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Chad McKell

ABOUT

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Summary I am a Ph.D. student at UC San Diego and a research intern at Meta. In my research, I develop computational and mathematical tools for physical simulation and geometry processing. My research has applications in computer music, computer animation, virtual reality, and other fields.

EDUCATION

9/19– **University of California San Diego**, Ph.D. in Computer Music
GPA: 4.0. Coursework: acoustics, computer graphics, DSP, differential geometry.
Dissertation topic: computational geometric techniques for sound synthesis.
Advisors: Albert Chern, Tamara Smyth, and Miller Puckette.

9/16–10/17 **University of Edinburgh**, M.S. in Acoustics and Music Technology
8/09–12/15 **Wake Forest University**, M.S. in Physics
6/02–8/09 **Brigham Young University**, B.S. in Biophysics

PROFESSIONAL EMPLOYMENT

8/21– **Meta (Reality Labs)**, Research Intern (Acoustics)
7/18–7/19 **Applied Research in Acoustics**, R&D Scientist (Acoustics)
9/12–12/12 **Bennett Aerospace**, Engineering Intern

ACADEMIC EMPLOYMENT

9/19– **University of California San Diego**, Teaching Assistant/Researcher (Music)
9/12–12/12 **University of North Carolina School of the Arts**, Adjunct Instructor (Physics)
9/09–9/11 **Wake Forest University**, Teaching Assistant (Physics)
9/08–6/09 **Brigham Young University**, Tutorial Lab Assistant (Physics)
8/07–3/09 **Brigham Young University**, Research Assistant (Philosophy)

CONSULTING

5/18–5/18 **Moog Music**: Audio effects development in C++ for digital sound synthesizers.
4/17–9/17 **Lofelt**: Digital signal processing and mathematical modeling for audio-haptic devices.
10/14–8/16 **J.P. Morgan/Neovest**: QA software development in Java for J.P. Morgan's investment trading platform, Neovest.

PROFESSIONAL RESEARCH ACTIVITIES

- 8/21– **Meta (Reality Labs)**, Research Intern
La Jolla, California. Research areas: *acoustics, applied mathematics*. Research topics: spatial audio, numerical simulation, parallel programming, discrete complex analysis. Supervisor: Sebastian Prepelitã.
- 7/18–7/19 **Applied Research in Acoustics**, R&D Scientist
Culpeper, Virginia. Research areas: *acoustics, digital signal processing*. Research topics: underwater acoustics, sonar technology, matched filtering, sparse estimation, beamforming. Supervisor: Jonathan Botts.

ACADEMIC RESEARCH ACTIVITIES

- 9/19– **University of California San Diego**, Ph.D. Student
La Jolla, California. Research areas: *acoustics, applied mathematics, digital signal processing*. Research topics: spatial audio, elastoplasticity, discrete differential geometry, non-Euclidean geometry. Advisors: Albert Chern, Tamara Smyth, and Miller Puckette.
- 1/17–8/17 **University of Edinburgh**, Master's Student
Edinburgh, Scotland. Research areas: *acoustics, digital signal processing*. Research topics: speech synthesis, structural acoustics, modal synthesis, finite-difference time-domain methods. Advisor: Stefan Bilbao.
- 1/10–9/13 **Wake Forest University**, Master's Student
Winston-Salem, North Carolina. Research areas: *optics, fluid dynamics*. Research topics: optical trapping, laser beam characterization, fluid diffusion. Advisor: Keith Bonin.
- 8/07–8/09 **Brigham Young University**, Undergraduate Student
Provo, Utah. Research areas: *biophysics, condensed matter physics*. Research topics: membrane biophysics, atomic force microscopy. Advisor: David Busath.

