Luz D. Sotelo

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PROFESSIONAL EXPERIENCE

School of Mechanical Engineering, Purdue University January 2023 – Present
Assistant Professor

EDUCATION

Ph.D. in Mechanical Engineering and Applied Mechanics 2021
University of Nebraska-Lincoln | Lincoln, Nebraska
Dissertation: Ultrasonic Nondestructive Characterization and Monitoring in Metal and Hybrid Additive Manufacturing. Advisor: Joseph A. Turner
Areas of Interest: Ultrasound Nondestructive Evaluation, Convergent and Hybrid Manufacturing, Advanced Acoustic Materials and Metamaterials, Mechanotransduction, Optimization.

B.S. in Mechanical Engineering, *Summa Cum Laude* 2016
University of Texas Rio Grande Valley | Edinburg, TX
Senior Design: "A Filament Extruder for 3D Printing Applications" (youtu.be/YF3BGwXnyek)

GRANTS AND FELLOWSHIPS

Grants

National Academy of Sciences Engineering and Medicine, Research Assistantship Program, "Acoustic Metamaterials Using Hybrid Additive Manufacturing", $180,000 (2021). *Primary investigator*.

University of Nebraska-Lincoln Graduate Student Assembly, Special Projects Grant Program, "College of Engineering Graduate Student Symposium", $1000 (2020). *Primary applicant.*

National Science Foundation, Graduate Research Internship Program, "In Situ and Ex Situ Ultrasonic Non Destructive Evaluation of Metal Additive Manufacturing Parts for Acoustic Metamaterials", $5000 (2020). *Primary applicant.*

NASA Nebraska EPSCoR, NASA Nebraska Space Grant, "In Situ Ultrasonic Monitoring of Metal Additive Manufacturing Processes", $5000 (2019-2020). *Technical writer.*

Fellowships

National Academy of Sciences Engineering and Medicine Research Assistantship Program 2021
National Science Foundation Graduate Research Fellowship 2018
University of Nebraska-Lincoln Chancellor's Fellowship 2016
Nebraska Engineering Recruitment Fellowship 2016
Nebraska Mechanical and Materials Engineering Fellowship 2016

AWARDS AND HONORS

Diversity, Equity, and Inclusion Leadership

Society of Hispanic Professional Engineers, STAR Award – National Graduate Student Role Model 2020
University of Nebraska-Lincoln College of Engineering Graduate Complete Engineer Award 2020
Great Minds in STEM Outstanding Graduate Student Leadership Award 2019
University of Nebraska-Lincoln Student Luminary Award, Honorable Mention 2019

Research and Creative Activities

Purdue University, LATinE Fellow and Poster Competition Winner 2020
Ford Foundation Fellowship, Honorable Mention 2018
NDSEG Fellowship, Program Finalist 2018
University of Nebraska-Lincoln Spring Research Fair, Top 5 Poster Award 2018

Professional Development

Society of Hispanic Professional Engineers Faculty Development Symposium Travel Award 2019
NextProf Nexus Workshop Travel Award 2019
University of Colorado Boulder, ACTIVE Faculty Development Workshop Travel Award 2018

Great Minds in STEM, LEVERAGE Early Career Faculty Symposium Travel Award 2018

Academic

Great Minds in STEM Union Pacific Scholarship 2019
Mechanical Engineering Undergraduate Student of the Year 2016
Lloyd M. Bentsen Jr. Engineering Excellence Scholarship 2014
Tau Beta Pi Engineering Honor Society, Chapter Texas Nu 2014
Hispanic Scholarship Fund ExxonMobil Scholarship 2014
American Society of Materials Herman C. Burghard Memorial Scholarship 2013
National Hispanic Professional Organization RGV Endowment Scholarship 2013

