

**Name:** Nicholas J. Bryan

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## RESEARCH INTERESTS

- AI, machine (deep) learning, and signal processing
- Audio, speech, & music processing

## EDUCATION

**2014 Ph.D., Computer-based Music Theory and Acoustics**, Stanford University  
Thesis: Interactive Sound Source Separation. GPA 3.94.

**2011 M.S., Electrical Engineering**, Stanford University

**2008 M.A., Music, Science, and Technology**

Signal Processing and Machine Learning Emphasis. GPA 3.92.

**2007 B.S., Electrical Engineering**, University of Miami-FL (UM)

**2007 B.M., Music Engineering Technology**

Summa cum laude, General Honors, Dept. Honors, Best EE Senior Design, GPA 3.95

## EXPERIENCE

- Adobe Research (San Francisco, CA).....07/18-Current
  - Senior Research Scientist 2 (02/22 – Current)
  - Senior Research Scientist (07/20 – 02/22)
  - Research Scientist (07/18 – 07/20)
  - Developing new core audio and music technology
- Apple Inc., Interactive Media Group (Cupertino, CA).....01/14-07/18
  - Senior Audio Algorithm Engineer (10/16 – 07/18)
  - Audio Algorithm Engineer (01/14 – 10/16)
  - Voice processing algorithm research, development, & production
- Adobe Research (San Francisco, CA).....06/12-05/13
  - Research Intern, mentor: Gautham Mysore
  - Audio Layers/interactive sound source separation, MAX Sneaks 2013
- Adobe Advanced Technology Labs (San Francisco, CA).....06/11-12/11
  - Research Intern, mentors: Gautham Mysore & Paris Smaragdís
  - Synchronization of multiple videos of the same event via audio
  - Tech transfer to Premier Pro CC, MAX Sneaks 2011, SF Intern 2<sup>nd</sup> Place
- Youth Radio (Oakland, CA).....09/10-09/11
  - Mobile Action Lab Developer and Consultant (Objective-C/C++)
  - Application design and development with youth through engineering process

- Smule Inc. (Palo Alto, CA).....06/10-09/10
  - Software Development Intern
  - Client/Server networking for real-time music control data (C++/Python)
- Dept. of Electrical & Computer Eng.-UM (Coral Gables, FL).....06/07-09/07
  - Research Intern at Distributed Decision Environments Laboratory
  - Optimizing the NN-Classifer using the genetic algorithm and intelligent mating
- Analog Devices Inc. (Wilmington, MA).....05/06-08/06
  - Engineering Intern at Digital Audio Group/Precision Signal Processing
  - Room acoustic tuning via SigmaStudio DSP programming environment
- Recording Services-UM (Coral Gables, FL).....09/03-01/06
  - Recording Engineer at Gusman and Clarke Concert Halls, UM
  - 3 years (50+ recordings) of live multi-track recording for classical/jazz concerts
- Dept. Marine Geology & Geophysics-UM (Virginia Key, FL).....06/05-08/05
  - Research Intern at Seismic Imaging Lab, lighter-than-air photo. & image proc.
  - UM Research & Creativity Fair, Undergrad 2nd Place Winner
- Professional Instruments Company (St. Louis Park, MN).....06/02-09/02
  - Research Intern at a specialized machine shop
  - Evaluation and testing of torque drag in precision air bearings

## PEER-REVIEWED PUBLICATIONS

33. J. Casebeer, N. J. Bryan, P. Smaragdis. "MetaAF: Meta-learning for Adaptive Filtering", Under review, 2022.
32. H. Yang, S. Firodiya, N. J. Bryan, M. Kim. "Don't Separate, Learn to Remix: End-to-End Neural Remixing With Joint Optimization." *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2022.
31. M. Won, J. Salamon, N. J. Bryan, G. J. Mysore, X. Serra, "Emotion Embedding Spaces for Matching Music to Stories." *International Society for Music Information Retrieval Conference (ISMIR)*. Online, 2021. **(Best student paper award)**
30. J. Salamon, O. Nieto, N. J. Bryan. "Deep Embeddings and Section Fusion Improve Music Segmentation." *International Society for Music Information Retrieval Conference (ISMIR)*. Online, 2021.
29. Y. Wang, N. J. Bryan, J. Salamon, M. Cartwright, J. P. Bello. "Who Calls the Shots? Rethinking Few-Shot Learning for Audio." *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2021. **(IEEE special best paper award)**.

