

## CONTACT INFORMATION

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Harbor Branch Oceanographic Institute • Florida Atlantic  
University 231 Lab II, 5600 US 1 North • Fort Pierce, Florida 34946  
• USA [anayak@fau.edu](mailto:anayak@fau.edu) • 1-772-242-2427 (Office)  
ORCID: <http://orcid.org/0000-0002-2936-5607>

## RESEARCH INTERESTS

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Oceanic optical instrumentation; Experimental fluid dynamics; Small-scale turbulence; Coastal/Estuarine processes; Biophysical interactions; Particle dynamics; Oceanic field measurements.

## APPOINTMENTS

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**Assistant Professor**, Department of Ocean and Mechanical Engineering/Harbor Branch Oceanographic Institute at Florida Atlantic University  
**Aug 2018 - present**

**Postdoctoral Research Associate**, Harbor Branch Oceanographic Institute at Florida Atlantic University  
**Jun 2015 – Aug 2018**

## EDUCATION

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**Ph.D. Mechanical Engineering**, Johns Hopkins University, Baltimore, MD, USA **2015**  
*Thesis:* Flow and turbulence over a rippled seabed and biophysical interactions in the inner part of the coastal bottom boundary layer. *Advisor:* Dr. Joseph Katz  
**M.S.E. Mechanical Engineering**, Johns Hopkins University, Baltimore, MD, USA **2010**  
**B.Tech. Mechanical Engineering**, National Institute of Technology Karnataka, Surathkal, India **2007**

**AWARDS:** Association for the Sciences of Limnology & Oceanography (ASLO) Early Career Travel Grant to attend the Aquatic Sciences Meeting in Honolulu, Hawaii. **2017**  
• Johns Hopkins University Mechanical Engineering Department Fellowship for the year **2007-2008**.  
• National Talent Search Examination scholarship in **2001** for Karnataka state, awarded by the National Council of Educational Research and Training, India.

## SCIENTIFIC GRANT AWARDS

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- **Co-Principal Investigator, National Science Foundation Award #1634053** (Ocean Technology and Interdisciplinary Coordination Program)  
**Award date:** Sep 15, 2016 – Aug 31, 2019  
**Title:** Autonomous holographic imaging system for long term *in situ* studies of marine particle dynamics.  
**Award Amount:** \$894,762  
[https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1634053](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1634053)
- **Co-Principal Investigator, National Science Foundation Award #1657322** (Biological Oceanography)  
**Award date:** Apr 1, 2017 – Mar 31, 2020  
**Title:** Orientation of elongate diatoms as a strategy for light harvesting.  
**Award Amount:** \$289,134  
[https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1657322](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1657322)

## JOURNAL PUBLICATIONS

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- **A.R. Nayak**, M. McFarland, J. Sullivan and M. Twardowski, "Evidence of ubiquitous preferential particle orientation in representative oceanic shear flows", 2018. *Limnology & Oceanography*, 63(1), 122-143.
- T.S. Moore, C.B. Mouw, J. Sullivan, M. Twardowski, A. Burtner, A. Ciochetto, M. McFarland, **A.R. Nayak**, D. Paladino, N. Stockley, T. Johengen, A. Yu, S. Ruberg and A. Weidemann, "Bio-optical properties of cyanobacteria blooms in western Lake Erie", 2017. *Frontiers in Marine Science*, 4, 300.

- **A.R. Nayak**, C. Li, B.Kiani, and J. Katz, “On the wave and current interaction with a rippled seabed in the coastal ocean bottom boundary layer”, 2015. *Journal of Geophysical Research: Oceans*, 120, 4595-4624.
- S. Talapatra, J. Hong, M. McFarland, **A.R. Nayak**, C. Zhang, J. Katz, J. Sullivan, M. Twardowski, J. Rines, P. Donaghay, “Characterization of biophysical interactions in the water column using *in situ* digital holography”, 2013. *Marine Ecology Progress Series*, 473, 29-51.
- E.E. Hackett, L. Luznik, **A. R. Nayak**, J. Katz, and T. R. Osborn, “Field measurements of turbulence at an unstable interface between current and wave bottom boundary layers “, 2011. *Journal of Geophysical Research: Oceans*, 116, C02022.

