEE Lebanese chapter in Robotics and Automation, Instrumentations and Measurements, and Control Systems. Daniel was a member of the World Economic Forum (WEF) council on Artificial Intelligence, Robotics, and Virtual and Augmented Reality from 2018 to 2022.

Courses

MECH 430 (Process Instrumentation and Measurements), MECH 436 (Control Systems), MECH 642 (Computer Vision), MECH 530 (Mechatronics), MECH 650 (Autonomous Mobile Robotics)

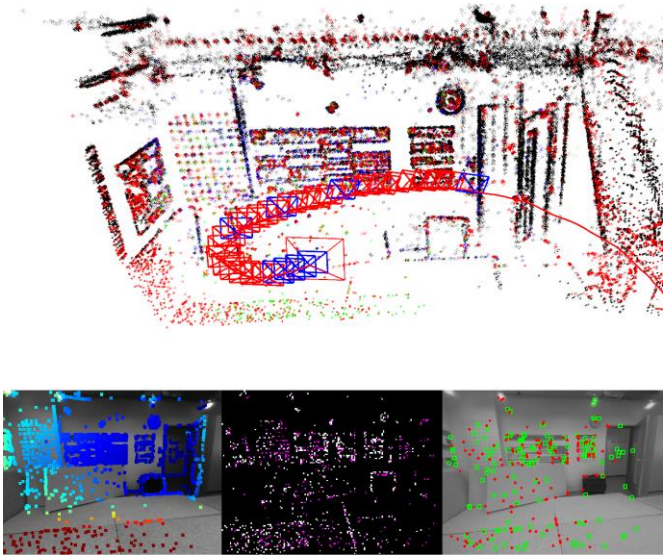
Research Interests

Robotics and Computer Vision

Visual Perception

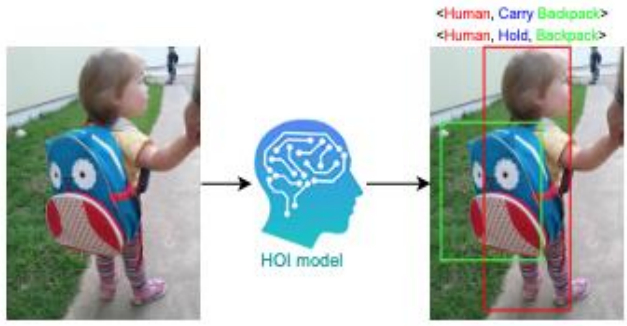
Digital Cultural Heritage

Autonomous Robot Navigation



Simultaneous Localization and Mapping (SLAM) using Robots

Digital cultural heritage (XR, gamification,..)



Human-object interaction

AR Assistant for training

| Joseph Bakarji

| Ph.D, Stanford University

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Joseph Bakarji joined AUB as an Assistant Professor in the Mechanical Engineering department and the AI, Data Science and Computing (AI-DSC) Hub. Prior to that, he spent 3 years as a postdoctoral fellow at the AI institute in Dynamic Systems, University of Washington where he developed machine learning algorithms for scientific modeling. Joseph received his Bachelor's degree in Mechanical Engineering at the American University of Beirut in 2013, his M.S. at UC San Diego in 2015 and his PhD at Stanford University in 2020, where he developed multiscale stochastic models for granular materials. During his graduate studies, he received the Henry J. Ramey, Jr. and the Frank G. Miller fellowship awards in 2018 and 2020 respectively. He is currently a Center for Advanced Mathematical Sciences (CAMS) fellow. His current research focuses on combining deep learning and sparse identification of differential equations techniques to discover interpretable physical models from data. He also heads the music intelligence lab at AUB that develops innovative technology at the intersection of artificial intelligence, music instrument design and music composition and performance.

Courses

EECE490/MECH536 (Introduction to Machine Learning), MECH798M/EECE798K (Data-Driven Modeling in Science and Engineering), MECH230 (Dynamics)

Research Interests

Complex systems, granular materials, multiscale modeling and simulation, nonlinear dynamics, machine learning, multiagent systems and active matter.

| Nesreen Ghaddar
| Ph.D, MIT

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Nesreen Ghaddar is Qatar Chair of Energy Studies, and professor of mechanical engineering at the American University of Beirut. She is also the Director of the Munib and Angela Masri Institute of Energy and Natural Resources at AUB. She joined the University in 1991, and subsequently served as Chair of the Mechanical Engineering Department (2001- 2007), coordinator of the Chemical Engineering program and Acting Associate Provost (2008-09), before being appointed Associate Provost in 2009. She obtained her BE (1980) from Kuwait University; and her Master's (1982) and PhD (1985) in Mechanical Engineering from the Massachusetts Institute of Technology. Dr. Ghaddar was named a Fellow of the Islamic World Academy of Sciences in 2007 and was elected to the Lebanese Academy of Science in 2009. In 2012 she received the Distinguished Scholar Medal and Certificate for Research Excellence from the Lebanese Council.