28. J. Casebeer, N. J. Bryan, P. Smaragdis. "Auto-DSP: Learning to Optimize Acoustic Echo Cancellers." *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics*, 2021.
27. M. A. Martínez Ramírez, O. Wang, P. Smaragdis, N. J. Bryan. "Differentiable Signal Processing with Black-Box Audio Effects." *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2021.
26. Y. Wang, N. J. Bryan, M. Cartwright, J. O. Bello, J. Salamon. "Few-shot Continual Learning for Audio Classification." *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2021.
24. M. Morrison, L. Rencker, Z. Jin, N. J. Bryan, J.-P. Caceres, B. Pardo. "Context-aware Prosody Correction for Text-based Speech Editing." *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2021.
23. P. Manocha, A. Finkelstein, Z. Jin, R. Zhang, N. J. Bryan, G. J. Mysore. "A Differentiable Perceptual Audio Metric Learned from Just Noticeable Differences." In *Interspeech*, 2020. **(Best student paper finalist)**
22. M. Morrison, Z. Jin, J. Salamon, N. J. Bryan, G. J. Mysore. "Controllable Neural Prosody Synthesis." In *Interspeech*, 2020.
21. J. Lee, N. J. Bryan, J. Salamon, Z. Jin, J. Nam. "Metric Learning vs Classification for Disentangled Music Representation Learning." In *International Society for Music Information Retrieval*, 2020.
20. Y. Wang, J. Salamon, M. Cartwright, N. J. Bryan, J. P. Bello. "Few-shot Drum Transcription in Polyphonic Music." In *International Society for Music Information Retrieval*, 2020.
19. J. Lee, N. J. Bryan, J. Salamon, Z. Jin, J. Nam. "Disentangled Multidimensional Metric Learning for Music Similarity." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2020.
18. Y. Wang, J. Salamon, N. J. Bryan, J.-P. Bello. "Few-Shot Sound Event Detection." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2020. **(Press)**
17. S. I. Mimilakis, N. J. Bryan, P. Smaragdis. "One-Shot Parametric Audio Production Style Transfer With Application to Frequency Equalization." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2020.
16. N. J. Bryan. "Impulse Response Data Augmentation and Deep Neural Networks For Blind Room Acoustic Parameter Estimation." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*, 2020.
15. Z. Tang, N. J. Bryan, D. Li, T. Langlois, D. Manocha, "Scene-Aware Audio Rendering via Deep Acoustic Analysis." *IEEE VR Journal Papers*, 2020.
14. N. J. Bryan, G. J. Mysore, G. Wang. "ISSE: An Interactive Source Separation Editor." In *Conference on Human Factors in Computing Systems*. April 2014.
13. N. J. Bryan. "Interactive Sound Source Separation." *Ph.D. Thesis*, Stanford University, 2014. **Audio Eng. Society Graduate Student Design Gold Award (2013).**

12. N. J. Bryan, G. J. Mysore, G. Wang. "Source Separation of Polyphonic Music with Interactive User-Feedback on a Piano-Roll Display." In *International Society for Music Information Retrieval Conference*. November 2013.
11. N. J. Bryan, G. J. Mysore. "An Efficient Posterior Regularized Latent Variable Model for Interactive Sound Source Separation." In *International Conference on Machine Learning*. May 2013.
10. N. J. Bryan, G. J. Mysore. "Interactive Refinement of Supervised and Semi-Supervised Sound Source Separation Estimates." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*. May 2013.
9. N. J. Bryan, J. Herrera, G. Wang. "User-Guided Variable-Rate Time-Stretching Via Stiffness Control." In *International Conf. on Digital Audio Effects*. September 2012.
8. N. J. Bryan, P. Smaragdis, G. J. Mysore. "Clustering and Synchronizing Multi-Camera Video via Landmark Cross-Correlation." In *IEEE International Conference on Acoustics, Speech, and Signal Processing*. March 2012.
7. N. J. Bryan, G. Wang. "Musical Influence Network Analysis and Rank of Sample-Based Music." In *International Society for Music Information Retrieval Conf.* October 2011.
6. N. J. Bryan, G. Wang. "Two Turntables and a Mobile Phone." In *International Conference on New Interfaces for Musical Expression*. May 2011. **(Press)**
5. K. Lee, N. J. Bryan, J. S. Abel. "Approximating Measured Reverberation Using A Hybrid Fixed/Switched Convolution Structure." In *International Conference on Digital Audio Effects*. October 2010.
4. N. J. Bryan, J. Herrera, J. Oh, G. Wang. "MoMu: A Mobile Music Toolkit." In *International Conf. on New Interfaces for Musical Expression*. June 2010. **(Press)**
3. J. Oh, J. Herrera, N. J. Bryan, G. Wang. "Evolving The Mobile Phone Orchestra." In *International Conference on New Interfaces for Musical Expression*. June 2010.
2. T. Quirino, M. Kubat, N. J. Bryan. "Instinct-Based Mating in Genetic Algorithms Applied to the Tuning of 1-NN Classifiers." *IEEE Transactions on Knowledge and Data Engineering*. December 2010.
1. G. Wang, N. Bryan, J. Oh, R. Hamilton. "Stanford Laptop Orchestra (SLORK)." In *International Computer Music Conference*. August 2009. **(Press)**

