JOHN T SOLOMON

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EDUCATION

Ph.D. in Mechanical Engineering, Florida State University, Fall-2010
Dissertation Title: High Bandwidth Unsteady Micro-actuators for Active Control of High-Speed Flows

M. Tech in Mechanical Engineering, National Institute of Technology, Calicut, India, Spring-2002. *Thesis Title: Studies on Heat Transfer and Flow Friction Characteristics in Mini Channels*

B. Tech in Mechanical Engineering, College of Engineering, Trivandrum, India, Fall-1998

PROFESSIONAL EXPERIENCE

2023 July- till now– Professor of Mechanical Engineering, Tuskegee University
2018 August-2023 July – Associate Professor, Tuskegee University
2019 May 16-August 16, 2020 June 1-July 31- Summer faculty research fellow, NASA Jet Propulsion Laboratory, California Institute of Technology.
2012 August-2018 July- Tenure Track Assistant Professor, Tuskegee University
2010- 2012 July: Assistant Professor (Adjunct), Florida State University
: Research Associate, Florida Center for Advanced Aero Propulsion
2006- 2010: Graduate Research Assistant, Teaching Assistant, Florida State University
2002- 2005: Faculty in Mechanical Engineering, National Institute of Technology, Calicut, India.

RESEARCH INTERESTS

Experimental fluid mechanics, High-speed flow control, Microactuator development, Microscale flow diagnostics, Engineering Education, Curriculum development

TEACHING

Teaching Evaluation Summary (Sample from 2012- 2017) Tuskegee University
Scale 5-Excellent to 1 poor (mean/5.0) *Data available on request

Semester	Year	Instructor	Dept.	Course Name	*Avg.
Spring	2017	John Solomon	MENG	Fluid Mechanics	4.7

Spring	2017	John Solomon	MENG	Thermal Sciences Laboratory	4.5
Spring	2017	John Solomon	MENG	Heating Ventilating & Air Cond	4.5
Spring	2016	John Solomon	MENG	Thermal Sciences Laboratory	4.8
Spring	2016	John Solomon	MENG	Heating Ventilating & Air Cond	5.0
Spring	2016	John Solomon	MENG	Renewable Energy	4.7
Fall	2016	John Solomon	MENG	Fluid Mechanics	4.5
Fall	2016	John Solomon	MENG	Thermal Sciences Laboratory	4.5
Fall	2016	John Solomon	MENG	Heating Ventilating & Air Cond	4.7
Spring	2015	John Solomon	MENG	Heating Ventilating & Air Cond	4.8
Spring	2015	John Solomon	MENG	Renewable Energy	4.3
Spring	2015	John Solomon	MENG	Thermal Sciences Laboratory	4.3
Fall	2015	John Solomon	MENG	Thermal Sciences Laboratory	4.7
Fall	2015	John Solomon	MENG	Heating Ventilating & Air Cond	4.8
Fall	2015	John Solomon	MENG	Fluid Mechanics	3.3
Spring	2014	John Solomon	MENG	Thermal Sciences Laboratory	4.4
Spring	2014	John Solomon	MENG	Heating Ventilating & Air Cond	4.3
Spring	2014	John Solomon	MENG	Renewable Energy	4.3
Fall	2014	John Solomon	MENG	Fluid Mechanics	4.6
Fall	2014	John Solomon	MENG	Thermal Sciences Laboratory	4.4
Fall	2014	John Solomon	MENG	Heating Ventilating & Air Cond	4.1
Fall	2013	John Solomon	MENG	Heating Ventilating & Air Cond	4.5
Spring	2013	John Solomon	MENG	Heat Transfer, Thermal lab, HVC	**N.A
Fall	2012	John Solomon	MENG	Heat Transfer, Fluids, Thermal lab	N.A
				Average score 4.5/5.0	

**not available

Teaching Evaluation Summary at Florida State University -2011 Jan 2012 July (Mean/5.0)

Scale 5 – Excellent to Poor-1			*Overall Instructor Rating (Mean/5.0)
Spring 2011	EML 4711/EML 5710	Introduction to Gas Dynamics.	4.5
Fall 2011	EML3016C	Thermal Fluids II	4.0
Spring 2012	EML 4304	Thermal-Fluids Lab	4.4