PUBLICATIONS

Peer-Reviewed Journal Articles

1. L.D. Sotelo, R. Karunakaran, C.S. Pratt, M.P. Sealy, J.A. Turner, "Ultrasonic Nondestructive Certification of Hybrid Additively Manufactured Ti6Al4V" (In Review)
2. Z. Smoqi, L.D. Sotelo, A. Gaikwad, J.A. Turner, P. Rao, "Ultrasonic Nondestructive Evaluation of Additively Manufactured Wear Coatings", *NDT & E International*, vol. 133, p. 102754, January 2023.
3. L.D. Sotelo, A.O. Vignola, C.A. Brown, K. Sampath, M.D. Guild, "Ultrasonic Nondestructive Evaluation of Additively Manufactured Photopolymers", *Research in Nondestructive Evaluation*, vol. 33, no. 4-5, p. 175-195, September 2022.
4. R. Karunakaran, L.D. Sotelo, H. Maharaja, S. Mishra, K.P. Karunakaran, J.A. Turner, M.P. Sealy, "Improved Ductility of Ti6Al4V due to Interlayer Milling during Directed Energy Deposition (Accepted)
5. D.R. Schipf, G.H. Yesner, L.D. Sotelo, C.A. Brown, M.D. Guild, "Barium Titanate 3-3 Piezoelectric Composites Fabricated using Binder Jet Printing, *Additive Manufacturing*, vol. 55, p. 102804, July 2022.
6. L.D. Sotelo, R. Karunakaran, C.S. Pratt, M.P. Sealy, J.A. Turner, "Ultrasound In Situ Characterization of Hybrid Additively Manufactured Ti6Al4V", *The Journal of the Acoustical Society of America*, vol. 150, 6, p. 4452-4463.
7. L.D. Sotelo, H. Hadidi, C.S. Pratt, M.P. Sealy, J.A. Turner, "Ultrasonic Mapping of Hybrid Additively Manufactured 420 Stainless Steel", *Ultrasonics*, vol. 110, p. 106269, February 2021.
8. M.P. Sealy, H. Hadidi, L.D. Sotelo, W. Li, J.A. Turner, J.A. McGheough, "Compressive behavior of 420 stainless steel after asynchronous laser processing", *CIRP Annals Manufacturing Technology*, vol. 69, 1, p. 169-172, January 2020.

Peer-Reviewed Conference Proceedings

9. L.D. Sotelo, A.J. Fuller, C.S. Pratt, G. Maddiredy, R. Karunakaran, M.P. Sealy, T.M. Liebe, and J.A. Turner, "Fatigue Performance of Bearing Rollers Manufactured by Laser Powder Bed Fusion", (Accepted, 1st ASTM Symposium on Bearing and Transmission Steels Technology)
10. S. Islam, S. Deshpande, L.D. Sotelo, M. Norouzian, M.T. Lumpkin, L.F. Ammerlaan, A.J. Fuller, J.A. Turner, "Quantitative Ultrasonic Characterization of Subsurface Inclusions in Tapered Roller Bearings", *ASTM 12th International Symposium on Rolling Bearing Steels: Progress in Bearing Steel Metallurgical Testing and Quality Assurance*, May 15-17, 2019.
11. C. Tarawneh, L. Sotelo, A. Villarreal, N. de los Santos, R. Lechtenberg, R. Jones, "Temperature Profiles of Railroad Tapered Roller Bearings with Defective Inner and Outer Rings", *ASME Joint Rail Conference*, April 12-15 2016.

Non-refereed Works

12. L.D. Sotelo. "MECH 996-007 – Ultrasound in Additive Manufacturing, Laboratory Manual". Department of Mechanical and Materials Engineering, College of Engineering, University of Nebraska-Lincoln.

PRESENTATIONS

**Denotes speaker*

Invited Talks

13. L.D. Sotelo, M. McClain, M.P. Sealy, A. Malshe, Panel: Manufacutring Research Challenges and Opportunities for Younger Engineers, 2022 North America Manufacturing Research Conference, Purdue University, West Lafayette, IN.
14. L.D. Sotelo*, Nondestructive Evaluation for Hybrid Additive Manufacturing, Manufacturing Leadership Seminar (Online), May 2022.