## OTHER PUBLICATIONS

6. M. Morrison, Z. Jin, N. J. Bryan, J.-P. Caceres, B. Pardo, "Neural Pitch-Shifting and Time-Stretching With Controllable LPCNET." arXiv, 2021.
5. N. J. Bryan, G. J. Mysore. "Interactive User-Feedback for Sound Source Separation." *International Conference on Intelligent User-Interfaces (IUI) Workshop on Interactive Machine Learning (Extended Abstract/Workshop Paper)*. March 2013.
4. J. S. Abel, N. J. Bryan, T. Skare, M. Kolar, P. Huang, D. Mostowfi, J. O. Smith III. "A Configurable Microphone Array with Acoustically Transparent Omnidirectional Elements." In *Audio Engineering Society Convention*. October 2009.

3. N. J. Bryan, M. A. Kolar, J. S. Abel. "Impulse Response Measurements in the Presence of Clock Drift." In *Audio Engineering Society Convention*. November 2010.
2. N. J. Bryan, J. S. Abel. "Methods For Extending Room Impulse Responses Beyond Their Noise Floor." In *Audio Engineering Society Convention*. November 2010.
1. J. S. Abel, N. J. Bryan, et al. "On Estimating Room Impulse Responses From Recorded Balloon Pops." In *Audio Eng. Society Convention*. November 2010.

## **ACADEMIC AWARDS**

- Best student paper award (mentor), ISMIR, 2021.
- IEEE best audio few-shot learning paper, IEEE WASPAA, 2021.
- Best student paper finalist, Interspeech, 2020.
- Best reviewer award, ISMIR, 2020.
- Graduate student design gold award, AES 2013.

## **OPEN SOURCE SOFTWARE**

- **ISSE** – An interactive source separation editor. An open-source, cross-platform, freely available audio editing tool for performing single-channel source separation via drawing and painting (<http://isse.sourceforge.net>). 82,000+ downloads across 120+ countries.

## **PATENTS SUBMITTED**

- M. Morrison, Z. Jin, J. P. Caceres, N. J. Bryan, B. Pardo, "Neural Pitch-Shifting and Time-Stretching", Submitted by Adobe, Nov. 2021.
- M. Morrison, Z. Jin, J. P. Caceres, N. J. Bryan, B. Pardo, "Context-Aware Prosody Correction of Edited Speech", Submitted by Adobe, Nov. 2021.
- J. Salamon, O. Nieto, N. J. Bryan, "Audio Segmentation Using Deep Embeddings." Submitted by Adobe, Oct. 2021.
- N. J. Bryan and J. Salamon, "Section-Based Music Similarity Searching." Submitted by Adobe, Oct, 2021.
- M. Martínez, N. J. Bryan, O. Wang, P. Smaragdis, "Deep Encoder for Performing Audio Processing", April, 2021.
- J. Lee, N. J. Bryan, J. Salamon, Z. Jin, "Searching for Music." Submitted by Adobe, March 2020.
- J. Salamon, Y. Wang, N. J. Bryan, "Automated Sound Matching Within an Audio Recording." Submitted by Adobe, November 2019.
- N. J. Bryan. "Improving Voice Recordings Using Acoustic Quality Measurement Models and Actionable Acoustic Improvement Suggestions." Submitted by Adobe, October 2019.

