FABIO BOTTALICO, PH.D.

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Professional Academic Experience

Aug 2026 – Present	**Instructor,** Department of Mechanical Engineering, The Citadel, Charleston, SC.
Sep 2025 – Aug 2026	**Visiting Professor**, Department of Mechanical and Industrial Engineering, University of Massachusetts Lowell, Lowell, MA.
Jan 2021 – Aug 2025	**Graduate Research Assistant,** Department of Mechanical and Industrial Engineering, University of Massachusetts Lowell, Lowell, MA

Education

July 2025	**Ph.D. in Mechanical Engineering,** Department of Mechanical and Industrial Engineering, University of Massachusetts Lowell, Lowell, MA **Dissertation:** *"Development of a UAV-Borne Stereophotogrammetry System for Dynamic Measurements on Large-Scale Structures* (Advisors: Profs. A. Sabato and C. Niezrecki)
Mar 2021	**M.S. in Mechanical Engineering – Mechatronics and Robotics,** Department of Mechanics, Mathematics and Management, Polytechnic of Bari, Bari, Italy **Thesis:** *"The case of the bipedal walker Rando the Walking Robot"* (Advisor: Prof. G. Reina)
Sept 2020	**M.S. in Mechanical Engineering,** Department of Mechanical and Aerospace Engineering, New York University Tandon School of Engineering, Brooklyn, NY
July 2018	**B.S. in Mechanical Engineering,** Department of Mechanics, Mathematics and Management, Polytechnic of Bari, Bari, Italy **Thesis:** *"Industrialization of a process to recover precious materials from electronic waste: a project solution"* (Advisors: Profs. R. P. Iavagnilio and M. Dassisti)

Curriculum Vitae Statistics

Publications	Citations 58; h-index 4; i10-index 2; total publications 17; (as of Aug 2026)

Scholarships, Honors, and Awards

Sept 2019 – Sept 2020	**Double Degree Scholarship,** Department of Mechanics, Mathematics and Management, Polytechnic of Bari, Bari, Italy (Advisor: Prof. Giulio Reina)
Apr 2023	**Best Poster Presentation Award** for poster **F. Bottalico**, C. Niezrecki, and A. Sabato, *3D-DIC for large-scale structures using a sensor-based calibration method*, SEM student symposium 2023, Kingstown, RI,
Mar 2023	**Best Student Paper Award** for paper **F. Bottalico**, C. Niezrecki, K. Jerath, Y. Luo, and A. Sabato, *Sensor-aided camera calibration for three-dimensional digital image correlation measurements*, in proceedings SPIE Smart Structures/NDE 2023, Long Beach, CA
Jan 2026	**Best Paper Award** for paper **F. Bottalico**, C. Niezrecki, and A. Sabato, *Three-dimensional Point Tracking using UAV-Based Stereo Vision,* in proceedings IMAC-XLIV 2026, Palm Springs, CA

Sponsored Research Projects

Sept 2024 – Aug 2026

National Science Foundation, WindSTAR – I/UCRC, *Internal and external inspection of wind turbine blades using computer vision and artificial intelligence*

- Led both the internal and external inspection teams by performing UAV mission planning and troubleshooting on the fly.

- Designed and implemented a custom UAV payload and a custom image processing pipeline to enable camera recalibration and accurate damage size estimation on internal surfaces of wind turbine blades.
- Performed manual UAV flight maneuvers for data acquisition in tight spaces.

Sept 2024 – Aug 2026

National Offshore Wind Research and Development Consortium, *Offshore wind turbine blade monitoring using computer vision and AI*

- Designed and implemented a UAV payload for ultra high-resolution imaging in the visible spectrum.
- Implemented hybrid motion compensation to eliminate UAV and blade motion from image sequences with an aligning error below 1 pixel.
- Designed and implemented a data-driven Multi Image Super-Resolution pipeline to perform remote blade inspection at a distance 2X larger than before.

Sept 2023 – Aug 2024

National Science Foundation, WindSTAR – I/UCRC, *Foundation stiffness monitoring using optical motion magnification for land-based and offshore wind turbines*

- Designed and implemented vibration testing procedures for back-to-back comparisons with contact-based seismic accelerometers.
- Performed data acquisition in Python, analysis and postprocessing in MATLAB and in RDI Motion Amplification.
- Implemented camera-motion compensation methods to reduce the effect of wind on measurements.