15. L.D. Sotelo*, J.A. Turner, "Ultrasonic Nondestructive Evaluation in Metal Additive Manufacturing", 2021 College of Engineering Graduate Student Symposium, University of Nebraska-Lincoln, Lincoln, NE.
16. L.D. Sotelo*, "The Ripple Effect", Talent Acquisition Team National Meeting, *Union Pacific*, Omaha, NE.
17. J.A. Turner*, L.D. Sotelo, C.S. Pratt, R. Karunakaran, C.J. Kanger, M.P. Sealy, "Integrated In Situ and Ex Situ Ultrasonic Characterization of Ti6Al4V parts made with DED AM with Hybrid Capabilities", *178th Meeting of the Acoustical Society of America*, Invited Session, Coronado, CA.
18. L.D. Sotelo*, J.A. Turner, "Ultrasonic Scattering for Materials Characterization: Optimization and Applications in Metal Additive Manufacturing", Invited Seminar, *Doane University*, Crete, NE.
19. L.D. Sotelo*, M.P. Sealy, J.A. Turner, R. Karunakaran, C.J. Kanger, "Enhanced Ultrasonic Characterization of Metal Additively Manufactured Parts using Hybrid Capabilities", Invited Seminar, *University of Texas Rio Grande Valley*, Edinburg, TX.

Conference Oral Presentations

20. J.A. Turner*, L.D. Sotelo, N.J. Matz, "Ultrasonic Testing for Metal Additive Manufacturing: Experience with New NDE Course Development", 30th ASNT Research Symposium, St. Louis, MO.
21. J. Ley, L.D. Sotelo, C.S. Pratt, N.J. Matz*, J.A. Turner, "Ultrasonic Characterization for Hybrid Additive Manufacturing of 316L Stainless Steel with Interlayer Milling", 30th ASNT Research Symposium, St. Louis, MO.
22. L.D. Sotelo*, J. Ley, C.S. Pratt, K.L. Avegnon, M.P. Sealy, J.A. Turner, "Effect of Architecture and Process on the Ultrasonic Mapping of Hybrid Additively Manufactured Materials:, 181th Meeting of the Acoustical Society of America, Seattle, WA.
23. L.D. Sotelo*, C.S. Pratt, H. Hadidi, M.P. Sealy, J.A. Turner, "Ultrasonic Non Destructive Characterization of Hybrid Additively Manufactured 420 Stainless Steel made with Directed Energy Deposition", *178th Meeting of the Acoustical Society of America*, Coronado, CA.
24. L.D. Sotelo*, H. Hadidi, C.S. Pratt, M.P. Sealy, J.A. Turner, "Ultrasonic Non Destructive Characterization of Hybrid Additively Manufactured 420 Stainless Steel made with Directed Energy Deposition", *46th Annual Review of Progress in Quantitative Nondestructive Evaluation*, Portland, OR.
25. L.D. Sotelo*, C.S. Pratt, J. Wicks, K. Reddy, P. Rao, J.A. Turner, "Effects of Manufacturing Process on the Microstructure of Ti6Al4V and Implications for Grain Sizing based on Normal Incidence Diffuse Ultrasonic Backscatter", *46th Annual Review of Progress in Quantitative Nondestructive Evaluation*, Portland, OR.
26. L.D. Sotelo*, R. Karunakaran, C.J. Kanger, M.P. Sealy, J.A. Turner, "In Situ Ultrasonic Characterization of Ti6Al4V parts made with Directed Energy Deposition Additive Manufacturing using Hybrid Capabilities", *46th Annual Review of Progress in Quantitative Nondestructive Evaluation*, Portland, OR.
27. L.D. Sotelo*, M.P. Sealy, R. Karunakaran, C.J. Kanger, J.A. Turner, "Enhanced Ultrasonic Characterization of Metal Additively Manufactured Parts using Hybrid Capabilities*", Nebraska Academy of Sciences Annual Spring Meeting*, Lincoln, NE.
28. L.D. Sotelo*, M.P. Sealy, J.A. Turner, R. Karunakaran, C.J. Kanger, "Enhanced Ultrasonic Characterization of Metal Additively Manufactured Parts using Hybrid Capabilities", *The TMS Annual Meeting and Exhibition*, San Antonio, TX.
29. L.D. Sotelo* and J.A. Turner, "Parametric Optimization of the Measurement System for Grain Sizing based on Normal Incidence Diffuse Ultrasonic Backscatter", *45th Review of Progress in Quantitative Nondestructive Evaluation*, Burlington, VT.,
30. C. Tarawneh*, L. Sotelo, A. Villarreal, N. de los Santos, R. Lechtenberg, R. Jones, "Temperature Profiles of Railroad Tapered Roller Bearings with Defective Inner and Outer Rings", *ASME Joint Rail Conference*, Columbia, SC.
31. L. Sotelo*, C. Tarawneh, A. Villarreal, N. de los Santos, R. Lechtenberg, R. Jones, "Temperature Profiles of Railroad Tapered Roller Bearings with Defective Inner and Outer Rings", UTRGV Engaged Scholar Symposium, Edinburg, TX.