## PATENTS ISSUED

- N. J. Bryan, Q. Yang, V. Iyengar, “Mitigating Noise in Audio Signals”. Submitted by Apple, September 2021.
- S. I. Mimitakis, N. J. Bryan, P. Smaragdis, “Audio Production Assistant for Style Transfers of Audio Recordings Using One-Shot Parametric Predictions”, Aug. 2021.
- D. Li, Z. Tang, T. Langlois, N. J. Bryan. “Rendering Scene-Aware Audio Using Neural Network-Based Acoustic Analysis.” Submitted by Adobe, November 2021.
- N. J. Bryan. “Generating Synthetic Acoustic Impulse Responses From an Acoustic Impulse Response.” US11,074,925, Issued to Adobe, July 2021.
- N. J. Bryan, V. Iyengar, “Speech Enhancement for an Electronic Device.” US20190272842, Issued to Apple. January 2020.
- N. J. Bryan, V. Iyengar, A. Lindahl, “Transparent Near-End User Control Over Far-End Speech Enhancement Processing”, US20190156847A1, Issued to Apple. March 2019.
- N. J. Bryan, V. Iyengar, “System and Method of Noise Reduction for Mobile Device.” US20180350381A1. Issued to Apple. April, 2019
- N. J. Bryan, P. Smaragdis, G. J. Mysore, “Clustering and Synchronizing Content.” US8924345B2, Issued to Adobe. December 2014.

## TECHNOLOGY TRANSFERS

- Adobe
  - Find Similar Audio – [Audio Stock](#), 2021.
  - MicCheck – [Project Shasta](#), 2021.
  - Sensei Toolkit – [Sensei Machine Learning Platform](#), 2020.
  - Merge Clips – [Premiere Pro](#), 2013.
- Apple – See four patents on single & multi-channel speech enhancement, 2014-2018.

## SELECTED PRESS

- “MAX Sneaks – SoundSeek.” (11/19).  
<https://www.youtube.com/watch?v=ebAlnW3Xs2k>
- “Audio Layers.” Adobe TV (05/13).  
[http://www.youtube.com/watch?feature=player\\_embedded&v=nyODK-J9keo](http://www.youtube.com/watch?feature=player_embedded&v=nyODK-J9keo)
- “Automatic Synchronization of Crowd Sourced Videos.” Adobe TV (10/11).  
<https://www.youtube.com/watch?v=dhyvzOJBhzc>
- “Smartphone turntables put new spin on DJing.” NewScientist (05/11).  
<https://tinyurl.com/newscientist-mophodj>

- "Air Instruments only." *The Stanford Daily* (10/10).  
<http://www.stanforddaily.com/2010/10/28/air-instruments-only>
- "From Pocket to Stage, Music in the Key of iPhone." *NY Times (Front Page)* 12/04/09).  
[http://www.nytimes.com/2009/12/05/technology/05orchestra.html?\\_r=2&hpw](http://www.nytimes.com/2009/12/05/technology/05orchestra.html?_r=2&hpw)
- "Make-TV: Computer Making Music (Episode 9)." PBS (02/09).  
<https://www.youtube.com/watch?v=R2OF2OLaHdw>
- "Stanford Students invent new music." Local ABC TV (SF), Drive to Discover (04/08).  
[http://abclocal.go.com/kgof/story?section=news/drive\\_to\\_discover&id=6064990](http://abclocal.go.com/kgof/story?section=news/drive_to_discover&id=6064990)
- "Rhythm and Cubes." *Stanford Magazine* (07/08).  
<http://www.stanfordalumni.org/news/magazine/2008/julaug/red/cubeats.html>

## TEACHING AND MENTORING

- Mentored or co-mentored the following interns at Adobe Research:
  - Jonah Casebeer (2020-2022) – University of Illinois Urbana-Champaign
  - Christian Steinmetz (2021, 2022) – Queen Mary University of London
  - Jack Atherton (2021) – Stanford University
  - Gabriel Zalles (2021) – University of California San Diego
  - Amber Blue (2021) – Georgia Tech
  - Minz Won (2020-2021) – Universitat Pompeu Fabra (UPF)
  - Marco Antonio Martínez Ramírez (2020) – Queen Mary University of London
  - Yu Wang (2019-2021) – New York University
  - Jongpil Lee (2019-2020) – Korea Advanced Institute for Science and Technology
  - Stylianos Mimilakis (2019) – Technical University of Ilmenau
  - Lucas Rencker (2019) – University of Surrey
  - Zhenyu Tang (2019) – University of Maryland
  - Maxwell Morrison (2019-2021) – Northwestern University
- Teaching Assistant, Stanford University (Ave. 4.7/5.0 rating)
  - Audio Applications of the Fast Fourier Transform.....Spring 2011
  - Compositional Algorithms, Psychoacoustics, and Spatial Processing ... Winter 2011
  - Music, Computing, and Design I .....Fall 2010
  - Digital Audio Effects .....Spring 2010
  - Music, Computing, and Design II .....Winter 2010
  - Introduction to Digital Audio Signal Processing .....Fall 2009

