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Chad McKell

ABOUT

Address	9500 Gilman Dr MC 0099 La Jolla, CA 92093-0099
Phone	+1 661 289 4215
Email	cmckell@ucsd.edu
Website	chadmckell.com

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 Prepeliță.

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

CSE 167	Computer Graphics I (Jürgen Schulze)
CSE 169	Computer Animation—*audit* (Steve Rotenberg)
CSE 274	Discrete Differential Geometry (Albert Chern)
CSE 291	Physical Simulation—*audit* (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.