Teaching Experience Prior Ph.D. at National Institute of Technology Calicut, India (2002-2005)

Teaching evaluation average 4/5		
Spring 2002	MENG 402	Dynamics of Machines
Fall 2002	MENG 202	Engineering Mechanics (Statics and Dynamics)
Spring 2003	MENG 304	Hydraulic Machines
Fall 2003	MENG 303	Fluid Mechanics
Spring 2004	MENG 405	Heat Transfer
Fall 2004	MENG 302	Thermodynamics-I
Spring 2015	MENG 102	Engineering Graphics

RESEARCH

PATENT

1. System and method for active injection into fluid streams: 11,230,996 Jan 2022, Inventor: John Solomon, Tuskegee University.
2. High Bandwidth & Control Authority Micro-Actuators for Active Flow & Noise Control 8,286, 895 -October 2012 (Alvi, Kumar, Solomon), Florida State University.
3. High-frequency pulsed co-axial injector system and method for high-speed flow mixing and control and method—Provisional Patent Application: 63354751, 2022, Inventor- John Solomon, Tuskegee University.

PROPOSALS FUNDED as P.I.

1. *Excellence in Research*: Co-axial Flow Mixing and Control using Ultra-High Frequency Actuators- Funded by *National Science Foundation*, CBET division ($579k, 2019-2023) P.I. Co-PIs- Dr. Chitra Nayak, Dr. Mandoye Ndoye, Tuskegee University; Dr. Philip Kreth, University of Space Institute, Tennessee.
2. *Collaborative Research*: Developing a Diverse, Future-oriented Workforce for Renewable Energy Industries- Funded by *National Science Foundation*, EHR IUSE program ($300k, 2021-2024) Collaboration with Dr. Lauren Beckingham and Dr. Karen Mcneal, Auburn University.
3. Tailoring Jet Instabilities Using Ultra-sonic Microactuators- Research Initiation Award funded by *National Science Foundation*, P.I. ($240k, 2015-2019). Single P.I.
4. Tailored Instruction and Engineered Delivery Using Protocols (TIED-UP) Funded by *National Science Foundation*, EHR I-USE program. PI ($250k) 2015-2018. Co-PIs –Dr. Vinu Unnikrishnan, University of Alabama; Dr. Eric Hamilton, Pepperdine University; Dr. Firas Akasheh, Tuskegee University.

RESEARCH PUBLICATIONS

1. ***J.T. Solomon***, P. Kreth, R.Lockyer, J. Tailor, "High-Frequency Pulsed Co-axial Injectors for High-Speed Flow Mixing and Control" *AIAA Journal*, 2023 (accepted)
2. ***J.T. Solomon***, N. Hackworth, R.Lockyer, U. Philil, P. Kreth, "Velocity and vorticity fields of a High-Frequency pulsed supersonic co-axial injector" AIAA-4239 Aviation Meeting, San Diego 2023
3. J.E. Jenkins, P.A. Kreth, ***J.T. Solomon***, "Experimental investigation of a high-frequency pulsed co-axial injector using optical diagnostics" AIAA-4240 Aviation Meeting-, San Diego 2023.
4. ***J. T Solomon***, S. Poozesh, H Song, K McNeal, LE Beckingham, K. Lazar, "Building High-Level Environmental Behavior into HBCU Engineering," ASEE-36976, Baltimore, MD, 2023
5. H. Song, K. McNeal, L.E. Beckingham, ***J.T.Solomon***, K.Lazar, "Developing a Broad Measure of Undergraduate Students' Sustainability and Renewable Energy Knowledge and Perspectives", AGU Fall Meeting 2022, Chicago, IL
6. ***J.T. Solomon***, P. Kreth, R.Lockyer, J. Tailor, "High-Frequency Pulsed Co-axial Injectors for High-Speed Flow Mixing and Control" AIAA-3926 Aviation Meeting, Chicago 2022.

