WELCOME!

COMPUTER SCIENCE: COMPUTER GAME DESIGN

Professor Jim Whitehead
Professor Nathan Altice

UC SANTA CRUZ
YOU’RE IN GOOD COMPANY

WE THINK UCSC GAME DESIGN IS GREAT, AND NOW YOU’RE PART OF IT! (LET’S BRAG A BIT.)
SUB-SONO

path-based puzzler
TRAIL MIX

room-rearranging metroidvania
ORBITAL DESCENT

sci-fi platforming

You're one floor away from that THING.

Don't get caught by the lifting platforms or you'll get squished. You're almost there!
I'm not giving up on you.
ALONE, NOT LONELY

CREDITS

START

CONTROLS
UCSC GAMES
GET ON STEAM
(AND OTHER PLACES)
IN 2019, SQUISH PLACED IN THE TOP 5 IN THE E3 COLLEGE GAME COMPETITION (TOP 5 OUT OF ALL COLLEGES…ANYWHERE)
UCSC GAMES SHOWCASE (AND AWARDS)
THE UCSC GAMES SHOWCASE IS A PRETTY GOOD TIME
Ranked #2 in California and #7 in the nation in Animation Career’s 2019 Game Design School Rankings

Has the most HEVGA scholars of any games program

Mad Mixologist selected to show at IndieCade (2019)

Squish was a Top 5 finalist in the E3 College Game Competition
THE S&E LIBRARY
VIDEOGAMES COLLECTION
EVERY JAPANESE PS2 GAME 👀
Institutions Active in Technical Games Research

Universities and other institutions ranked by how active they are in the past 10 years in publishing at conferences and journals dedicated to the technical portion of games and interactive entertainment research (AI, HRI, graphics, etc.). See below the table for the list of conferences and journals. Credit is assigned to authors’ current institutions. Credit for multi-author papers is split fractionally.

To give more information than just a ranking, under each institution are its researchers who are most active in these venues, plus the venues that the institution overall is most active in. There is also a large index of all active institutions and researchers who publish in these venues.

April 2021 edition (change Log).

<table>
<thead>
<tr>
<th>Institution</th>
<th>Country</th>
<th>Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. University of California Santa Cruz</td>
<td>USA</td>
<td>104.5</td>
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<tr>
<td>Michael Mateas, Noah Wardrip-Fruin, Maggy Sel El-Nasr, Jim Whitehead, Adam M. Smith, Katherine Isbister, Max Kraynidi, Erica Kleinman, Edward F. Melzer, Lucas Ferreira, Bjørke Alexander Larsen, Elif Cemmelikli, Marilyn A. Walker &amp; 12 more</td>
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<tr>
<td>2. University of Alberta</td>
<td>Canada</td>
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<tr>
<td>Vadim Bulbeck, Michal Barn, Nathan R. Sturtevant, Martin Müller, Matthew Gazdik, Ryan B. Hayward, Mario Stanescu, Duane Saflont, Jonathan Schaffer, Ting-Han Wei, Levi Lello, Jorge Paez Hernandez &amp; 17 more</td>
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<td>3. Queen Mary University of London</td>
<td>UK</td>
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<td>Simon M. Lucas, Diego Perez Lireh, Michael Cook, Peter J. Cowling, Simon Colson, Babasa D. Gama, Jeremy Cow &amp; 11 more</td>
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<tr>
<td>4. Maastricht University</td>
<td>Netherlands</td>
<td>56.8</td>
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<tr>
<td>Cameron Broede, Mark H. M. Wouds, Joo W. H. Uttervijk, Matthew Stephenson, Doreia M. J. S. Stevers, Chiara F. Ströt &amp; 2 more</td>
<td></td>
<td></td>
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<tr>
<td>5. North Carolina State University</td>
<td>USA</td>
<td>54.2</td>
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<tr>
<td>6. Google</td>
<td>Multinational</td>
<td>50.5</td>
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<tr>
<td>Santiago Otamendi, Stella Mancsak, Tom Schaul &amp; 28 more</td>
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<td>7. New York University</td>
<td>USA</td>
<td>50.0</td>
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<tr>
<td>Julian Togelius, Ahmed Khalfi, Michael Coryn Green, Rodrigo Carrean &amp; 5 more</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. University of Utah</td>
<td>USA</td>
<td>45.6</td>
</tr>
<tr>
<td>R. Michael Young, Royce E. Cardona-Rivera, José F. Zapal, Raoul Sanchez, Cem Yukel, Roger Allsley, David R. Winer, Peter Christianen &amp; 5 more</td>
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<tr>
<td>9. University of Malta</td>
<td>Malta</td>
<td>41.9</td>
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<tr>
<td>Georgios N. Yannakakis, Antonis Liapis, Stefano Guadagni &amp; 5 more</td>
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<td></td>
</tr>
</tbody>
</table>