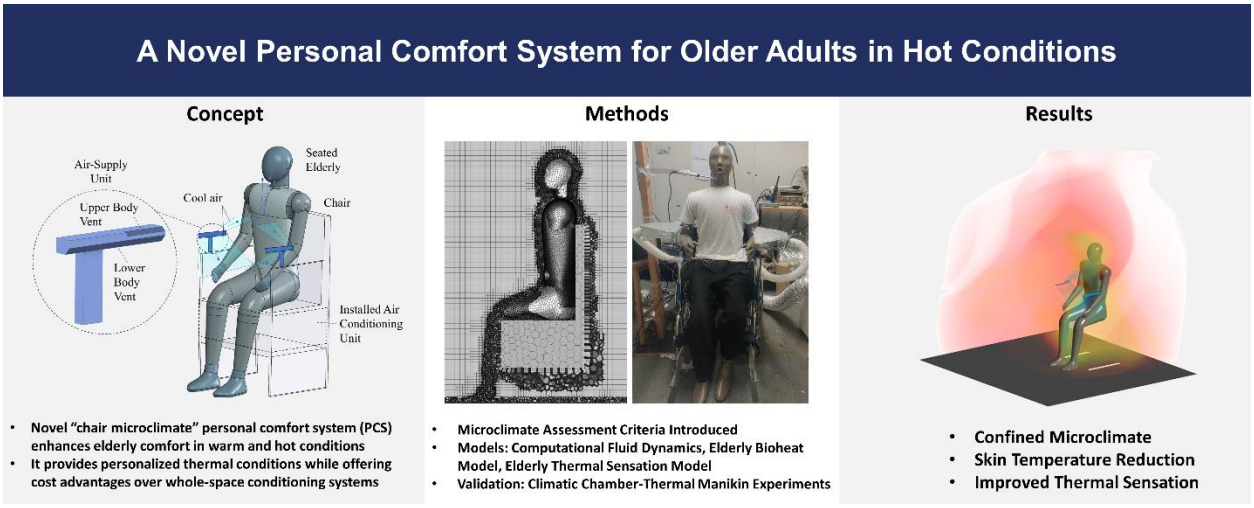
The focus of Dr. Ghaddar's research is computational and experimental heat transfer enhancement for efficient cooling, solar energy applications, energy conversion, personalized ventilation and localized cooling systems, indoor air quality, modeling of moisture and heat transport processes for clothed humans and thermal comfort. Dr. Ghaddar's research aims to find sustainable solutions for providing good air quality and thermal comfort in indoor environments using novel modeling approaches coupled with experimentation to achieve new designs. She has developed this approach to elucidate fundamental environmental science phenomena to advance energy-efficient, hybrid, and sustainable air conditioning systems and climate control whether centralized or personalized to ensure that human needs of thermal comfort and breathable air quality are met. The research activities continue to build on related thrust areas concerned with human wellbeing and sustainable air conditioning for built environment and outdoors. Interventions span the consideration of personal cooling vests, personalized ventilation, mitigation of cross contamination via use of novel ventilation and air distribution systems, design of sustainable cooling and dehumidification systems that integrates renewable energy as energy source towards net-zero buildings at low energy cost. Work is currently extended to improve outdoor thermal comfort in both hot dry and hot humid environments. The research work builds on a foundation of theory, novel modeling approaches, experimentation, human subject testing, optimization and economic feasibility of obtained designs and solutions.

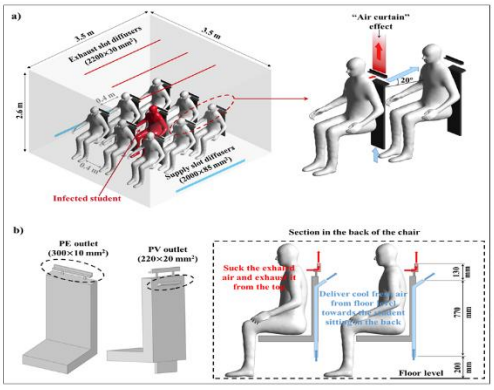
Courses

MECH 412 (Heat Transfer), MECH 414 (Thermodynamics II), MECH 673 (Energy Efficient Buildings with Good Air Quality), MECH 680 (HVAC and Refrigeration Lab), MECH 510 (Design of Thermal Systems), MECH 764 (Advanced Fluid Dynamics), MECH 705 (Thermal comfort and Bioheat Modeling)

Research Interests

Computational fluid dynamics and heat transfer, energy studies, heat and moisture transfer models of clothed humans; bioheat modeling, energy efficiency of HVAC and dehumidification systems, sustainable and hybrid air conditioning systems to combat climate change, human personal cooling systems including cooling vests, indoor air quality and strategies for the mitigation of airborne transmission of infectious aerosols at reduced energy costs, personalized ventilation, thermal comfort and bioheat modeling.





Schematic of a) the considered classroom layout with the adopted ventilation design and b) the chair-ventilation design concept

At BZ_1 / BZ_3

iF ($\times 10^{-4}$)

PV \ PE	4 l/s	6 l/s	8 l/s	10 l/s
4 l/s	1.0113	0.6579	0.2619	0.1628
6 l/s	0.4983	0.2823	0.0938	0.0318
8 l/s	0.3061	0.0636	0.0388	0.0017
10 l/s	0.0637	0.0261	0.0104	0.0003

At BZ_2

iF ($\times 10^{-4}$)

PV \ PE	4 l/s	6 l/s	8 l/s	10 l/s
4 l/s	1.0395	0.8329	0.5071	0.3655
6 l/s	0.6247	0.4112	0.1893	0.1034
8 l/s	0.2338	0.1159	0.0192	0.0038
10 l/s	0.0296	0.0169	0.0045	0.0014

At BZ_4 / BZ_6

iF ($\times 10^{-4}$)

PV \ PE	4 l/s	6 l/s	8 l/s	10 l/s
4 l/s	1.984	1.586	1.286	0.632
6 l/s	1.576	1.306	0.549	0.328
8 l/s	1.091	0.548	0.261	0.184
10 l/s	0.567	0.312	0.185	0.079

At BZ_8

iF ($\times 10^{-4}$)

PV \ PE	4 l/s	6 l/s	8 l/s	10 l/s
4 l/s	9.798	5.655	4.504	3.438
6 l/s	8.323	4.639	3.320	2.930
8 l/s	6.497	4.290	2.912	2.692
10 l/s	4.912	3.824	2.795	1.962

At BZ_7 / BZ_9

iF ($\times 10^{-4}$)

PV \ PE	4 l/s	6 l/s	8 l/s	10 l/s
4 l/s	3.090	2.538	2.323	1.621
6 l/s	2.570	1.994	1.664	1.505
8 l/s	1.781	1.560	1.441	1.256
10 l/s	1.509	1.351	1.232	1.078

| Mohammad Harb

| Ph.D, North Carolina State University

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Mohammad Harb is an Associate Professor of Mechanical Engineering at the Maroun Semaan Faculty of Engineering and Architecture (MSFEA) at the American University of Beirut (AUB). He holds a bachelor's degree in Biomedical Engineering and both a master's and doctoral degree in Mechanical Engineering from North Carolina State University.