7. ***J.T. Solomon***, P. Kreth, R.Lockyer, "Planar Laser-Induced Fluorescence (PLIF) Studies on a High-frequency Pulsed Co-Axial Injector Flowfield" Proceedings of the 9th International and 49th National Conference on Fluid Mechanics and Fluid Power (FMFP) December 14-16, 2022.
8. H Song, K McNeal, LE Beckingham, ***J. T Solomon***, K Lazar, "Developing a Broad Measure of Undergraduate Students' Sustainability and Renewable Energy Knowledge and Perspectives", AGU Fall Meeting 2022, held in Chicago, IL, 2022
9. ***J. T Solomon***, System, and method for active injection into fluid streams: Patent: 11,230,996 Jan 2022.
10. ***J.T. Solomon,*** "Liquid Jet Blasting Using Ultra-High Frequency Supersonic Pulsed Air Jet", *Journal of Flow Control, Measurement & Visualization*, 10, 57-75, 2022
11. ***J.T. Solomon.,*** K. A. Brown, and K. Brooks, "Active Injection Nozzles for High-speed Flow Mixing," AIAA SciTech- 2245, Orlando, Florida 2020.
12. ***J.T. Solomon***., K. Cairnes, C. Nayak., M. Jones, D. Alexander, "Design and Characterization of Nozzle Injection Assemblies Integrated High-frequency Microactuators," *AIAA Journal* Vol. 56, No. 9, pp. 3436-3448, 2018.
13. ***J.T. Solomon.,*** V. Viswanathan, E. Hamilton, C. Nayak, "A PROTOCOL Based Blended Model for Fluid Mechanics Instruction," *Journal of STEM education and research* - Volume 21, Issue 2, June-August,2020.
14. MY Ali, N Arora, M Topolski, FS Alvi, and ***JT Solomon,*** "Properties of Resonance Enhanced Microjets in Supersonic Crossflow," *AIAA Journal*, Vol. 55, No. 3 (2017), pp. 1075-1081. https://doi.org/10.2514/1.J055082
15. ***J.T.Solomon***, Hamilton E., Nayak C. "Repairing Misconceptions and Inadequate Preparation in Upper-Level Undergraduate Engineering: The KACIE Model and Pen-Based Computing. In: Hammond T., Prasad M., Stepanova A. (eds) Inspiring Students with Digital Ink. Human-Computer Interaction Series. Springer, Cham. https://doi.org/10.1007/978-3-030-17398-2_3, 2019.
16. ***J.T. Solomon,*** Foster, C., Alvi F.S., "Design and characterization of High-Bandwidth, Resonance Enhanced, Pulsed Microactuators: A parametric Study," *AIAA Journal,* Volume 51, No. 2, pp 386-396, 2013.
17. A.Uzun,, ***J.T. Solomon, C.H.*** Foster, W.Oates, M.Y. Hussaini, F.S.Alvi, "Flow physics of a pulsed microjet actuator for high-speed flow control," *AIAA Journal* Volume 51, No. 12, pp 2894-2918, 2013.
18. ***J.T. Solomon,*** Kumar R., Alvi F.S., "High Bandwidth Pulsed Microjets for High-Speed Flow Control," *AIAA Journal,* Volume 48, No. 10, 2010, pp 2386-2396.
19. ***J. T. Solomon*** with JPL MOXIE team, "On the Life Cycles of the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) on M2020 Rover". This paper was submitted to JPL (internal use) during the 2019 Summer faculty research in the MOXIE lab.
20. ***J. T Solomon***, with James Lewis, Senior System Engineer "Studies and Modelling of a Carbon Dioxide Acquisition and Compression (CAC) system for Martian Conditions," Submitted to JPL during the 2020 Summer faculty research at JPL (Internal Use)
21. ***J.T. Solomon.,*** E. Hamilton, V. Viswanathan, C. Nayak, F. Akasheh "A PROTOCOL Based Blended Model for Fluid Mechanics Instruction," ASEE-22514, 2018.
22. V. Viswanathan and ***J.T. Solomon.,*** "A Study on the Student Success in a Blended-Model Engineering Classroom," ASEE 21561-2018.

