

Jared Alan Frank

Work:

Mechatronics, Control, and Robotics Laboratory
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Summary

Accomplished and enthusiastic doctoral student with experience in research and development of robotic and control systems. History of leadership and teaching roles, and involvement in a broad range of projects and experimental work. Objective is to contribute multidisciplinary skills and experience to the research and development of emerging technologies.

Qualifications

Work Authorization: US Citizen

Languages: English, Spanish (Level B1)

Certification: Engineer in training (EIT)

Technical Skills: Robotics, statistical analysis, system modeling, control design, application development

Programming Experience: MATLAB/Simulink, LabVIEW, C/C++, Xcode, Objective-C, OpenCV, OpenGL, ROS, Python, Solid Works, Inventor

Education

Ph.D., Mechanical Engineering, NYU Tandon School of Engineering, August 2017, **GPA: 4.0**

Dissertation: "Mobile Devices as Mixed-Reality Platforms that Enhance Measurement, Control, and Interaction with Physical Systems".

M.S., Mechanical Engineering, Polytechnic Institute of NYU, May 2012, **GPA: 4.0**

Thesis: "Multimodal Mobile Apps for Intuitive Human-Machine Interaction".

B.S., Mechanical Engineering, Polytechnic University, May 2010, **GPA: 3.9** (*Summa Cum Laude*)

Minor: Aerospace Engineering.

Experience

Ph.D. Candidate and Lab Manager

NYU Tandon School of Engineering, Mechatronics, Control, and Robotics Laboratory (MCRL)

- Developed various autonomous systems for mobile navigation, manipulation, and social interaction.
- Designed mobile applications with inertial sensing, computer vision, augmented reality, and touch-screen gestures to enhance measurement, control, and user interaction with robots and control systems.
- Conducted user studies to evaluate task performance and user experience; wrote and published results in book chapters, journals, magazines; presented results at conferences.
- Coordinated with research assistants and directed their research efforts in the laboratory.

Research Mentor

NYU Tandon School of Engineering, Mechatronics, Control, and Robotics Laboratory (MCRL)

- Guided the research of five graduate, six undergraduate, and three visiting high school students.
- Trained teachers for 6 summers in an NSF-funded Research Experiences for Teachers (RET) program.

Teaching Fellow

Polytechnic Institute of NYU, Automatic Controls Laboratory, Mechanical and Aerospace Eng. Dept.

- Taught concepts of dynamic systems modeling, analysis, and controller design for three semesters.
- Performed experiments in filtering, motor control, magnetic levitation, and pendulum stabilization.

Honors & Awards

- NASA/New York Space Grant Consortium and Robotics-5 Fellowships, 2009-2011, 2012-2015.
- NYC Media Lab Connected Futures Research and Prototyping Grant, \$25,000, January – April 2016.
 - *Project: “Connecting People to Robots Using Interactive Augmented Reality Apps”*
- NYU School of Engineering Research Expo, First Place, 2013, 2014, 2015.
 - *2015 Project: “Making Faces with CAESAR: Teaching Emotions to Expressive Humanoid Robots”*
 - *2014 Project: “Intuitive Interaction with Mobile and Humanoid Robots*
 - *2013 Project: “Mobile Apps for Intuitive Human-Robot Interaction*
- NYU Poly Inno/Vention Finalist, 2012.
- Simulink Student Challenge, Third Place, 2011.
- Tau Beta Pi, National Engineering Honor Society, Rho of New York, 2009.

Projects

Interfacing Mobile Devices with Mobile, Manipulation, and Humanoid Robotic Platforms

- Studied the ability of untrained people to use mobiles to monitor, command, and control robots to perform tasks.
- Explored effects of interactive augmented-reality on user experience, task performance, and situation awareness.

Cellular-Accessible, Expressive, Semi-Autonomous Robot (CAESAR)

- Supervised the design and testing of all structural, aesthetic, control, and perception systems of a humanoid robot.
- Oversaw evaluations of the robot’s manipulation of objects and its recognition and social interaction with people.
- Presented and demonstrated the robot at public events, research expos, summits, competitions, and festivals.

Integration of Mobile Devices and Laboratory Test-beds

- Established two approaches for developing more portable, affordable, and engaging science and engineering learning platforms by directly mounting smartphones to test-beds or by pointing tablet cameras at test-beds.
- Investigated the distinct educational features and affordances provided by the two proposed approaches.

Research

Research Interests: Mobile Robotics, Humanoid Robotics, Human-Robot Interaction, User Interface/User Experience (UI/UX) Design, Interaction Design, Mobile Application Development, Mobile Learning.

