Dr. James L. McCann, PhD

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Education

Carnegie Mellon University, Pittsburgh, Pennsylvania (Fall 2005 to Spring 2010)
Member of the Graphics Lab, advised by Nancy Pollard
Thesis Topic: "Image Editing and Creation with Perception-Motivated Local Features"
PhD received in 2010.

University of Michigan, Ann Arbor, Michigan (Fall 2001 to Spring 2005)
Dual Major: Honors Computer Science, Honors Mathematics

Work Experience

Assistant Professor – Carnegie Mellon (2017-Present)
Continuing my textiles manufacturing agenda as part of the CMU Robotics Institute.

Researcher – Disney Research (2014-2017)
Leading the Textiles Lab and pursuing other projects in support of universal creativity.

Indie Game Creator – TCHOW (sole proprietor) (2012-2014)
Code, tools, art, and sound for Rktcr, Rainbow, and pending games for desktop and mobile.

Researcher – Adobe Creative Technologies Lab (2010-2012)
Worked in the Creative Technologies Lab, designing new graphics technologies and techniques.

Researcher – Adobe Creative Technologies Lab (Summer 2009)
Exploring what it means for people to collaboratively create photographs.

Lead Graphics/Engine Programmer – Chronic Logic (Summer 2006)
Worked on the game 'MicroWarrior' with this independent game studio.

Central Tools Programmer – Electronic Arts Redwood Shores (Summer 2005)
Debugged and overhauled the character animation system used in Bond, Tiger, and Godfather.

Journal Publications

Lightweight Structure Design Under Force Location Uncertainty
by E. Ulu, J. McCann, L. B. Kara; ACM Transactions on Graphics (SIGGRAPH 2017), 36(4), 2017.

RFID Light Bulb: Enabling Ubiquitous Deployment of Interactive RFID Systems
by J. Gummeson, J. Mccann, C. Yang, D. Ranasinghe, S. Hudson, A. Sample; Proc. ACM Interact. Mob. Wearable Ubiquitous Technol., 1(2), 2017.

A Compiler for 3D Machine Knitting
by J. McCann, L. Albaugh, V. Narayanan, A. Grow, W. Matusik, J. Mankoff, J. Hodgins; ACM Transactions on Graphics (SIGGRAPH 2016), 35(4), 2016.

Composition-Aware Scene Optimization for Product Images
by T. Liu, J. McCann, W. Li, T. Funkhouser; Computer Graphics Forum (EG 2015), 34(2), 2015.

Physics Storyboards
by S. Ha, J. McCann, C. K. Liu, and J. Popović; Computer Graphics Forum (EG 2013), 32(2pt2), 2013.

Soft Stacking
by J. McCann and N. S. Pollard; Computer Graphics Forum (EG 2012), 31(2pt2), 2012.

Local Layering
by J. McCann and N. S. Pollard; ACM Transactions on Graphics (SIGGRAPH 2009), 28(3), 2009.

Real-Time Gradient-Domain Painting
by J. McCann and N. S. Pollard; ACM Transactions on Graphics (SIGGRAPH 2008), 27(3), 2008.

Responsive Characters from Motion Fragments
by J. McCann and N. S. Pollard; ACM Transactions on Graphics (SIGGRAPH 2007), 26(3), 2007.

Conference Publications

A 3D Printer for Interactive Electromagnetic Devices
by H. Peng, F. Guimbretière, J. McCann, S. Hudson; ACM UIST 2016

RapID: A Framework for Fabricating Low-Latency Interactive Objects with RFID Tags
by A. Spielberg, A. Sample, S. Hudson, J. Mankoff, J. McCann; ACM CHI 2016
⋆ Best paper [top 1% of papers]

Joint 5D Pen Input for Light Field Displays
by J. Tompkin, S. Muff, J. McCann, H. Pgister, J. Kautz, M. Alexa, W. Matusik; ACM UIST 2015

A Layered Fabric 3D Printer for Soft Interactive Objects
by H. Peng, J. Mankoff, S. Hudson, J. McCann; ACM CHI 2015
⋆ Honorable mention [top 5% of papers]

Dynamic Sprites
by B. Jones, J. Popović, J. McCann, W. Li, and A. Bargteil; ACM SIGGRAPH Conference on Motion in Games, 2013.