Sept 2023 – Aug 2024

Wind Technology Testing Center, *73-meter turbine blade modal test support*

- Designed a novel image processing pipeline in MATLAB to perform natural feature tracking in 3D.
- Performed a modal test using 10+ accelerometers and two paired high-speed cameras at a 4.5-meter baseline.
- Achieved a minimum 3D tracking accuracy of 97% compared to target-based 3D-PT
- Achieved a minimum accuracy in resonant frequency estimation of 99% compared to accelerometers.

Jan 2021 – Jan 2025

National Science Foundation, *MRI: Development of a Calibration System for Stereophotogrammetry to Enable Large-Scale Measurement and Monitoring*

- Invented a novel inertial sensor-based system to calibrate stereo cameras for simplifying camera-based measurements for dynamic measurements on large-scale structures using UAVs.
- Performed prototype design in Autodesk Inventor, manufacturing with Prusa 3D printers, sensors implementation and synchronization on Raspberry Pi with Python3, C++, and ROS.
- Designed a multitude of laboratory and field tests for accuracy validation against checkerboard-based calibration methods.
- Mentored and supervised undergraduate students supporting the assembly and deployment of the prototypes.
- Calibrated synchronized cameras at large (> 4 meters) baselines in less than 20 seconds, achieving >99% reduction in time required to calibrate, and 97.3% minimum accuracy against traditional checkerboard-based calibration methods.
- Calibrated independent cameras on UAVs at large baselines in quasi-real-time with hybrid motion compensation, achieving 99% 3D tracking accuracy compared to ground-mounted cameras.

Non-Sponsored Academic Projects

Feb 2020 – Aug 2020

Robotic Gait and Manipulation, NYU Tandon, *Rando the Walking Robot*

- Modified and optimized the original control board for easy microcontroller (Arduino Nano) removal and hot-swapping, enhancing troubleshooting efficiency.

- Manually optimized the Arduino control code parameters to make the robot walk in open-loop control, as per assignment (no closed-loop allowed).
- Achieved the highest score in the Robotic G&M course with 6 full steps in open loop control, demonstrating a deep understanding of robotic mechanics.

Mechatronics, NYU Tandon, *SafeRide Bike*

Oct 2019 – Dec 2019

- Designed dual Arduino-based control boards for a helmet and bicycle, enabling ad-hoc Bluetooth communication.
- Implemented Bluetooth-controlled LED turning and braking lights on the helmet; Fall Detection using accelerometers, Backside Monitoring using ultrasonic sensors, and Automated Emergency Calling on the bicycle.
- Created Version 2.0 using a Raspberry Pi 4B, adding a console screen and live rear-camera feed with Python.

Peer-Reviewed Publications

JOURNAL PUBLICATIONS

[J4] **F. Bottalico,** C. Niezrecki, and A. Sabato, *Preliminary Validation of a Hybrid Visual-Inertial Stereocamera Calibration for 3D Point Tracking Using Independent UAVs,* Measurement 264, 120287 (2026), doi: https://doi.org/10.1016/j.measurement.2025.120287

[J3] **F. Bottalico**, N. Valente, C. Niezrecki, K. Jerath, Y. Luo, and A. Sabato, *Rapid 3D Camera Calibration for Large-Scale Structural Monitoring*, Remote Sensing 17 (15) 2720 (2025), doi: https://doi.org/10.3390/rs17152720

[J2] **F. Bottalico** and A. Sabato, *Stereo-point tracking of inherent structural features for 3D computer vision measurements*, Mechanical Systems and Signal Processing 235, 112937, (2025), doi: https://doi.org/10.1016/j.ymssp.2025.112937

[J1] **F. Bottalico**, Y. Luo, K. Jerath, C. Niezrecki, and A. Sabato, *Sensor-based calibration of camera's extrinsic parameters for stereophotogrammetry*, IEEE sensors journal, 23.7, (2023): 7776-7785, doi: 10.1109/JSEN.2023.3244413.

Non-Peer-Reviewed Publications

CONFERENCE PROCEEDINGS (↓ Presenter)

[C13] **F. Bottalico,** F. Gasperini, and A. Sabato, *Feature tracking algorithm for 3D displacement measurements of bridges*, accepted to 13th International Conference on Bridge Maintenance, Safety and Management (IABMAS), Orlando, FL, July 7-10, 2026.

[C12] **F. Bottalico,** J. S. Syed, C. Niezrecki, and A. Sabato , *Drone-based super-resolution imaging for automated wind turbine blade inspection*, accepted to SPIE Smart Structures/NDE 2026, Vancouver, BC, March 16-19, 2026

[C11] **F. Bottalico,** C. Niezrecki, and A. Sabato, *Three-dimensional Point Tracking using UAV-Based Stereo Vision,* in proceedings IMAC-XLIV 2026, Palm Springs, CA (best paper award).