Dr. Harb co-leads the Smart Structures and Structural Integrity (SSSI) Laboratory, where his research focuses on advanced composite materials, composite manufacturing, additive manufacturing, and sustainable materials engineering. His work aims to enhance the safety, performance, and cost-efficiency of structural systems while addressing pressing environmental challenges such as waste reduction and material recycling. A key component of his research includes innovating nondestructive testing techniques and structural health monitoring systems to ensure the long-term reliability of materials used in critical industries like aerospace and automotive engineering.

A cornerstone of Dr. Harb's research is the development of sustainable solutions, such as upcycling carbon fiber composites and recycling discarded fishing nets into 3D printing filaments and ultrafiltration membranes for water treatment. His work in additive manufacturing explores the intersection of precision, sustainability, and innovation, providing advanced 3D modeling and diagnostic tools to optimize material integrity and performance.

Dr. Harb is the founding director of the AUB Makerspace and the Engineering Learning Lab (ELL). At the AUB Makerspace, he guides a team of students and young designers in a student-driven space that fosters creativity, collaboration, and technological exploration. The space equips youth with tools, materials, and advanced technology, such as 3D printing, to develop innovative projects.

At ELL, Dr. Harb is at the forefront of transforming education within MSFEA by fostering active, experiential, and innovative learning practices. ELL focuses on empowering educators through professional development, refining teaching practices, and enhancing curriculum design. By offering training, tools, and support, ELL ensures a seamless transition to active and experiential learning while maintaining robust infrastructure and evaluation systems to assess and improve the impact of teaching innovations.

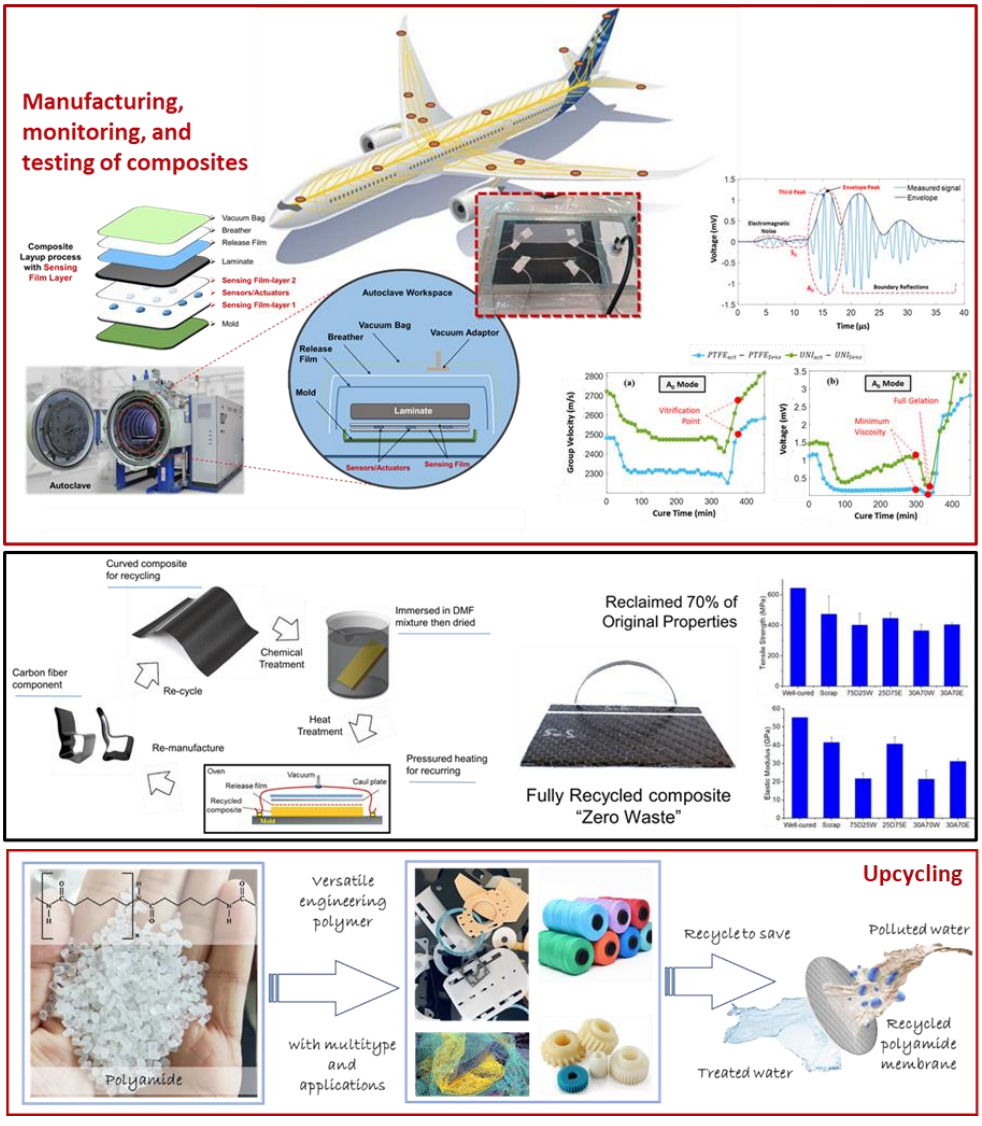
Previously, Dr. Harb directed the Interdisciplinary Design Practice Program (IDPP) at AUB, where he focused on cultivating human-centered design practices to address complex challenges of the 21st century. His dedication to innovation, sustainability, and education has been recognized through publications in high-impact journals and presentations at international conferences.