32. L. Sotelo*, "Measurement of Train Kinematic Parameters Utilizing Vibration Monitoring Techniques", *UTCRS-NTC Symposium*, Lincoln, NE.

33. L Sotelo*, Y.G. Park, S. Jung, S. Ryu, "Swimming Vorticella Convallaria in 2-D Confined Geometries", *American Physical Society's March Meeting*, San Antonio, TX.

Poster Presentations

34. L.D. Sotelo*, "Sound Wave Propagation in Complex Media", Purdue University LATinE program (online), poster competition winner.

35. L.D. Sotelo* and J.A. Turner, "Characterization of Near-Race Subsurface Inclusions Detected with Ultrasonic Surface Waves in Railroad Tapered Roller Bearings", *University of Nebraska-Lincoln Spring Research Fair*, Lincoln, NE.

36. L. Sotelo*, "A Method for the Analysis of Inclusions in Railroad Bearing Steel", *UTCRS Research Symposium*, Edinburg, TX.

37. L. Sotelo, Y.G. Park, S. Jung, S. Ryu*, "Swimming Vorticella Convallaria in Various Confined Geometries", *67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics*, San Francisco, CA.

RESEARCH EXPERIENCE

NAS NRC Postdoctoral Research Associate

U.S. Naval Research Laboratory, supervised by Matthew D. Guild — September 2021 – December 2022

- Design experiments and signal processing routines to measure the acoustic properties of advanced materials for acoustic metamaterial structures.
- Collaborate to map frequency dependent acoustic and mechanical properties for additively manufactured photopolymers as well as composite polymers using ultrasound, dynamic mechanical analysis, and static tension testing.
- Collected and analyzed X-Ray CT data to quantify porosity in binder jet piezoceramics.
- Created process development maps for LPBF and DED of copper alloys based on extensive literature search.
- Assisted in the LPBF of a 316L stainless steel test sample for laser Doppler vibrometry experiments.
- Provide technical training and career development mentorship to two graduate students from underrepresented backgrounds.