Refereed Journal Articles

1. **Frank, J.A.**, Krishnamoorthy, S.P., and Kapila, V. (2017). Towards Mobile Mixed-Reality Interaction with Multi-Robot Systems. *Robotics and Automation Letters*. (submitted).
2. **Frank, J.A.** and Kapila, V. (2017). Towards Mobile Mixed-Reality Interfaces that Enhance Human-Robot Interaction in Shared Workspaces. *Frontiers in Robotics and AI*. (submitted).
3. **Frank, J.A.** and Kapila, V. (2017). Mixed-reality Learning Environments: Integrating Mobile Interfaces with Laboratory Test-beds. *Computers & Education*. <http://dx.doi.org/10.1016/j.compedu.2017.02.009>. (to appear).
4. **Frank, J.A.**, Brill, A., and Kapila, V. (2016). Mounted Smartphones as Measurement and Control Platforms for Motor-Based Laboratory Test-Beds. *Sensors* 16(8), 1331, 1–21.
5. **Frank, J.A.** and Kapila, V. (2016). Using Mobile Devices for Mixed-Reality Interactions with Educational Laboratory Test-Beds. *Dynamic Systems & Control* 4(2), 2–6.
6. **Frank, J.A.** and Kapila, V. (2014). Development of Mobile Interfaces to Interact with Automatic Control Experiments. *IEEE Control Systems* 34(5), 78–98.
7. Abaid, N., Bernhardt, J., **Frank, J.A.**, Kapila, V., Kimani, D., and Porfiri, M. (2013). Controlling a Robotic Fish with a Smart Phone. *Mechatronics* 23(5), 491–496.

Conference Papers

1. Nagi, J., **Frank, J.A.**, Di Caro, G.A., and Kapila, V. (2017). CAESAR: A Socially Expressive Humanoid Robot that Learns Emotional Expressions using Behavior Modulation In *IEEE Int. Conf. Intelligent Robots and Systems*. (submitted).
2. **Frank, J.A.**, Moorhead, M., and Kapila, V. (2016). Design and Evaluation of CAESAR: A 3D-Printed Expressive Robot. In *IEEE Int. Symp. Robot-Human Interactive Communication*, New York, NY. (Video paper).
3. **Frank, J.A.**, Moorhead, M., and Kapila, V. (2016). Realizing Mixed-Reality Environments with Tablets for Intuitive Human-Robot Collaboration for Object Manipulation Tasks In *IEEE Int. Symp. Robot-Human Interactive Communication*, New York, NY, 302–307. DOI: 10.1109/ROMAN.2016.7745146.
4. Brill, A., **Frank, J.A.**, and Kapila, V. (2016). Using Mounted Smartphones as a Platform for Laboratory Education in Engineering In *Proc. ASEE Annual Conference*, Session: T626, New Orleans, LA. 10.18260/p.27153.
5. Brill, A., **Frank, J.A.** and Kapila, V. (2016). Visual Servoing of an Inverted Pendulum on Cart using a Mounted Smartphone *Proc. American Control Conf.*, Boston, MA, 1323–1328.
6. Brill, A., **Frank, J.A.** and Kapila, V. (2016). Using Inertial and Visual Sensing from a Mounted Smartphone to Stabilize a Ball and Beam Test-bed *Proc. American Control Conf.*, Boston, MA, 1335–1340.
7. **Frank, J.A.** and Kapila, V. (2016). Towards Teleoperation-based Interactive Learning of Robot Kinematics using a Mobile Augmented Reality Interface on a Tablet *Proc. Indian Control Conference*, Hyderabad, India, 385–392.
8. **Frank, J.A.** and Kapila, V. (2016). Interactive Mobile Interface with Augmented Reality for Learning Digital Controls Concepts *Proc. Indian Control Conference*, Hyderabad, India, 85–92.

9. **Frank, J.A.**, De Gracia Gómez, J.A., and Kapila, V. (2015). Using Tablets in the Vision-Based Control of a Ball and Beam Test-bed *Proc. Int. Conf. Informatics in Control, Automation and Robotics*, Colmar, Alsace, France, 92–102.
10. **Frank, J.A.**, Brill, A., Bae, J., and Kapila, V. (2015). Exploring the Role of a Smartphone as a Motion Sensing and Control Device in the Wireless Networked Control of a Motor Test-bed *Proc. Int. Conf. Informatics in Control, Automation and Robotics*, Colmar, Alsace, France, 328–335.
11. **Frank, J.A.** and Kapila, V. (2015). Path Bending: Interactive Human-Robot Interfaces With Collision-Free Correction of User-Drawn Paths *Proc. ACM Int. Conf. Intelligent User Interfaces*, Atlanta, GA, 186–190.
12. **Frank, J.A.**, Sahasrabudhe, Y., and Kapila, V. (2015). An augmented reality approach for reliable autonomous path navigation of mobile robots. *Proc. Indian Control Conference*, Chennai, India.
13. **Frank, J.A.** and Kapila, V. (2014). Performing Difficult Teleoperation Tasks Using Dominant Metaphors of Interaction. *Proc. ASME Conf. Engineering Systems Design and Analysis*, Paper No. ESDA2014-20133, pp. V003T15A007, Copenhagen, Denmark.
14. Fernandes, V.B.P., **Frank, J.A.** and Kapila, V. (2014). A Wearable Interface for Intuitive Control of Robotic Manipulators Without User Training. *Proc. ASME Conf. Engineering Systems Design and Analysis*, Paper No. ESDA2014-20128, pp. V003T15A006, Copenhagen, Denmark.
15. Lopez, D.A., **Frank, J.A.** and Kapila, V. (2014). Comparing Interface Elements on a Tablet for Intuitive Teleoperation of a Mobile Manipulator. *Proc. ASME Conf. Engineering Systems Design and Analysis*, Paper No. ESDA2014-20126, pp. V003T15A005, Copenhagen, Denmark.
16. **Frank, J.A.** and Kapila, V. (2014). Towards Natural Interfaces to Interact with Physical Systems Using Smart Mobile Devices. *Proc. IEEE Industrial Electronics Society Conference*, Dallas, TX, 2458–2464.