Courses

MECH 340 (Engineering Materials), MECH 421 (Manufacturing Processes I), MECH 520 (Engineering Design II), MECH 501/502 (Final Year Project), MECH 617 (Smart Materials and Structures), MECH 721 (Elasticity and Plasticity), ENMG 698E (Introduction to Human-Centered Design) (co-taught)

Research Interests

Composite and Advanced Materials, Smart Materials and Structures, Material Recycling and Upcycling, Sustainable Manufacturing, Additive Manufacturing and Prototyping, Structural Health Monitoring (SHM) and Nondestructive Evaluation (NDE), Ultrasonics and Wave Mechanics, Engineering Education and Pedagogy, STEM Education, Active and Experiential Learning Strategies in Engineering, Makerspaces and Human-Centered Design.



| Theresa Honein

| Ph.D, University of California Berkeley

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My name is Theresa Honein. I earned my Ph.D. in Mechanical Engineering at the University of California, Berkeley in Summer 2024 under Professor Oliver O'Reilly. I am interested in utilizing tools from dynamics and mechanics to create physically accurate simulations of seemingly simple, yet actually difficult to model, phenomena. I have previously studied the treatment of holonomic and nonholonomic constraints in different formulations of the equations of motion. I am currently interested in leveraging recent advances in numerical methods to model the nonsmooth dynamics of impacting rigid bodies.

Courses

MECH 230 (Dynamics)

Research Interests

Broadly: Dynamics and Mechanics

More specific: Theoretical and numerical treatment of constraints in systems of rigid bodies. Holonomy. Motion planning.

| Hussein Hussein
| Ph.D, University of Franche-Comté

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Dr. Hussein Hussein is an Assistant Professor in the Mechanical Engineering Department at the Maroun Semaan Faculty of Engineering and Architecture (MSFEA), American University of Beirut (AUB). He earned a Ph.D. in Engineering Sciences and Microsystems from the University of Franche-Comté, France, a Master's degree in Mechatronics from the University of Technology of Compiègne, France, and a Bachelor's degree in Mechanical Engineering from the Lebanese University.

Dr. Hussein's research focuses on the design, modeling, fabrication, and control of mechanical and mechatronic systems at both micro- and macro-scales. At LIRMM, CNRS, France, he contributed to the European Hephaestus project by designing a cable-driven parallel robot for automating curtain wall installations on building façades. At KAUST, Saudi Arabia, he worked on microsystems projects, including multistable positioning microsystems, mobile microrobots, electrothermal actuators, various designs of micromechanisms, accelerometers with advanced sensing applications, as well as superconductive resonators for quantum computing.

Dr. Hussein has significant experience in cleanroom fabrication, developing micro-devices and validating their performance through analytical modeling, finite element simulations, and experimental testing. His work, often conducted in collaboration with academic and industrial partners worldwide, has been published in leading scientific journals in robotics and microsystems. He has also supervised students at various academic levels, supporting their development through research and technical projects.

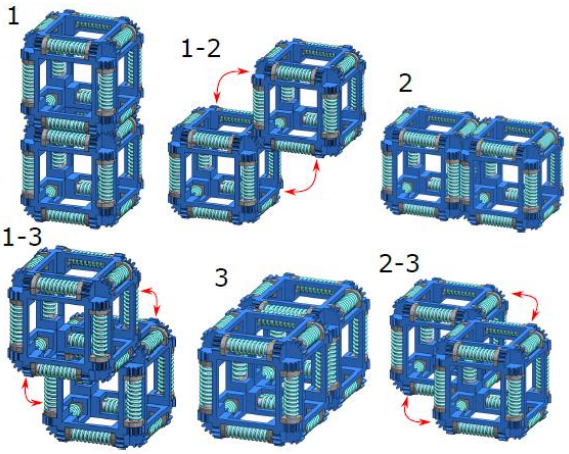
At AUB, Dr. Hussein divides his efforts between teaching and research. He teaches courses such as Dynamics, Robotics, Mechanics of Materials, and MEMS. His ongoing research includes work on quadruped robotics, modular robotics, flexible metamaterials, and micro-robotics, with the goal of addressing practical engineering challenges and advancing knowledge in these fields.

Courses

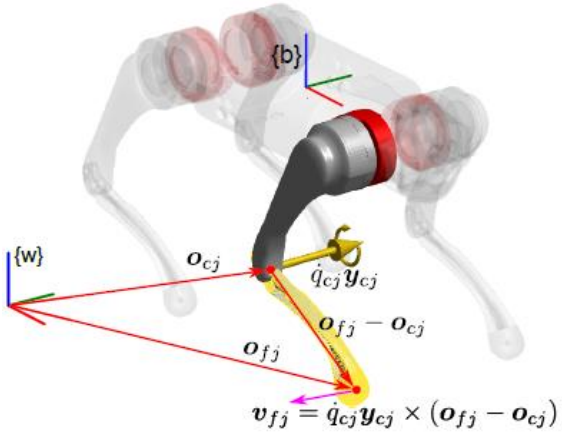
MECH 641/EECE 661 (Robotics), MECH 320 (Mechanics of Materials), MECH 230 (Dynamics), MECH 631 (MEMS - Micro Electro Mechanical Systems)