#### JOURNAL PUBLICATIONS (UNDER REVIEW/IN PREPARATION)

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- T.S. Moore, J. Churnside, J. Sullivan, M. Twardowski, **A.R. Nayak**, M. McFarland, N. Stockley, R. Gould, T. Johengen and S. Ruberg, “Vertical distributions of blooming cyanobacteria populations in a freshwater lake from LIDAR observations”. *Submitted to Remote Sensing of Environment*.
- **A.R. Nayak**, M. McFarland, J. Sullivan and M. Twardowski, “Characterizing particles and plankton in diverse aquatic environments using an *in situ* submersible holographic imaging system”, *In preparation*.
- M. McFarland, **A.R. Nayak**, J. Sullivan and M. Twardowski, “Effects of orientation on light absorption and scattering in colonial phytoplankton”, *In preparation*.

#### CONFERENCE PROCEEDINGS

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- **A.R. Nayak**, M. McFarland, M. Twardowski and J. Sullivan, “On plankton distributions and biophysical interactions in diverse aquatic environments”, April 17-18, 2018. *SPIE Ocean Sensing & Monitoring X*, Apr 16-17, 2018. Orlando, Florida, USA.
- **A.R. Nayak**, C. Li, B. Kiani and J. Katz, “Wave-current and bottom topographical interactions in the coastal ocean bottom boundary layer”, *10<sup>th</sup> International Symposium on Particle Image Velocimetry*, July 1-3, 2013. Delft, Netherlands.
- S. Talapatra, J. Sullivan, J. Katz, M. Twardowski, H. Czerski, P. Donaghay, J. Hong, J. Rines, M. McFarland, **A.R. Nayak** and C. Zhang. “Application of *in-situ* digital holography in the study of particle, organisms and bubbles within their natural environment”, 2012. *SPIE Ocean Sensing & Monitoring IV*, 8372, 837205.

#### INVITED TALKS

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- *Applied Ocean Physics & Engineering Department*, Woods Hole Oceanographic Institution, USA, **Apr 2018**.
- *Department of Ocean & Mechanical Engineering*, Florida Atlantic University, Boca Raton, Florida, USA, **Mar 2018**.
- *College of Marine Science*, University of South Florida, St. Petersburg, Florida, USA, **Mar 2018**.
- *Engineering Mechanics Unit*, Jawaharlal Nehru Center for Advanced Scientific Research, Bengaluru, India, **Jul 2017**.
- *Department of Mechanical Engineering*, Indian Institute of Technology Bombay, Mumbai, India, **Jul 2017**.
- *Department of Ocean Engineering*, Indian Institute of Technology Madras, Chennai, India, **Jul 2017**.
- *Department of Applied Mechanics & Hydraulics*, NITK Surathkal, India, **Dec 2016**.
- National Center for Antarctic and Oceanographic Research, Vasco, India, **Nov 2016**.
- National Institute of Oceanography, Dona Paula, India, **Nov 2016**.

#### CONFERENCE PRESENTATIONS

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- **A.R. Nayak**, M.McFarland, J. Sullivan, M.Twardowski. “Interesting features in particle fields and size distributions in particle fields from coastal oceans, lakes and fjords”, Feb 11-16, 2018. *19<sup>th</sup> Ocean Sciences Meeting*, Portland, Oregon, USA
- M.McFarland, **A.R. Nayak**, J. Sullivan, M.Twardowski. “Horizontal orientation enhances light absorption by colonial phytoplankton”, Feb 11-16, 2018. *19<sup>th</sup> Ocean Sciences Meeting*, Portland, Oregon, USA
- **A.R. Nayak**, M.McFarland, N. Stockley, M. Twardowski, J. Sullivan, “*In situ* particle characterization and evidence of ubiquitous particle orientation in the ocean using a submersible holographic imaging system”, Apr 9-13, 2017. *SPIE Defense and Security Sensing Conference*, Anaheim, California, USA.
- **A.R. Nayak**, M.McFarland, J. Sullivan, M.Twardowski. “A study of colonial diatom chain distributions and biophysical interactions in the water column of a fjord using a submersible holographic imaging system”, Feb 26 – Mar 3, 2017. *ASLO Aquatic Sciences Meeting*, Honolulu, Hawaii, USA.