Graduate Research Fellow

Quantitative Ultrasonics Lab, advised by Joseph A. Turner — August 2016 – August 2021

University of Nebraska-Lincoln Department of Mechanical and Materials Engineering, Lincoln, NE

- Designed and implemented a calibration and monitoring procedure to quantify ultrasonic pressure fields in a bioreactor.
- Designed and successfully incorporated an ultrasonic measurement device for in situ real time measurements in metal AM.
- Applied ex situ ultrasonic nondestructive measurements and analytical modeling to a variety of heterogeneous materials.
- Investigated the impact of hybrid AM processing on the mechanical properties and microstructure of alloys used in aerospace and biomedical applications.
- Designed and implemented a process parameter development methodology based on microscopy, residual stress, and ultrasonic response for AM of metal alloys.
- Designed and implemented an ultrasonic calibration methodology that reduced calibration cost by 90% for an industry client.
- Mentored 10 junior graduate students and undergraduate students. Managed purchasing, experiment scheduling, and training.

Summer Research Affiliate

Nebraska Transportation Center, advised by Laurence R. Rilett — June 2016 – August 2016

University of Nebraska-Lincoln, Lincoln, NE

- Designed, built, and tested a portable system for the in situ vibration and dynamic monitoring of freight trains.

Undergraduate Research Intern

Quantitative Ultrasonics Lab, advised by Joseph A. Turner — June 2015 – August 2015

University of Nebraska-Lincoln Department of Mechanical and Materials Engineering, Lincoln, NE

- Defined a procedure for the detection, exposure, and analysis of inclusions in railroad bearing steel.

Bio-Flow Research Lab, advised by Sangjin Ryu — July 2014

University of Nebraska-Lincoln Department of Mechanical and Materials Engineering, Lincoln, NE

- Design experiments and image processing routines to investigate the kinematics of cell motility in confined geometries.

Undergraduate Research Assistant

University Transportation Center for Railway Safety, advised by Constantine Tarawneh — August 2015 – May 2016

University of Texas Rio Grande Valley Department of Mechanical Engineering, Edinburg, TX
- Monitored and analyzed temperature and vibration emissions of railroad bearings during fatigue life testing.

Biomechanics Lab, advised by YoungGil Park — August 2014 – June 2015
University of Texas Rio Grande Valley Department of Mechanical Engineering, Edinburg, TX
- Developed an image analysis protocol to identify and track moving cells in 2D space.

TEACHING AND MENTORING EXPERIENCE

University of Nebraska-Lincoln Department of Mechanical and Materials Engineering

- Co-Instructor, Laboratory Lead — Spring 2020
  - MECH 996.Ultrasound in Additive Manufacturing (Graduate)
    (New research based graduate course developed in collaboration with J.A. Turner and M.P. Sealy)
- Project Mentor — Spring 2019, Summer 2019
  - MECH 498/898. Additive Manufacturing (Dual-Listed)
  - MECH 447. Mechanical Engineering Senior Design (Undergraduate)
- Guest Lecturer — Spring 2018, Fall 2018
  - MECH 875. Vibration Theory and Applications (Dual-Listed)
  - MECH 801. Analytical Methods in Engineering (Graduate)
    Alternate Lecturer, Fall 2020
- Graduate Teaching Assistant — Fall 2016, Spring 2017
  - MECH 325. Mechanics of Elastic Bodies (Undergraduate)

University Transportation Center for Railway Safety, Nebraska Transportation Center, and Texas A&M Transportation Institute

- Program Mentor — May 2016 – August 2016
  - UTRCS Research Experience for Undergraduates.
    Mentored 10 Hispanic undergraduate students in two different locations during a summer research experience.

University of Texas Rio Grande Valley Department of Mechanical Engineering

- Undergraduate Teaching Assistant — Fall 2014, Spring 2015
  - MECE 2340. Engineering Materials Laboratory
  - MECE 3449. Engineering Analysis I (Calculus III, Linear Algebra, Statistics)

FIELD EXPERIENCE

Nebraska Transportation Center — 2016
On-site Vibration and Dynamic Freight Train Monitoring Tests