Research Interests

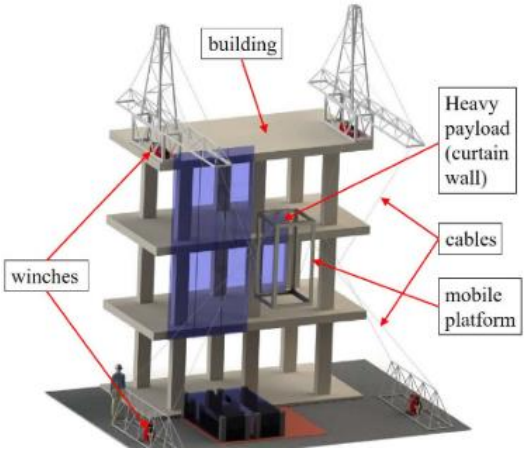
MEMS, Microfabrication, Sensor Design, Smart Mechanical Micromechanisms, Multiphysics Modeling, Finite Element Simulations, Quadruped Robotics, Quadruped Locomotion and Control, Redundancy in Robots, Metamaterials, Modular Robotics.



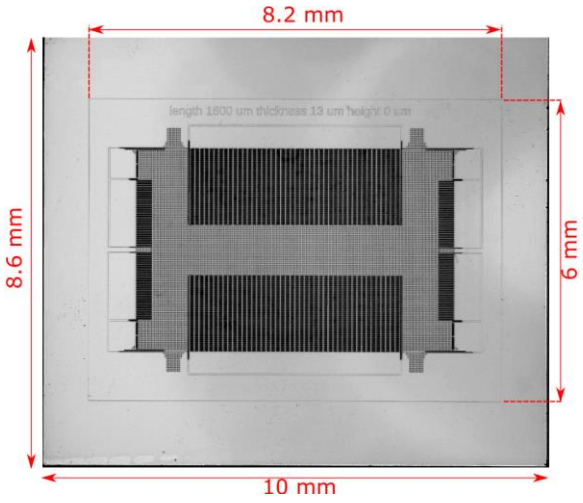
A geared modular robot design.



Posture optimization for quadrupeds



CDPR for automated building façade construction.



Near-zero stiffness accelerometer with sensitivity tuning.

| Bilal Kaddouh

| Ph.D, University of Manchester

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Dr Bilal Kaddouh is an Assistant Professor in Aerial Robotics at MSFEA, specializing in unmanned aerial systems (UAS), robotics, and autonomous systems. As a researcher in Aerial Robotics, his primary objective is to push the boundaries of this technology beyond conventional remote sensing, aiming to enable UASs to perform tangible actions in complex, real-world environments. Bilal's expertise and future research efforts are concentrated in the field of Active Aerial Robotics, where UAVs are not only designed for observation but also for interaction and manipulation of their surroundings.

At the American University of Beirut, he is establishing the Aerial Robotics Laboratory, focusing initially on two high-impact areas: Wildfire Management and Precision Agriculture. These domains address critical societal needs, offering significant opportunities for innovation through advanced unmanned aerial systems. By enhancing public safety, ecological protection and promoting sustainable food production, the laboratory aims to position the institution as a leader in this transformative field, fostering interdisciplinary research and practical solutions.

Bilal's career spans academia and industry, where he has successfully led multidisciplinary teams, managed multi-million-pound research grants, and contributed to the development of cutting-edge technologies in aerial robotics. His extensive industry experience includes leading the R&D team at Archangel Lightworks on a European Space Agency-funded space laser communication project designed for extreme environments like Svalbard, Norway. Bilal founded Aerotonomy Ltd., securing £100k in funding to develop high-speed, fixed-wing VTOL UAVs for long-range delivery. Additionally, he has collaborated with Gravitilab Aerospace Services, managing the development of the LOUIS microgravity research vehicle system, delivering its first prototype in just six months.

In academia, Bilal has made significant contributions to several high-profile research projects. He served as a Co-I and Case Studies officer on the UKRI Trustworthy Autonomous Systems Verifiability Node (EP/V026801/1, £3.58m), a Co-I on EPSRC Pipebots (EP/S016813/1, £7.29m) and, before that, was an Operations Director on the Self Repairing Cities Project (EP/N010523/1, £4.7m) aimed at developing autonomous systems for infrastructure maintenance. Additionally, he led the University of Leeds team in the MBZIRC International Robotics Challenge, designing UASs for firefighting, building, and tracking rogue drones.

Bilal's applied expertise includes multi-robot mission management, resource allocation systems, and the development of advanced UAS technologies for applications like BVLOS operations, precision agriculture, and atmospheric studies. He has designed and demonstrated innovative

systems such as a UAV capable of deploying and retrieving robots from high structures and the world's first asphalt 3D printing UAS with ground manoeuvring capabilities. His pioneering work on the MAGMA UAV, a 40kg jet-powered flying wing, at the University of Manchester, further highlights his deep technical expertise.

Courses

MECH 430 (Process Instrumentation and Measurements), MECH 436 (Control Systems) and MECH 659 (Aerial Robotics).

Research Interests

Active Aerial Robotics, Autonomous Systems Design, UxV Mission Management Systems, Precision Agriculture, and Ecological UAS development.