Book Chapters

1. **Frank, J.A.**, Brill, A., Kapila, V. (2017). Mobile Cyber-Physical Labs: On the Integration of Mobile Devices with Laboratory Test-beds to Teach Dynamic Systems and Control Concepts *Cyber-Physical Laboratories in Engineering and Science Education*, to appear.
2. **Frank, J.A.**, Kapila, V. (2017). Integrating Smart Mobile Devices for Immersive Interaction and Control of Physical Systems: A Cyber-Physical Approach *Advanced Mechatronics and MEMS Devices II*, (D. Zhang and B. Wei, Eds.), Switzerland:Springer International, 73–93.

Patents

1. Prieto, R., Kapila, K., **Frank, J.A.**, Lopez, D.A., Universal construction robotics interface, Application No: US 13/901,275, Publication No: US 20140350723 A1. Issued Nov 27, 2014.

Invited Seminar Presentations

NYC Media Lab Annual Summit, September 2016.

RET Site, SMARTER Seminar, NYU Tandon School of Engineering, Summer 2015.

Tech Talk, ASME Student Chapter, NYU Tandon School of Engineering, April 2015.

RET Site, SMARTER Seminar, NYU Polytechnic School of Engineering, Summer 2014.

Service

- Reviewed manuscripts for *IEEE RO-MAN*, *IEEE-RAS Humanoids*, *MDPI Sensors European Control Conference*, *American Control Conference*, and *Transactions on Control Systems Technology*,
- Attended the following events as exhibitor:
 - 3rd NYU School of Engineering Annual Research Expo, 2015
 - Genius Gala 3.0, Liberty Science Center, Jersey City, NJ, 2014
 - 3rd U.S Science and Engineering Expo, Washington, DC, "Learning With Robots and Games", 2014
 - 2nd NYU School of Engineering Annual Research Expo, 2014
 - World Science Festival, "Mobile Apps for Robotics", 2013
 - 1st NYU School of Engineering Annual Research Expo, 2013
 - 2nd U.S Science and Engineering Expo, Washington, DC, "Mobile Apps for Robotics", 2012
 - NYU School of Engineering Promise Reception, 2011
 - Maker Faire, New York Hall of Science, Queens, NY, 2011
 - NASA Expo, "What's your Favorite Space?", New York, NY, 2011
 - Sci-Ed Innovators Expo and Symposium, New York University, 2011
 - 1st U.S National Science and Engineering Expo, Washington, DC, "Mechatronics Mania", 2010
- Member of American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers Robotics and Automation Society (IEEE-RAS), Association for Computing Machinery (ACM).

Mentorship and Leadership

- Mentored the following research by high school and middle school teachers as part of a National Science Foundation Research Experience for Teachers (RET) Site:
 - P. Cook and I. Irimina: "Making things talk in the physical world using augmented reality", 2015
 - L. Ali and M. Zitolo: "Tracking and Distance Detection Methods for a Humanoid Robot", 2014
 - K. Brandon and J. Jadav: "Facial Recognition and Learning with Embedded Computing", 2013
 - J.S. Bernhardt, H. Mallar, and L. Outerbridge: "iPhone-Controlled Robotic Projects", 2011
 - M. Fisher and V. Gerald: "iPhone-Controlled Robotic Project", 2010
 - L. Outerbridge: "iPhone/iPod Touch as a Data Acquisition and Control Device", 2009
- Advised the project and research work of the following students:

Matthew Moorhead (2015–2016)	João Victor Nunes e Silva (2015).
Anthony Brill (2014–2016)	Keith Gildea (2013–2014).
José Antonio De Gracia Gómez (2014–2015)	Gaspard Lemoine-Scelles (2013)
Giancarlo Gramazio (2012–2013)	Meysane Alj Hakim (2013)
David Lopez (2011–2013)	Guilherme Teixeira (2013)
	Vinicius Bazan Pinto Fernandes (2012–2013).

Teaching

- Sponsored by a Teaching Fellowship from NYU Tandon Mechanical and Aerospace Engineering Dept.
 - Automatic Control Laboratory (Undergraduate): Fall 2011, Spring 2012, Summer 2016.