SERVICE AND OUTREACH

Profession

Society of Hispanic Professional Engineers, RLDC123 Conference LGBTQ+ Chair — 2021 – Present
Society of Hispanic Professional Engineers, SHPEtina Chair, Region 3 — 2020 – Present
Society of Hispanic Professional Engineers, National Convention Poster Competition Reviewer — 2019
Society of Hispanic Professional Engineers, Lincoln Chapter, Community Service Chair (2018 – 19) — 2018 – Present
Noche de Ciencias, Lincoln High School Bilingual Career Fair, Introduce a Girl to Engineering Day
Society of Women Engineers, Lincoln Chapter, Graduate School Panelist — 2018, 2020
Society of Automotive Engineers, UTRGV Chapter, HESTEC and E-week Outreach — 2014 – 2015
Society of Manufacturing Engineers, UTRGV Chapter, HESTEC and E-week Outreach — 2013 – 2014

University

University of Nebraska-Lincoln

College of Engineering, Council of Diversity, Equity, and Inclusion — 2020 – Present
University Graduate Council — 2020 – Present
Drafted policy and guidelines for the approval of graduate and dual-level courses
Graduate Student Assembly, Executive Vice President — 2020 – Present

Chancellor's Student Committee on Sexual Misconduct Member 2019 – 2020
Executive Vice Chancellor of Academic Affairs Student Advisory Board Member 2019 – 2020
Parking Advisory Committee, Vice Chair 2019 – 2020
Graduate Student Assembly, Vice President of Student Affairs 2019 – 2020
Graduate Student Assembly Diversity and Inclusion Committee, Member (2017 – 18), Chair 2018 – 2019
Diversity and Inclusion Coffee Hour, Sexual Assault Awareness #HuskerOut Event, Campus Climate Coffee Hour, Title IX Awareness #HuskerOut Event, Academic Freedom Informational Panel
College of Engineering Task Force on Diversity and Inclusion 2019
Drafted guideline for the recruitment and retention of diverse students
College of Engineering Graduate Student Advisory Board, Founding Member 2019 – Present
Organizer of the inaugural 2020 College of Engineering Graduate Student Symposium
College of Engineering Dean Search Committee 2018
Mid-America Transportation Center Scholars Program Panelist 2017
Nebraska Transportation Center STEM Summer Camps Volunteer 2015 – 2016

University of Texas Rio Grande Valley
University Transportation Center for Railway Safety, STEM Summer Camps Volunteer 2015 – 2016

Department

University of Nebraska-Lincoln Mechanical and Materials Engineering
MME Graduate Student Association, Founding President (2018 – 19), Communications Chair 2018 –2020
Research Fair, Graduate Student Appreciation Events, Student Profiles Website, Orientation, Recruitment

Community

Mechanical Engineering Volunteer Online Tutor (in response to online instruction due to Covid-19) 2020
Nebraska Coalition to end Sexual Assault and Domestic Violence, Panelist 2019
"Coalition Conversations: Survivors and Systems Change"

PROFESSIONAL ORGANIZATIONS

Acoustical Society of America 2018 – Present
Society of Hispanic Professional Engineers 2018 – Present
Society of Automotive Engineers (jigs, fabrication, and outreach) 2014 – 2015
Society of Manufacturing Engineers (outreach) 2013 – 2014

SKILLS

Languages: Fluent in English and Spanish.
Software: Matlab™ and Simulink, SolidWorks, ImageJ, Adobe Creative Cloud.
Manufacturing: Laser processing, ultrasonic peening, 3D printing, engineering machine shop, Raspberry Pi, basic circuit design and soldering.
Materials Characterization: Nano-indentation, Scanning Electron Microscopy (SEM), laser confocal microscopy, video microscopy, Energy Dispersive X-Ray Spectroscopy (EDS/EDX), Electron Backscatter Diffraction (EBSD), ultrasonic NDE, residual stress, metallography/polishing, microhardness, surface topography, uniaxial tension/compression, impact.
Data analysis: Image analysis, time and frequency domain analysis, numerical methods, statistical methods, optimization.