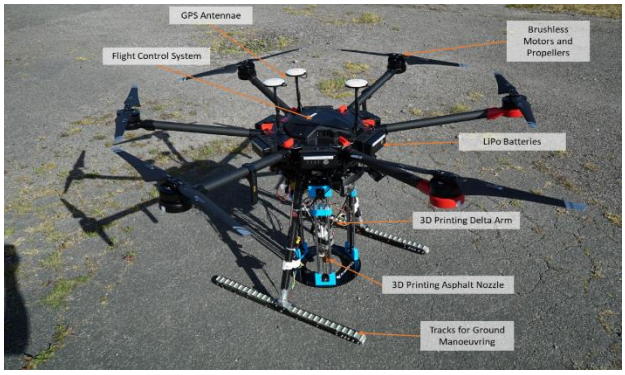

Figure 1: Asphalt 3D Printing UAS


Figure 2: Bridge Inspection UAS

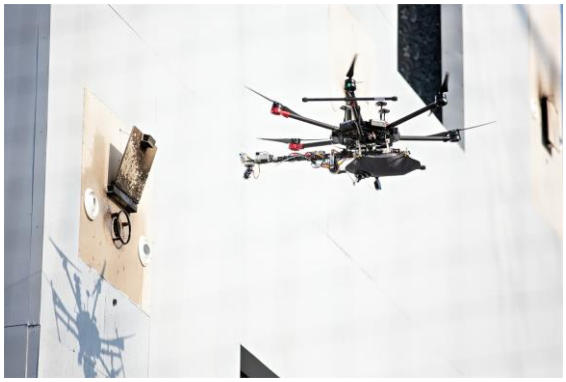

Figure 3: Firefighting UAS

Figure 4: COVID-19 Disinfection UGV

Figure 5: MicroGravity Research Vehicle

Figure 6: Circulation Control flying demonstrator

| Issam Lakkis
| Ph.D, MIT

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Dr. Lakkis graduated from AUB with a BE and ME in mechanical engineering in 1991 and 1993 respectively. He then joined the reacting gas dynamics lab at MIT in 1994 and earned his Ph.D. degree in 2000. From 2000 to 2003, he worked at Coventor on Computer-Aided Design of MEMS and RF Circuits. In 2003, he joined AUB and has been a professor since 2017. He is currently the chair of the Mechanical Engineering department.

Courses

MECH 310 (Thermodynamics I), MECH 314 (Fluid Mechanics), MECH 607 (Microflows), MECH 631 (MEMS), MECH 760 (Advanced Fluid Mechanics), MECH 703* (Combustion), MECH 707* (Statistical Mechanics).

Research Interests

Modeling, analysis and design of Micro-Electromechanical Systems with focus on micro-fluidics applications.

Grid-free numerical modeling of transport phenomena in stochastic flow fields with focus on atmospheric flows, oceanic flows, and pollution transport.

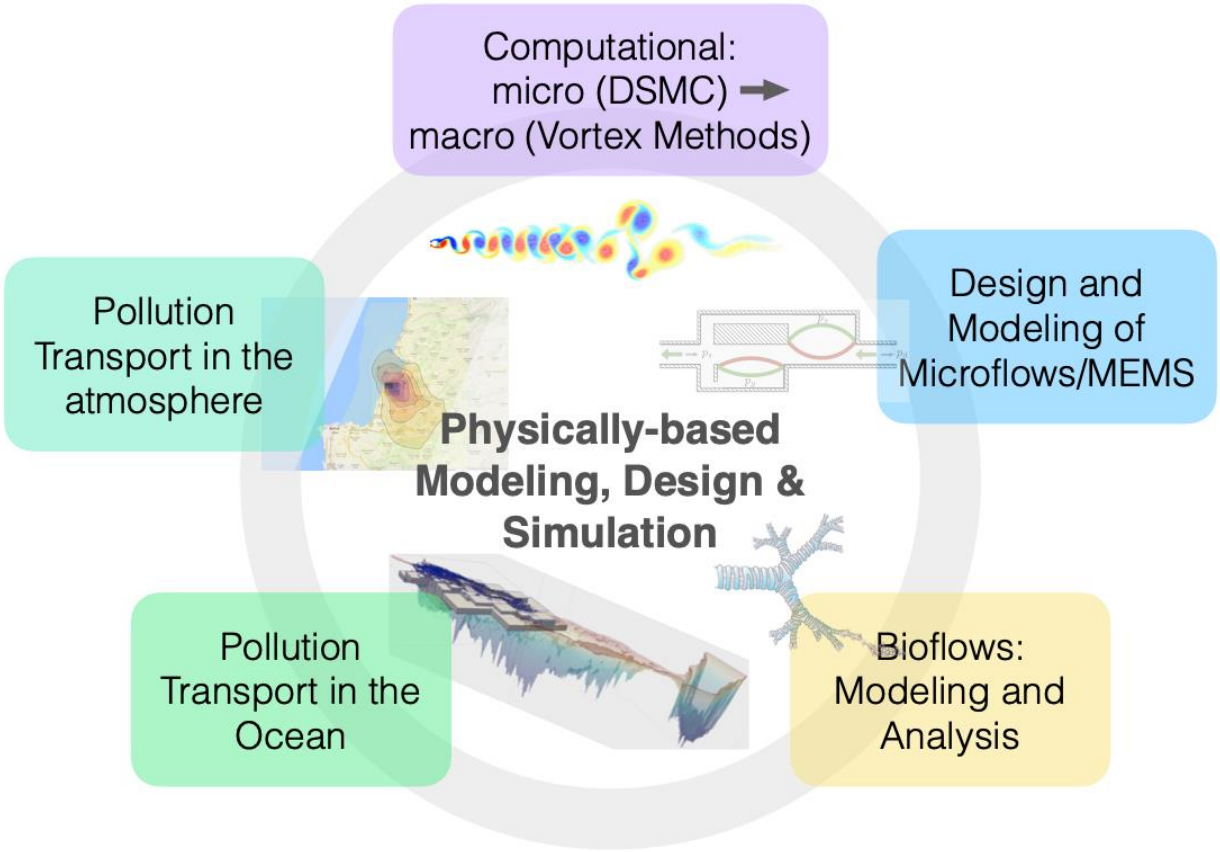
Modeling and simulation of bio-flows: air transport and gases exchange in the respiratory system.