TEACHING EXPERIENCE

UCSD

- MUS 5 Sound in Time—*TA*. Spring 2020 (1 term).
MUS 6 Electronic Music—*TA*. Fall 2020 (1 term).
MUS 15 Popular Music: David Bowie—*TA*. Winter 2021 (1 term).
MUS 15 Popular Music: Video Game Music—*TA*. Winter 2020 (1 term).
MUS 172 Computer Music II—*TA*. Spring 2021 (1 term).

UNCSA

- SCI 1100 General Physics—*Instructor*. Fall 2012 (1 term).

WFU

- PHY 113 General Physics I (Mechanics)—*TA*. 2009–2011 (4 terms).
PHY 114 General Physics II (E&M)—*Tutor*. Fall 2010 (1 term).

BYU

- PHSCS 105 General Physics 1 (Mechanics)—*Tutor*. 2008–2009 (2 terms).
PHSCS 106 General Physics 2 (E&M)—*Tutor*. Winter 2009 (1 term).
PHSCS 121 Principles of Physics 1 (Mechanics)—*Tutor*. 2008–2009 (2 terms).
PHSCS 123 Principles of Physics 2 (Waves/Thermo)—*Tutor*. W/Sp 2009 (2 terms).
PHSCS 220 Principles of Physics 3 (E&M)—*Tutor*. W/Sp 2009 (2 terms).

PH.D. COURSEWORK

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| CSE 167 | Computer Graphics I (Jürgen Schulze) |
| CSE 169 | Computer Animation— <i>audit</i> (Steve Rotenberg) |
| CSE 274 | Discrete Differential Geometry (Albert Chern) |
| CSE 291 | Physical Simulation— <i>audit</i> (Steve Rotenberg) |
| CSE 299 | Differential Geometry Research (Albert Chern) |
| MUS 206 | Deep Learning for Music Generation (Shlomo Dubnov) |
| MUS 206 | Computational Acoustic Modeling (Tamara Smyth) |
| MUS 206 | Spatial Audio (Shahrokh Yadegari) |
| MUS 270A | Digital Audio Processing (Tamara Smyth) |
| MUS 270B | Analysis of Musical Sound (Miller Puckette) |
| MUS 270C | Compositional Algorithms (Miller Puckette) |
| MUS 270D | Advanced Projects in Computer Music (Puckette/Smyth) |
| MUS 298 | Spatial Audio Research (Puckette/Smyth/Dubnov) |

PUBLICATIONS

Journal Articles

- (1) **C. McKell** and K. Bonin, “Optical corral using a standing-wave Bessel beam,” *Journal of the Optical Society of America B*, Vol. 35, No. 8, 1910–1920, 2018.

Conference Proceedings

- (2) **C. McKell**, “Sonification of Optically-Ordered Brownian Motion,” In Proceedings of the International Computer Music Conference (ICMC), Utrecht, Netherlands, September 2016.

Master’s Theses

- (3) **C. McKell**, *Real-Time Physical Modeling for Haptic Feedback Rendering*, Final Project Dissertation, University of Edinburgh, Acoustics and Audio Group, 2017. (Advisor: Stefan Bilbao).
- (4) **C. McKell**, *Finite-Difference Simulations of Speech with Wall Vibration Losses*, Special Project Dissertation, University of Edinburgh, Acoustics and Audio Group, 2017. (Advisor: Stefan Bilbao).
- (5) **C. McKell**, *Confinement and Tracking of Brownian Particles in a Bessel Beam Standing Wave*, Master’s Thesis, Wake Forest University, Department of Physics, 2015. (Advisor: Keith Bonin).

Technical Reports

- (6) **C. McKell**, H. Conley, and D. Busath, “AFM Study of Structural Changes in Supported Planar DPPC Bilayers Containing General Anesthetic Isoflurane,” Brigham Young University, Paper 827, 2010.

Conference Abstracts

- (7) K. Bonin and **C. McKell**, “Tracking Brownian Particles in a Standing-Wave Bessel Beam 2D Optical Trap,” SPIE: Optical Trapping and Optical Micromanipulation, XIV Meeting, 2017.