[C10] **F. Bottalico,** J.S. Syed, C. Niezrecki, and A. Sabato, *Improving Image Resolution for Drone-Borne Inspection of Wind Turbine Blades",* in Proceedings of the 15th IWSHM, 2025.

[C9] **F. Bottalico** and A. Sabato (↓), *Assessment of three-dimensional displacements via a novel natural-pattern tracking algorithm,* In Proceedings ISMA-USD Conference, Leuven, Belgium, September 9 - 11, 2024, in press.

[C8] N. N. Kulkarni (↓), L. Peretto, **F. Bottalico**, C. Niezrecki, and A. Sabato, *Infrared-based point cloud reconstruction for heat loss detection in a virtual reality environment*, in proceedings SPIE Smart Structures/NDE 2024, Long Beach, CA, March 25-28, 2024, https://doi.org/10.1117/12.3009908.

[C7] **F. Bottalico** (ǂ), and A. Sabato, *Natural pattern tracking for 3D digital image correlation*, in proceedings SPIE Smart Structures/NDE 2024, Long Beach, CA, March 25-28, 2024, https://doi.org/10.1117/12.3009906.

[C6] **F. Bottalico** (ǂ) and A. Sabato, *Pattern-less stereophotogrammetry for structural dynamic measurements*, in proceedings IMAC XLII, Orlando, FL, January 29 – February 2, 2024, https://doi.org/10.1007/978-3-031-68192-9_1.

[C5] **F. Bottalico**, C. Niezrecki, and A. Sabato (ǂ), *Next generation 3D-DIC technique with sensor-based extrinsic parameter calibration and natural pattern tracking*, in proceedings IWSHM 2023, Stanford, CA, September 12-14, 2023, doi: 10.12783/shm2023/36867.

[C4] **F. Bottalico** (ǂ), C. Niezrecki, K. Jerath, Y. Luo, and A. Sabato, *Sensor-aided camera calibration for three dimensional digital image correlation measurements*, in proceedings SPIE Smart Structures/NDE 2023, Long Beach, CA, March 12-16, 2023, (best students' paper award), https://doi.org/10.1117/12.2657163.

[C3] **F. Bottalico** (ǂ), C. Niezrecki, K. Jerath, Y. Luo, and A. Sabato, *Experimental quantification of sensor-based stereocameras' extrinsic parameters calibration,* in Proceedings IMAC XLI, Austin, TX, February 13-16, 2023, https://doi.org/10.1007/978-3-031-34910-2_6.

[C2] A. Sabato (ǂ), S. Dabetwar, N. N. Kulkarni, **F. Bottalico**, T. Nieduzak, and C. Niezrecki, *Advancements in structural health monitoring using combined computer-vision and unmanned aerial vehicles approaches,* in Proceedings 10th EWSHM 2022, Palermo, Italy, July 4-7, 2022, https://doi.org/10.1007/978-3-031-07258-1_43.

[C1] **F. Bottalico** (ǂ), N. Valente, S. Dabetwar, Y. Luo, K. Jerath, C. Niezrecki, and A. Sabato, *A sensor-based calibration system for three-dimensional digital image correlation,* in Proceedings SPIE Smart Structures/NDE 2022, Long Beach, CA, March 6-10, 2022, https://doi.org/10.1117/12.2612106.

CONFERENCE ABSTRACTS (ǂ Presenter)

[A5] **F. Bottalico** and A. Sabato (ǂ), *Structural dynamics measurements with natural features-based point tracking*, in IMAC XLIII, Orlando, FL, February 10-13, 2025.

[A4] **F. Bottalico**, C. Niezrecki (ǂ), and A. Sabato, *Wind turbine foundation monitoring with motion magnification: Lessons learned and best practices*, in IMAC XLIII, Orlando, FL, February 10-13, 2025.

[A3] **F. Bottalico** and A. Sabato (ǂ), *Progressing stereophotogrammetry for expedited inspection of large-scale structure,* in EMI 20124, Chicago, IL, May 28 - 31, 2024.

[A2] **F. Bottalico**, C. Niezrecki (ǂ), and A. Sabato, *Sensor-based calibration of cameras' extrinsic parameters for stereophotogrammetry*, Accepted to 15th International Conference on Vibration Measurements, Ancona, Italy, June 21-23, 2023.