Molecular Dynamics: modeling, simulation and applications in NEMS and MEMS

Species transport in stochastic fields (with applications to pollution transport in the ocean, atmosphere, and urban environments)

Development of grid-free computational methods for continuum (vortex methods) and non-continuum flows (DSMC)

Design, analysis and simulation of multi-scale/multi-physics micro-devices (RF switches, micro-mixers, microfluidic transistors and micro energy harvesters)


Computational:
micro (DSMC) →
macro (Vortex Methods)
Pollution Transport in the atmosphere
Design and Modeling of Microflows/MEMS
Physically-based Modeling, Design & Simulation
Pollution Transport in the Ocean
Bioflows: Modeling and Analysis

| Fadl Moukalled

| Ph.D, Louisana State University

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Dr. Moukalled is a Professor of mechanical engineering at the American University of Beirut. He joined the Mechanical Engineering Department at the American University of Beirut in 1987 after receiving his Ph.D. in 1987 from Louisiana State University, USA. He served as the Chairperson of the Mechanical Engineering Department from 1995 to 2001 and as the Associate Dean of the Maroun Semaan Faculty of Engineering and Architecture (MSFEA) from 2003 to 2016. He was appointed the acting Dean of MSFEA from September 2010 to July 2011. He completed several industrial projects including the development of a computer package for air-conditioning calculations. His research interests are mainly in the development of advanced numerical methods for Computational Fluid Dynamics (CFD) and the use of these techniques for solving problems spanning a wide spectrum of fluid flow regimes including turbulent incompressible and compressible multiphase flows. In addition, he used CFD to solve problems involving heat and mass transfer and to optimize the performance of air-conditioning equipment. He has over 100 journal articles published in leading international journal, over 70 refereed conference papers and book chapters, and a book on the finite volume method in computational fluid dynamics.

His research focuses on the development of innovative numerical techniques as applied to Computational Fluid Dynamics (CFD) in the context of the Finite Volume Method. His work can be subdivided into the following three groups: (i) advanced discretization techniques, (ii) pressure-velocity coupling algorithms, and (iii) applications.

In the advanced discretization techniques category, work included the development of bounded high-resolution convection schemes and the development of a fully implicit technique for the discretization of the diffusion term. Early work on pressure-velocity coupling algorithms dealt with segregated solvers where velocity components and pressure are solved consecutively. Later work focused on developing a new class of algorithms defined as coupled solvers. In the coupled approach, velocity components and pressure are solved simultaneously as a block system thus allowing an implicit treatment of mutual influences and leading to large improvements in performance and robustness. In terms of applications, he solved problems that concentrated on forced and natural convection heat transfer in addition to predicting the performance and improving the design of AC units.

Currently, Dr. Moukalled is involved in solving FSI problems and accelerating computations through parallel processing (CPUs) and the use of GPUs. His early work culminated in a book titled: "The Finite Volume Method in Computational Fluid Dynamics: An Advanced Introduction with OpenFOAM® and Matlab®".

Courses

MECH310 (thermodynamics I), MECH 314 (Introduction to Fluids Engineering), MECH414 (Thermodynamics II), MECH 513 (Air conditioning), MECH 663 (Computational Fluid Dynamics), MECH 764 (Advanced Topics in Computational Fluid Dynamics)

Research Interests

Computational Fluid Dynamics Developments: Adaptive Grid; High Resolution Schemes; Adaptive Schemes; Skew Schemes, Acceleration techniques; Multi-Grid methods, Pressure-Based compressible flows, Multi-blocks, and Muli-phase flows.

Applications: Forced, Free, and Mixed Convection Heat Transfer in irregular domains. Laminar and turbulent flows.

Finite-Time Thermodynamics.

Educational Packages.

| Samir Mustapha

| Ph.D, University of Sydney

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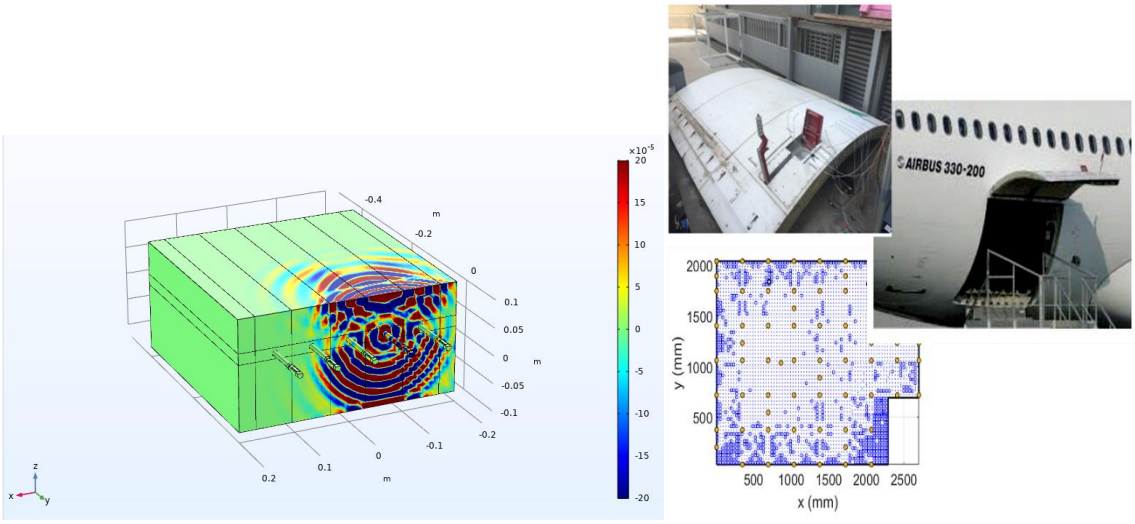
Dr. Mustapha is an associate professor in the Department of Mechanical Engineering at the American University of Beirut. He has an undergraduate degree in Aeronautical Engineering and a PhD in Engineering from the School of Aerospace, Mechanical, and Mechatronics at the University of Sydney in 2013. He worked at the National ICT Australia as a researcher focusing on developing a structural monitoring system for the Sydney Harbor Bridge and other small bridges in the Sydney suburbs. His research focuses on the development of structural health monitoring systems and methods for metallic and composite structures based on vibration, ultrasonics, and fiber optic sensors. He is mainly aiming for damage detection and assessment of metallic pipes, composite pipes, bridge decks, and welded structures. In addition, Dr. Mustapha is very active in the numerical modelling of linear and non-linear problems. Dr. Mustapha published more than 90 peer-reviewed journal and conference papers in the area of structural health monitoring, numerical modelling, vibration, and machine learning.