- J.Sullivan, M.Twardowski, **A.R.Nayak**, M.McFarland, N.D. Stockley, "Characterizing natural, undisturbed particle size and 3-D spatial distributions using in situ holographic microscopy", Oct 23 – 28, 2016. *Ocean Optics XXIII Conference*, Victoria, Canada.
- **A.R. Nayak**, M. Twardowski, J. Sullivan, M.McFarland, N.D. Stockley, S. Nardelli, "A field study of particle orientation in shear flows", Feb 21-26, 2016. *18th Ocean Sciences Meeting*, New Orleans, Louisiana, USA.
- M. McFarland, J. Sullivan, M. Twardowski, **A.R. Nayak**, "Effect of orientation on light absorption by colonial diatoms", Feb 21-26, 2016. *18th Ocean Sciences Meeting*, New Orleans, Louisiana, USA.
- **A.R. Nayak**, C.Li, B.Kiani, J.Katz, "Wave-Current Interaction over a Rippled Seabed in the Coastal Ocean Bottom Boundary Layer", Jun 15-20, 2014. *17th U.S. National Congress on Theoretical and Applied Mechanics*, Lansing, Michigan, USA
- **A.R. Nayak**, C. Li, B. Kiani, J. Katz, "Reynolds and wave stresses in the coastal ocean bottom boundary layer", Feb 23-28, 2014. *17th Ocean Sciences Meeting*, Honolulu, Hawaii, USA
- J. Katz, **A.R. Nayak**, C. Li, B. Kiani, "Effect of a thin layer of benthic biology on turbulence and flow structure in the inner part of the continental shelf bottom boundary layer", Feb 23-28, 2014. *17th Ocean Sciences Meeting*, Honolulu, Hawaii, USA
- **A.R. Nayak**, C. Li, B. Kiani, J. Katz, "Turbulence statistics in the inner part of the coastal bottom boundary layer", Nov 24-26, 2013. *67th Annual Meeting, APS Division of Fluid Dynamics*, Pittsburgh, Pennsylvania, USA.
- **A.R. Nayak**, S. Talapatra, J. Katz, "Handling and interpreting massive databases – PIV and holography to characterize flow and particle distribution", Jan 7-10, 2013. *51st AIAA Aerospace Sciences meeting*, Grapevine, Texas, USA
- J. Katz, **A.R. Nayak**, S. Talapatra, J. Hong, "Applications of PIV and holography to characterize flow and particle distributions in the ocean", Dec 3-7, 2012. *45th AGU Fall Meeting*, San Francisco, California, USA
- **A.R. Nayak**, C. Li, D. Choi, J. Katz, "Wave, current and bottom topographical interactions in the coastal ocean bottom boundary layer", Nov 21-23, 2012. *66th Annual Meeting, APS Division of Fluid Dynamics*, San Diego, California, USA
- **A.R. Nayak**, C. Li, D. Choi, J. Katz, "Wave-current interaction and bottom topographical influences on turbulence in the coastal ocean bottom boundary layer", Feb 20-24, 2012. *16th Ocean Sciences Meeting*, Salt Lake City, Utah, USA.
- **A. R. Nayak**, Hackett, E. E., L. Luznik, J. Katz, and T. R. Osborn, "Turbulence Statistics in the Coastal Ocean Bottom Boundary Layer", *43rd AGU Fall Meeting*, Dec 13-17, 2010. San Francisco, California, USA.
- S. Talapatra, **A.R. Nayak**, C. Zhang, J. Hong, J. Katz, M. Twardowski, J. Sullivan and P. Donaghay, "Characterization of Organisms, Particles, and Bubbles in the Water Column using a Free-drifting, Submersible, Digital Holographic System", Sep 25 – Oct 1, 2010. *Ocean Optics XX Conference*, Anchorage, Alaska, USA.
- **A. R. Nayak**, E.E. Hackett, L. Luznik, J. Katz, and T. R. Osborn, "Flow Structures and Scaling Issues associated with Wave-Current Interaction in the Bottom Boundary Layer of the Coastal Ocean", Feb 20-24, 2010. *16th Ocean Sciences Meeting*, Portland, Oregon, USA.
- Hackett, E. E., L. Luznik, **A. R. Nayak**, J. Katz, and T. R. Osborn, "Near-bed turbulence in the bottom boundary layer of the coastal ocean", Apr 19-24, 2009. *EGU General Assembly*, Vienna, Austria.