23. F Akasheh, ***J.T Solomon***, E Hamilton, C Nayak, V. Viswanathan, "Application of Brain-based Learning Principles to Engineering Mechanics Education: Implementation and Preliminary Analysis of Connections between Employed Strategies and Improved Student Engagement," ASEE-23200 2018.
24. ***J.T. Solomon***., C. Nayak., K. Cairnes, D. Alexander, M. Jones, "Resonance Enhanced Microactuator Nozzles for high-speed flow mixing," AIAA Aviation Forum, Colorado, 2017-4308.
25. ***J.T. Solomon***, D. Alexander, C. Nayak, J. Howard, L. Lewis, P. Kreth., "Temporal Flow Characteristics of High-Frequency Supersonic Actuators Integrated in REM-Nozzle Assembly," ICTACEM conference IIT Kharagpur, India, 2017.
26. ***J.T. Solomon.,*** C. Nayak, V. Viswanathan, E. Hamilton., "Improving Student Engagement in Engineering Using Brain-Based Learning Principles as Instructional Delivery Protocols" ASEE, 2017-17913.
27. ***J.T. Solomon***., C. Nayak., K. Cairnes, D. Alexander, M. Jones, Higgins., "High-Speed Flow Mixing Using High-frequency Microactuators," AIAA 1885- 2017.
28. ***J.T. Solomon***, V. Unnikrishnan, V. Viswanathan, E. Hamilton, "Course material delivery in engineering using brain-based learning techniques Frontiers in Education Conference (FIE), 2016 IEEE, 2016.
29. C. R. Nayak, V. Viswanathan***, J.T. Solomon*** "The first step towards a pre-requisite knowledge tracking architecture for engineering programs"- Frontiers in Education Conference (FIE), 2016 IEEE, 2016
30. V. Viswanathan, ***J.T Solomon***., "Improving Student Engagement in Engineering Classrooms: The First Step toward a Course Delivery Framework using Brain-based Learning Techniques, ASEE- 2016-16685.
31. Topolski, N., Arora, N., Ali, M.Y., ***Solomon, J.T***., Alvi, F.S., "Study on Resonance Enhanced Microactuators in Supersonic Crossflow," AIAA-2813, 2012.
32. F. Alvi, R. Kumar, ***J.T. Solomon***, High Bandwidth & Control Authority Micro-Actuators for Active Flow & Noise Control 8,286, 895 -October 2012.
33. Garret, S., ***J.T. Solomon,*** *Gustavsson*, G., Alvi, F.S., "Implementing Resonance Enhanced Microactuators for the control supersonic microjets," AIAA-0065, 2012.
34. Uzun, A., Foster, C.H., ***J.T. Solomon,*** Oates, W.S., Hussaini, M.Y., Alvi, F.S., "Simulations of Pulsed Microactuators of High–Speed Flow Control," AIAA-2938, 2011.
35. Kreth, P., ***J.T. Solomon,*** Alvi, F.S., "Resonance-Enhanced High-Frequency Micro-actuators with Active Structures," AIAA-2939, 2011.
36. Foster, C., ***J.T. Solomon,*** Alvi, F.S., "Visual Study of Resonance dominated Microjet flows using laser-based micro- Schlieren," AIAA-2011-766, 2011.
37. ***J.T. Solomon,*** Ph.D. dissertation, Florida State University, 2010.
38. Ali, M.Y., ***J.T. Solomon,*** Gustavsson, J., Alvi, F.S., "Control of Supersonic Cavity Flows Using High Bandwidth Microactuators," AIAA-197194-564, 2010.
39. ***J.T. Solomon,*** Alvi, F.S., Kumar, R., Gustavsson, J., "Principles of a High Bandwidth Microactuators Producing Supersonic Pulsed Microjets," AIAA-197237-476, 2010.
40. ***Solomon, J.T.,*** Wiley, A., Kumar, R., Alvi, F.S., "Active and Adaptive Control of Supersonic flow using High Bandwidth Pulsed Micro-actuators," FCAAP meeting Aug 13-14, 2009.