Courses

MECH 632 (Structural Health Monitoring), MECH 630 (Finite Element Analysis), MECH 525 (Product Design and Development), MECH 520 (Mechanical Design II), MECH 332 (Mechanics of Machines), MECH 340 (Engineering Materials), MECH 320 (Mechanics of Materials)

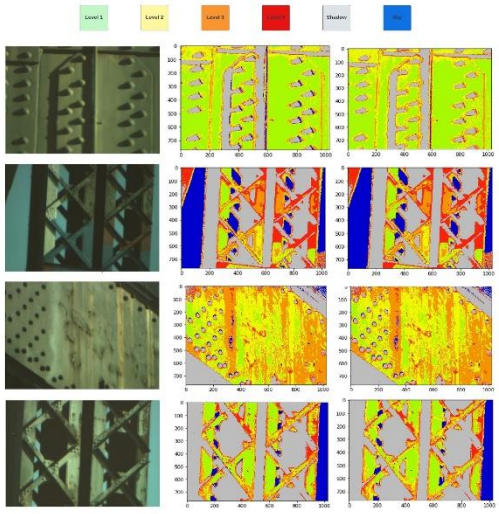
Research Interests

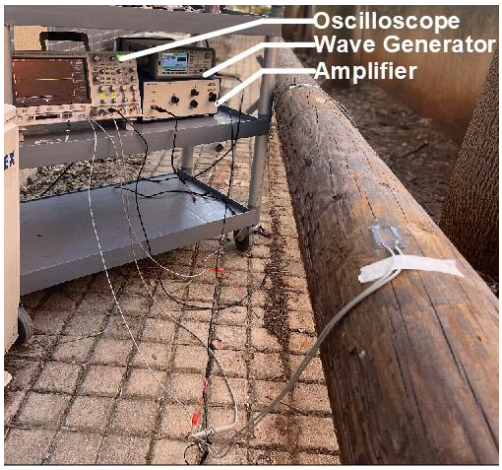
Fabrication of composite structures, finite element modeling, linear and non-linear analysis, dynamic vibration, elastic wave propagation, mechanics of materials, fiber optic sensing, smart materials and sensors, applied machine learning.



Numerical model - ultrasonic guided waves propagation in steel-reinforced concrete

Sensor network optimization on metallic and composite structures





Hyperspectral imaging for paint condition assessment

Structual assessment of timber utility poles

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Alan Shihadeh is Dean of the Maroun Semaan Faculty of Engineering and Architecture at the American University of Beirut. He leads major initiatives on digitizing learning, re-centering liberal education in STEM, broadening access to education, building partnerships to support the competitiveness and sustainability of the region's enterprises, and leveraging the special contexts the region to pursue novel research programs that help bring about a more viable, livable, and equitable world. He also leads the AUB Aerosol Research Lab and several international programs on tobacco regulatory science and urban air pollution, producing the technologies and scientific evidence needed to protect human health.

Shihadeh is also Project Director at the VCU Center for the Study of Tobacco Products, a multidisciplinary group of researchers from Virginia Commonwealth University, AUB, and Johns Hopkins University and founding director of the Aerosol Research Laboratory. He advises or advised numerous agencies including the World Health Organization and the US Food and Drug Administration. Author or co-author of more than 100 refereed journal publications primarily concerned with the chemistry, physics, and exposure science of particle pollutants, Shihadeh's research has been sponsored by the US National Institutes of Health (NIH), the US Food and Drug Administration (FDA), and the International Development Research Center (Canada). He has developed novel technologies that are used by researchers in the Middle East, Europe, and North America to study tobacco use and effects. His methods for waterpipe tobacco smoke testing have been adopted as international standards. In 2018, he and his collaborators were awarded the American Psychological Association Prize for Interdisciplinary Team Research. He is a Clarivate Analytics Highly Cited Researcher and has held appointments at the University of Texas, MIT, Duke University, and the University of New Mexico.

Dr. Shihadeh was also active in efforts to ban the operation of diesel-fueled small passenger vehicles and the sale of leaded fuel in Lebanon, and to pass Lebanon's first comprehensive tobacco control law. He has also brought attention to the deleterious health effects of distributed diesel generators in residential areas.

Dr. Shihadeh's undergraduate engineering students know his courses for bringing historical and social context to light in the study of the engineering, and for making visible in daily life the material they study in the classroom.

Courses

MECH 314 (Fluids Engineering I), MECH 414 (Thermodynamics II)

Research Interests

Aerosols, tobacco product regulation, atmospheric pollution