## WORKSHOPS

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| • NOAA Ocean Exploration Research Workshop, University of Hawaii, Honolulu, USA       | <b>Mar 2017</b> |
| • Tomographic PIV and Applications Workshop, Johns Hopkins University, Baltimore, USA | <b>Nov 2013</b> |

## SERVICE

- **Peer Reviewer**  
National Science Foundation OTIC Program (Federal grant proposal reviews, 2018)  
IEEE Transactions on Geoscience and Remote Sensing (2017)  
Remote Sensing Applications: Society and Environment (2017)  
Continental Shelf Research (2016)  
SPIE Journal of Applied Remote Sensing (2016)
- **Session Chair, 2019 ASLO Aquatic Sciences Meeting**  
Special Session SS27, titled "Small scale spatial and temporal patterns in particles, plankton and other organisms" to be held at the biennial ASLO Aquatic Sciences Meeting in San Juan, Puerto Rico between Feb 23 – March 2, 2019.  
<https://aslo.org/sanjuan2019/sessions>

## PROFESSIONAL EXPERIENCE

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- **Chief Scientist:** Led a 7 member team on two oceanographic cruises to study bottom boundary layer turbulence in the coastal Atlantic Ocean.
- **Oceanographic Cruise Participant (6 total):** Studying coastal bottom boundary layer turbulence using a submersible PIV system in the Atlantic Ocean (2008, 2011 and 2012); Characterizing biophysical interactions and particle dynamics using *in situ* holography in the Pacific Northwest region and Gulf of Mexico (2010, 2015, and 2017).
- **Mentor:** Mentored several students as part of the AGU/ASLO Graduate Mentoring program (2016/2017) as well as the ASLO Multicultural Program (2017/2018), promoting under-represented groups in the aquatic sciences.
- **Teaching Assistant:** Two undergraduate courses, Introduction to Thermodynamics (Fall 2008) and Heat Transfer (Spring 2009). Nominated as one of four candidates for the university wide George M.L. Sommerman award recognizing outstanding performance by a Graduate Teaching Assistant.

## RESEARCH/CONFERENCE MENTORING

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- **PhD student(s):** Ranjoy Barua (2018 – present)
- **Undergraduate Research Mentees:** Daniel Choi (2010-2011, JHU); Danny Fischer (2010-2011, JHU); Jeffrey Yu (2010-2012, JHU); Bobak Kiani (2011-2015, JHU); Brandon Lee (2011-2012, JHU).
- **Graduate Research Mentees:** Daniel Choi (2012, JHU); Erich Kreyling (2010-2011, JHU).
- **AGU/ASLO Meeting Mentees:** Katie Samuelson (2016); Bertrand Delorme (2017-2018); Jessica Czarnecki (2017).
- **ASLOMP Mentees :** Carlos Gomez (2017); Cassidy Gonzalez-Morabito (2018); Danya AbdelHameid (2018); Luis Pomales (2018); Christian Rojas (2018); Jamin Rader (2018).

## PROFESSIONAL AFFILIATIONS

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- Member, American Association for the Advancement of Science, **2015 – present.**
- Member, American Geophysical Union, **2009 - present.**
- Member, Association for the Sciences of Limnology and Oceanography, **2016 – present.**
- Member, American Physical Society, **2012 - 2014.**
- Member, SPIE, **2017 – present.**