41. ***Solomon, J.T.,*** Wiley, A., Kumar, R., Alvi, F.S., "Development and Implementation of High-Frequency Pulsed Microactuators for Active Control of Supersonic Impinging Jet," SAROD meeting, National Aerospace Lab, India, 2009.
42. ***Solomon, J.T***., Hong, S., Wiley, A., Kumar, R., Annaswamy, A.M., Alvi, F.S., "Control of Supersonic Resonant flow Using High bandwidth Micro- Actuators," AIAA -3247, 2009.
43. ***Solomon, J.T***., Kumar, R., Alvi, F.S., "Development and characterization of High bandwidth Microactuators," ASME FEDSM 55032, 2008.
44. ***Solomon, J.T***., Kumar. R, Alvi, F.S., "High bandwidth pulsed microactuators for active flow control', AIAA-3042, 2008.
45. Hogue, J., ***Solomon, J.T***., Oates, W., Alvi, F.S., "Broadband Pulsed Flow Using Piezoelectric Microjets., Proc. SPIE 7643, 76431V (2010); doi:10.1117/12.847560
46. Liu, F., Hogue, J., Oates, W., ***Solomon, J.T***., Alvi, F.S., "Piezoelectric controlled Pulsed microjet actuation" ASME SMASIS1448, California 2009.
47. ***Solomon, J.T***., Sobhan, C.B., "Experimental Investigations on Fluid Flow and Heat Transfer through Rectangular Minichannels," ASME Fluid Engineering Summer Conference, Huston, TX, 2005.
48. Sobhan, C.B., ***Solomon, J.T***., "Flow transitions and Convective Heat Transfer in Single-Phase flow Through Mini channels," 6th ASME-JSME Thermal Engineering Joint Conference, Hawaii, 2003.

Google Scholar citation: https://scholar.google.com/citations?user=91W5HpIAAAAJ&hl=en
Citation: 258 h-index -8 i10-index- 8

HONORS & AWARDS

- Faculty Achievement Award, Tuskegee University 2023
- NASA-JPL Summer faculty fellowship at California Institute of Technology, 2019, 2020.
- Excellence in Research grant winner ($570k, NSF)
- Outstanding faculty performance award for Teaching, 2017, 2020, Tuskegee University
- Research Initiation Award, 240k, 2015, National Science Foundation
- Graduate Research and creativity award nomination by FAMU-FSU College of Engineering, 2010
- Outstanding graduate seminar award of Mechanical Engineering Department, FSU spring-2008

PROFESSIONAL ACTIVITIES

Professional Society Memberships:

- American Institute of Aeronautics and Astronautics (AIAA) Senior Member
- American Society of Engineering Education (ASEE) Member
- Sigma Xi member

Service

- Member of retention task force, Tuskegee University 2023
- Member T.U. faculty senate (2017-2020)

- Executive Member in Tuskegee University faculty Center for Teaching and Learning. (2013-2014)
- Tuskegee University Faculty Advisor for student registration and advising (2012-2017)
- ABET committee member of Mechanical Department for Cumulative Data Collection and Analysis (2015-2018)
- Reviewer of articles from
    a. AIAA journal
    b. Experiments in Fluids
    c. International Journal for Aerospace Engineering
    d. Journal of micro machines
    e. Journal of Shockwaves
- Served as Judge of AIAA (American Institute of Aeronautics and Astronautics) Huntsville division annual section awards

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INVITED LECTURES and CONTINUING EDUCATION

- Invited seminar, University of Washington, St. Loius, MS, 2021
- AAAS and NSF IUSE Symposium, DC, 2016, 2022
- NSF panelist 2018, 2022, 2023
- Invited Seminar, Auburn University, AL, 2017
- Summer faculty research, JPL, Caltech, 2018, 2020
- Participatory applied research on enhancing learning, a spectrum of small change to transformation" professional intensive workshop I, Conducted by Tuskegee University faculty Center for Teaching and Learning, January 22-23, 2014
- "Faculty collaborative presentations" April 3, 2014. Professional development intensive workshop" Conducted by Tuskegee University faculty Center for Teaching and Learning, April 3, 2014.
- "The science of learning: Utility in Learning, an extended professional development workshop." Conducted by Tuskegee University faculty Center for Teaching and Learning, April 4, 2014
- Train the trainer workshop for critical thinking assessment (CAT) Two-day workshop conducted by the Center for assessment and improvement of learning, by Tennessee Tech University. The workshop was in San Antonio, Texas, November 16-17, 2015,
- "Strategies that promote active learning," Oct 31-Nov 1, 2013. Professional development in
- Intensive workshop, Tuskegee University. Conducted by Tuskegee University faculty Center for Teaching and Learning, 2013
- "Embracing change as University Faculty: What is a Professor Do" Professional development intensive workshop, Tuskegee University. Conducted by Tuskegee University faculty Center for Teaching and Learning, March 24-25, 2014,
- "Participatory applied research on enhancing learning, a spectrum of small change to transformation" professional intensive workshop I, Conducted by Tuskegee University faculty Center for Teaching and Learning, January 22-23, 2014