## ACADEMIC COMMITTEES

- ISMIR 2022 Program Committee
- ICASSP 2022 Area Chair – Music Signal Analysis, Processing, and Synthesis
- ISMIR 2021 Program Committee
- IEEE WASPAA 2021 Area Chair – Music Signal Analysis, Processing, and Synthesis
- IEEE ICASSP 2021 AASP – Deep Learning for Music Signal Processing Session Chair
- IEEE ICASSP 2021 AASP – Music Signal Analysis, Processing & Synthesis Area Chair
- IEEE ICASSP 2020 AASP – Music Information Retrieval Session Chair
- IEEE Audio and Acoustic Signal Processing (AASP) Technical Committee (2020-2023)
  - Challenge, EDICS, and Industry Committees
- Ph.D. Thesis Committees
  - Jonah Casebeer – University of Illinois Urbana-Champaign (ongoing)
  - Yu Wang – New York University (ongoing)
  - Jongpil Lee – Korea Advanced Institute for Science and Technology, 2020

## ACADEMIC REVIEWING

- 2022 – ICASSP AASP meta reviews (41), IEEE SPL (1)
- 2021 – ICASSP AASP meta reviews (24), WASPAA meta reviews (12), IEEE TASLP (2), ISMIR meta + reviews (3), Pattern Recognition (1)
- 2020 – ICASSP (12), SIGGRAPH (1), IEEE TASLP (3), ISMIR (4, **Best Reviewer Award**)
- 2019 – ICASSP (10, **AASP – Awarded Reviewer w/Longest Feedback**), WASPAA (6), IEEE Trans. on Signal Processing (1), IEEE Signal Processing Letters (1), Stanford HAI Blog (1)
- 2018 – ICASSP (3), EUSIPCO (5), NIME
- 2017 – ICASSP, WASPAA, EUSIPCO, ACM Trans. on Interactive Intelligent Systems, NIME
- 2016 – ICASSP, WASPAA, EUSIPCO, ACM Trans. on Interactive Intelligent Systems, NIME
- 2015 – ICASSP, WASPAA, EUSIPCO, JASA, NIME, IEEE Journal of Selected Topics in Signal Processing
- 2014 – ICASSP, Elsevier Signal Processing, NIPS, NIME, Computer Communications
- 2013 – NIME
- 2012 – NIME



## SELECTED TALKS & WORKSHOPS

- “Learning to Control Signal Processing Algorithms with Deep Learning”, *Women in Music Information Retrieval Workshop*, 2021.
- “ISSE: An Interactive Machine Learning Workflow.” (Workshop Demo) *NIPS Workshop on Machine Learning Open Source Software*. December 2013.
- “ISSE: An Interactive Source Separation Editor.” (Two-part Talk) *CCRMA DSP Seminar*, Stanford University. October and November 2013.
- “Audio Source Separation.” (Workshop Speaker w/Gautham J. Mysore, Pierre Leveau, Derry FitzGerald, Elias Kokkinis), *Audio Eng. Society Convention*. October 2013.
- “Source Separation Tutorial Mini-Series.” (Three-part Talk w/Dennis Sun and Eunjoon Cho) *CCRMA DSP Seminar*, Stanford University, April 2013.
- “User-Guided Variable-Rate Time-Stretching Via Stiffness Control.” (Talk) *CCRMA DSP Seminar*, Stanford University. November 2012.
- “Reinventing Musical Instruments.” *Brains and Beakers Seminar* (Talk w/Nick Kruge), Youth Radio, Oakland, CA. December 2010.
- “Graduate School Perspectives for Music Engineering Students.” (Talk w/Kurt Jacobson & Becky Stewart) *Music Eng. Forum*, University of Miami-FL. October 2011.
- “Mobile Music Design and Programming.” (Workshop speaker w/Jorge Herrera, Jieun Oh, Ge Wang). *New Interfaces for Music Expression*. June 2010.

## REFERENCES

- Available upon request