DynaMMo: Mining and Summarization of Coevolving Sequences with Missing Values
by L. Li, J. McCann, N. S. Pollard, C. Faloutsos; KDD 2009.

Laziness is a virtue: Motion stitching using effort minimization
by L. Li, J. McCann, N. S. Pollard, and C. Faloutsos; Short Papers Proceedings of EUROGRAPHICS, 2008.

Physics-Based Motion Retiming
by J. McCann, N. S. Pollard, and S. Srinivasa; ACM SIGGRAPH / Eurographics Symposium on Computer Animation, 2006.

NEWTON: A Library-Based Analytical Synthesis Tool for RF-MEMS Resonators
by M. S. McCorquodale, J. McCann, and R. B. Brown; Asia and South Pacific Design Automation Conference, 2006.

Demos, Talks, and Posters

Threadsteading: Playful Interaction for Textile Fabrication Devices (Demo)
by L. Albaugh, A. Grow, C. Liu, J. McCann, G. Smith, J. Mankoff; CHI Interactivity, 2016. / Alt.Ctrl.GDC 2016. / IndieCade, 2016.
⋆ IndieCade "Technology Award" winner

Challenges Facing a High-Level Language for Machine Knitting (Talk)
by L. Albaugh, J. McCann; ACM SIGPLAN-SIGACT POPL Off The Beaten Track Workshop, 2016.

Virtual Cane Creation for Glassblowers (Talk)
by A. Winslow, K. Baldauf, J. McCann, E. Demaine, M. Demaine, and P. Houk; SIGGRAPH, 2012.

Interactive Light Field Painting (Demo)
by J. Tompkin, S. Muff, S. Jakuschevskij, J. McCann, J. Kautz, M. Alexa, and W. Matusik; SIGGRAPH Emerging Technologies, 2012.

Mid-level Fluid Control with Fluid Motifs (Poster)
by A. Barnat, Z. Li, J. McCann; ACM SIGGRAPH / Eurographics Symposium on Computer Animation, 2009.

Recalling The Single-FFT Direct Poisson Solve (Poster)

by J. McCann; ACM SIGGRAPH, 2008.

A Hierarchical Self-Organizing Map for Motion Exploration (Poster)
by R. Slyper and J. McCann and N. S. Pollard and J. K. Hodgins; ACM SIGGRAPH / Eurographics Symposium on Computer Animation, 2007.

Commercial Games

Rktcr – `http://tchow.com/games/rktcr/` – (Windows, OSX, Linux)
A side-view physics platforming game wherein the future, given the current control inputs, is shown and time moves only when players want it to. This allows for deliberate, perfect play.
Save for basic libraries, I created everything in Rktcr – 150k+ lines of C++ code, 200 sprites, 30 sound effects, 16 music tracks, and 70 levels – from scratch, myself.

Rainbow – `http://tchow.com/games/rainbow/` – (HTML5, C++)
A game about driving rainbows through the sky. Made in 48 hours for the Ludum Dare 25 competition, then expanded and re-written in C++/OpenGL for iOS, Android.
⋆ Ludum Dare 25 1st in "innovation," 10th in "overall" category (of 1327 entries).
⋆ Pocket Gamer "Most Innovative" Nominee, 2015.

Advising

R. Desai (PhD, CMU RI) – PhD Student (Fall 2017 – Present)
Advanced design tools robots

V. Narayanan (PhD, CMU CSD) – PhD Student (Fall 2017 – Present)
Advanced design tools for machine knitting

J. Lin (PhD, CMU CSD) – PhD Student (Fall 2017 – Present)
Planning algorithms for knitting machine needle scheduling

T. Sethapakdi (MSCS, CMU) – Masters Student (Fall 2017 – Present)
Texture painting with real-time video input

E. Ulu (PhD, CMU) – Disney Intern (Fall 2016, Winter 2017)
Automatic LEGO model creation with advanced [e.g. studs-not-on-top] building techniques

A. Grow (PhD, UCSC) – Disney Intern (Summer 2015)
Prototyped knitting design interface; returned to UCSC and expanded her thesis topic to include computational crafting