- "Faculty collaborative presentations" April 3, 2014. Professional development intensive workshop" Conducted by Tuskegee University faculty Center for Teaching and Learning, April 3, 2014.
- Preparing future faculty workshop, organized by Florida State University, 2009
- Major Research Instrumentation award proposal preparation workshop, BWI Airport Hotel. Conducted by QEM network funded by NSF, Nov2-3, 2012
- Short-term course on "Instructional Design and Delivery" conducted by Technical Teachers' Training Institute Chennai, Government of India, MHRD, 2004
- ISTE workshop on "Teacher effectiveness" conducted by National Institute of Technology Calicut. 2004
- "The science of learning: Utility in Learning, an extended professional development workshop." Conducted by Tuskegee University faculty Center for Teaching and Learning, April 4, 2014

SYNERGETIC ACTIVITIES AT TUSKEGEE UNIVERSITY

1. High-speed microscale flow diagnostic lab establishment at Tuskegee University (2016-2022)

Dr. Solomon has established an experimental flow diagnostic laboratory (fig.1) for graduate and undergraduate research at Tuskegee University. The lab can phase-locked PIV and PLIF measurements of high-speed supersonic flow at the microscale. The lab is equipped with Quantel Laser (Nd YAG, 266 and 532 nm), Powerview 29MP-LS CCD camera (2 No.), and high-speed camera (Photron Mini UX100, 4000 frames (1280x1024) up to 200,000 fps at a lower spatial resolution. The lab also has a micro-Schlieren flow visualization system and state-of-the-art data acquisition systems from National Instruments, LabVIEW, and workstations. **30+ minority students were trained in research in this laboratory from 2015-2023.**

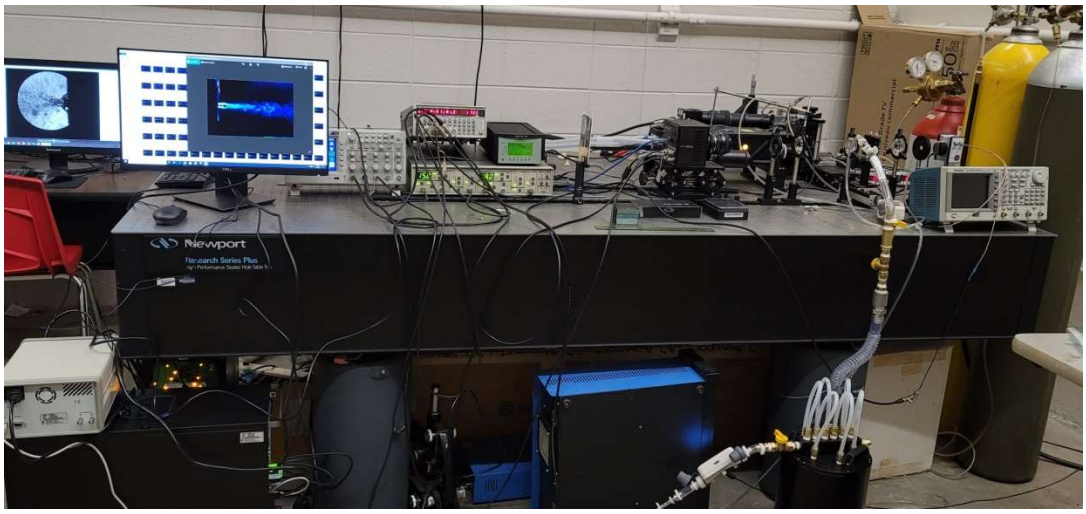


Fig. 1 High-speed microscale flow diagnostic lab established with support from NSF