[A1] **F. Bottalico** (ǂ), C. Niezrecki, K. Jerath, Y. Luo, and A. Sabato, *A novel method to calibrate stereo cameras' extrinsic parameters using sensors,* in iDICs 2022, Boston, MA, November 7-10, 2022.

POSTER PRESENTATIONS (ǂ Presenter)

[P3] **F. Bottalico** (ǂ) ,J. S. Syed, M. Mohammadzadeh, C. Niezrecki, and A. Sabato, *Internal and external Inspection of wind turbine blades using computer vision and artificial intelligence*, WindSTAR IAB Meeting, Lowell, MA, June 4, 2025.

[P2] **F. Bottalico** (ǂ), C. Niezrecki, and A. Sabato, *Foundation stiffness monitoring using optical motion magnification for land-based and offshore wind turbines*, WindSTAR IAB Meeting, Lowell, MA, June 12, 2024.

[P1] **F. Bottalico** (↓), C. Niezrecki, and A. Sabato, *3D-DIC for large-scale structures using a sensor-based calibration method*, SEM student symposium 2023, Kingstown, RI, April 22, 2023, (best presentation award).

TECHNICAL REPORTS

[TR1] **F. Bottalico**, C. Niezrecki, and A. Sabato, *Foundation Stiffness Monitoring using Optical Motion Magnification for Land-Based and Offshore Wind Turbines*, the University of Massachusetts Lowell for WindSTAR Industrial Advisory Board, Lowell, MA, September 2024, Unpublished, submitted to private clients.

Invited Lectures and Seminars

[L1] *Advancements in Computer Vision for Structural Health Monitoring: Overcoming Challenges and Expanding Applications*, invited talk for MECH5010 – Mechanical Engineering Research Seminar, Lowell, MA, March 22, 2024

Academic Teaching Experience

Post-Ph.D.: two semesters of visiting professorship for undergraduate level classes.
During the Ph.D.: one semester of formal teaching assistantship for undergraduate level classes, four semesters of informal teaching assistantship for graduate level classes, one capstone group informally mentored, two directed studies informally mentored.

[T5] **IENG.2100,** *Engineering Design and Manufacturing,* Spring 2026 - UML

[T4] **MECH.2960**, *Materials Science for Engineers*, Fall 2025 - UML

[T3] **MECH.2020**, *Manufacturing Laboratory,* Fall 2025, Spring 2026 - UML

[T2] **MECH.5195**, *Principles and applications of sensors for engineering*, Spring 2022, Spring 2023, Spring 2024 and Spring 2025 - UML

[T1] **MECH.3020**, *Instrumentation and measurement laboratory*, Fall 2023 - UML

Mentorship and Supervision Experience

Ph.D. Students (informal mentorship)

[PS4] Francesco Gasperini, Ph.D. Mechanical Engineering, January 2026 – present.

[PS3] Mohammad Mohammadzadeh, Ph.D. Mechanical Engineering, January 2025 – present.

[PS2] Jabbar Shah Syed, Ph.D. Mechanical Engineering, September 2024 – present.

[PS1] Gaurav C. Modak, Ph.D. Mechanical Engineering, January 2024 – present.

Undergraduate Students (informal mentorship)

[U4] Yoav Nossenson, *3D imaging method for the analysis of the inside of structures of interest*, for Mechanical engineering directed study MECH.4991, Spring 2024.

[U3] Ryan Webster, *3D imaging method for the analysis of the inside of structures of interest*, for Mechanical engineering directed study MECH.4991, Spring 2024.

[U2] Melissa Ing, *Development of a 3D imaging method for the analysis of structures of interest*, for RHSA roadways to research, Summer 2024.

[U1] Mario Celi, Thoai Kline, Connor Russell, and Christopher Sullivan, *Dual-UAV payload development for simultaneous data acquisition*, for Mechanical Engineering Capstone Design MECH.4230, Spring 2024.

Service

Journal Reviewer

Journal Name	Publisher	Impact Factor	Reviews
Measurement	Elsevier	5.2	10
Computers in Industry	Elsevier	8.2	3
Journal of Sound and Vibration	Elsevier	4.3	2
Optics and Lasers in Engineering	Elsevier	3.5	4
SoftwareX	Elsevier	2.4	1
Journal of Bridge Engineering	ASCE	3.1	1
Journal of Nondestructive Evaluation	Springer	2.6	2
Journal of Testing and Evaluation	ASTM	0.8	1
Instrumentations and Measurement Magazine	IEEE	1.6	1
		TOTAL	**25**

University level

[UL1] Graduate Student Association of UMass Lowell , Secretary, Fall 2023 – Spring 2024