V. Narayanan (masters, SERC / IISc) – Disney Long-Term Intern (Summer 2015-Summer 2016)
Developed large portions of our knitting compiler and support tools; left to join CMU's CSD as a PhD student

C. Liu (masters, CMU) – Disney Long-Term Intern (Spring 2015-Summer 2016)
Built a system to automatically create single-line quilting patterns from photographs; left to join UBC as a PhD student

J. Peng (undergrad, UBC) – Disney Intern (Winter/Spring 2015)
Built a system to play "Dodo Pop" (an iOS puzzle game) by learning from human players; left to become a UBC masters student; is now a UBC PhD student

H. Peng (PhD, Cornell) – Disney Intern (Summer 2014, Fall 2016)
Building 3D printers with new materials and capabilities

R. Malia (undergrad, CMU) – Disney Intern (Summer 2014)
Keepon (small 4DoF robot) performance animation system

T. Liu (PhD, Princeton) – Adobe Intern (Summer 2012)
Optimization-based scene layout for IKEA-catalogue-like product photographs

B. Jones (PhD, Utah) – Adobe Intern (Summer 2012)
Dynamic simulation for sketch-based sprites

S. Ha (PhD, GATech) – Adobe Intern (Summer 2012)
Developed a storyboard-based tool for optimizing parameters of dynamic systems

A. Davis (PhD, MIT) – Adobe Intern (Summer 2011)
Mobile rendering and compression for light field photographs

A. Barnat (undergrad, CMU) – Independent Study (Spring 2009)
Motif-based fluid control with texture synthesis

Z. Li (undergrad, CMU) – Independent Study (Spring 2009)
Motif-based fluid control with particle-tracking

Teaching

Computer Game Programming (Fall 2017)
I returned to this course after a 8-year hiatus and brought the focus back to developing game runtimes and asset pipelines from scratch in C++ and OpenGL.
http://graphics.cs.cmu.edu/courses/15-466-f17/

Game Engine Programming (Fall 2015)
I developed and taught this course for sophomore students in the IDEATE program. I guided the class in the creation of a lightweight engine and asset pipeline targeting single-page HTML5/javascript games.
http://graphics.cs.cmu.edu/courses/16-465-s15/

Computer Game Programming (Fall 2009)
I solo taught this popular junior/senior level project course about making games. Using previous course iterations as a loose blueprint, I restructured the class, developing new lectures and projects. In aggregate, my students crafted 105 new game prototypes and 6 polished final games.
http://graphics.cs.cmu.edu/courses/15-466-f09/

Computational Photography (Fall 2007)
As the TA of this class taught by Alexei Efros, I helped students with Matlab questions, revised existing assignments, and designed a new project.
http://graphics.cs.cmu.edu/courses/15-463/2007_fall/

Animation Art and Technology (Spring 2006)
As one of two TAs in this class taught by Jessica Hodgins and James Duesing, I helped students with maya and linux questions that arose as they worked in groups to produce short animations.
http://www.cs.cmu.edu/~jkh/aat_s06/

Departmental Service

Carnegie Mellon Computer Science Department PhD Admissions Committee (two year term)

Carnegie Mellon Computer Science Department Doctoral Review Committee (three years)

Other Interests

Interactive computer art: installations at Sync'04 and Sync'05; installation at Pittsburgh Children's Museum; installation in CMU Gates Hillman Center.

Glass blowing: 8 years experience; basic forms, sculpting, frit, solid color, cane, torch work, large assembly; pumpkin production at MIT.

Music: amateur-level top lines, synths, and production. Eight released albums as 50% of "Jimike."

Contest programming: ICFP 2010 Judges' prize; ICFP 2016 3rd place; ACM Team Programming Competition 2003, 2004 world finals.

Academic Satire: consistent contributor to CMU's "SIGBOVIK" joke conference, including 20+ joke papers and 10+ joke presentations over ten years; winner of multiple joke awards; occasional organizing committee member and conference emcee.

Rhythm Games: I've been playing Dance Dance Revolution for 15 years, play doubles at the 9-foot level, and own two arcade machines (Extreme and 7th Mix).