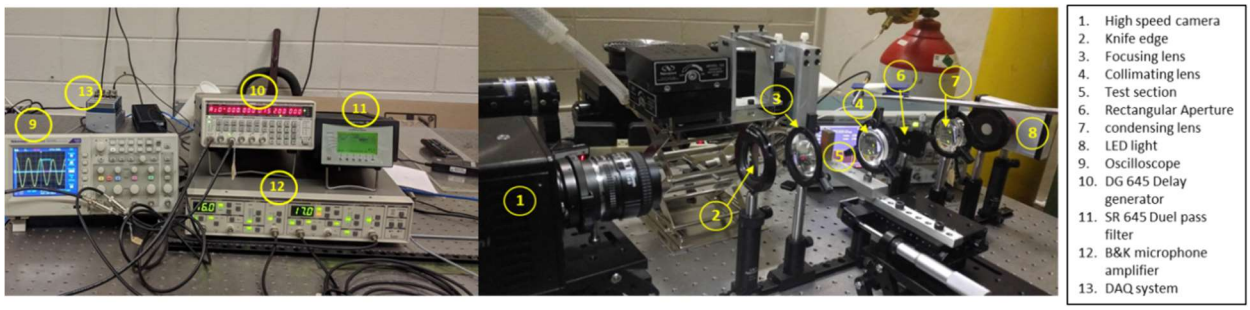
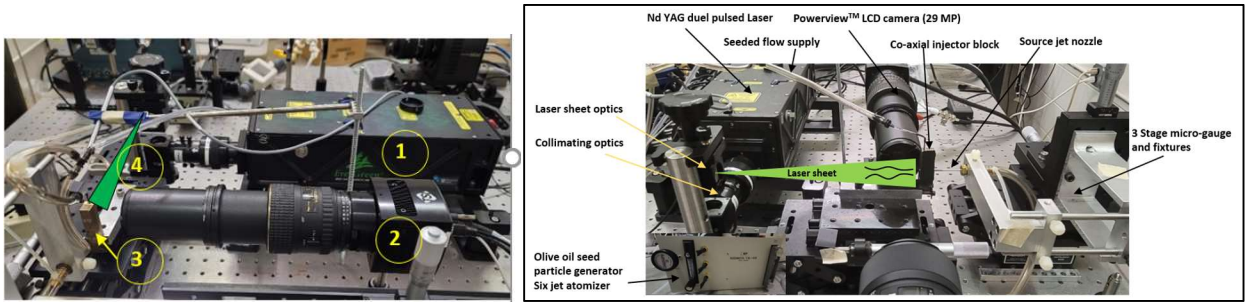


Fig. 3 Microschlieren imaging and DAQ setup developed for phased locked flowfield visualization



a) PLIF setup **b) PIV setup**

Fig. 4 a) PLIF b) PIV set up for high-speed microscale supersonic flow diagnostics (developed with NSF support)

2. A new teaching methodology developed with support from NSF

A protocol-based, media-rich teaching methodology developed by Dr. Solomon is successfully implemented at Tuskegee University. The brain-based teaching-learning model TIED UP (tailored instructions and engineered delivery) has improved student engagement and helped systematic and successful learning in engineering classrooms. Engineering concepts are presented using short animated video lectures and other teaching-learning tools developed using PROTOCOLs. More details and highlights of TIED UP and
TIED UP concept movies developed are available @[http://bit.ly/tuskegee-tiedup.](http://bit.ly/tuskegee-tiedup)

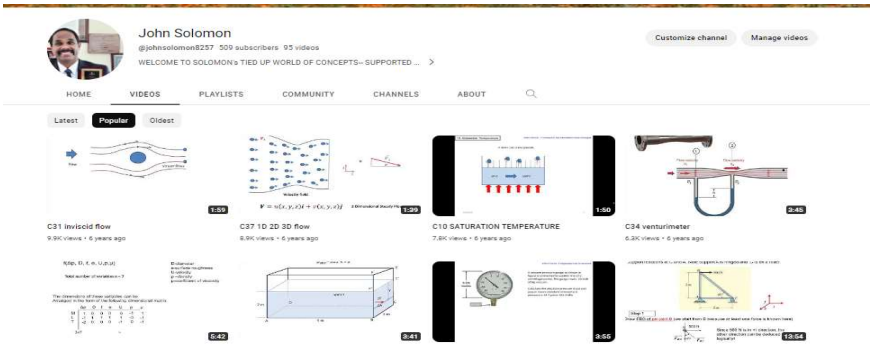


Fig. 2 Over 100 videos (2-6 minutes duration) developed and used in the TIED-UP model.