Source

AND OH YES, #1 IN TECHNICAL GAMES RESEARCH

(IF GRAD SCHOOL IS YOUR THING)
Game Data Science
Magy Seif El-Nasr et al.

How Pac-Man Eats
Noah Wardrip-Fruin

How Games Move Us
Katherine Isbister

I AM ERROR
Nathan Altice
PHYSARUM TELAM
Creative Coding Lab
AFRO HAIR LIBRARY

OPEN SOURCE AFRO HAIR LIBRARY

OPEN CALL FOR 3D ARTISTS

H. D. HARRIS
BLACK FUTURES SERIES

Submissions Are Now Closed

The Open Source Afro Hair Library (OSAH) is a feminist anti-racist database for 3D models of Afro hair. The library is aimed at providing a resource for artists, designers, and educators who want to use 3D models of Afro hair in their work. The library features a variety of styles, from natural to highly styled, and is designed to be inclusive and representative of the diversity of Afro hair.

AFRO HAIR LIBRARY

a.m. darke
WINNER – Sin Sol / No Sun

Impact Award

The Impact Award honors a game which explores social, cultural, and/or political issues in a whole new way. It may take us out of our comfort zones, and confront us directly on social progress yet to be done, or mark a real change in the industry. Impact isn’t simply about diversity or doing good in the world. It can be creating new access points for unlikely players engaging with unlikely topics, new points of connection for people across the globe, or new shared experiences that resonate in our modern culture.

“Honoring works that seek to expand understanding, compassion and insight, with a focus on changing the world we live in through the practice of play.” —

JURY

For bringing awareness to how climate change disproportionately effects immigrants, trans people and disabled people while balancing these issues with guidance from a comforting dog and astute AI, it is our honor to award for Impact Sin Sol / No Sun and its gamers Michi Cardenas, Marcelo Viana Neto, Adrian Phillips, Farah Stone, Abraham Avinsan, Wynne Greenwood, Dorothy Santos, Morgan Thomas, Zia Puig, and Clara Qin.

Sin Sol / No Sun is an augmented reality art game that calls on us all to be with the grief caused by climate change. Taking place fifty years in the future but reflecting the present, walk through the poetic tellings of trans Latinx AI hologram Aura as she conveys being trapped inside because of wildfire smoke. The environmental collapse of her past is our 2020 present. IndieCade recognizes the

micha cardenas, Marcelo Viana Neto, et al
Social media, including virtual worlds, has the potential to support children with autism in making friendships, learning pro-social behavior, and engaging in collaborative play with their peers. However, currently, little is known about how children with autism interact socially in online spaces. Furthermore, there is much more to learn about how technology can support these collaborative interactions. In this study, I propose investigating how a virtual world can be intentionally run alongside other complementary social media (e.g., website, forum, Facebook, Twitter, and Google+) specifically for children with autism. The contribution of this work is to create guidelines for creating social media systems (including virtual worlds) to support social interactions of children with autism.

Current Publications:
Kathryn E. Ringland. 2019. A Place to Play: The i(Dis)abled Embodied Experience for Autistic Children in Online Spaces. In CHI 2019 [PDF] [BLOG]
Mad Mixologist

ALT Games Lab @ UCSC

In the world of Mad Mixologist, two scientists set out to create the perfect drink. However, during their final experiment, an accident occurred and their vision became swapped. Now each mixologist can only see from the eyes of the other, and they must quickly work together to complete their ultimate drink before it is too late!

Mad Mixologist is a collaborative two-player alternative controller game that uses AR and perspective switching as the main mechanic to encourage understanding of another’s viewpoint. In the game, players use customized VR headsets which have been modified to capture and broadcast video of the view from the front of the headsets. However, rather than looking out of the headsets normally, each player is instead shown video from the other player’s camera/view (i.e., swapping perspectives). In this way, each player is looking at themselves from the other player’s viewpoint when playing, and have to consider how the other player might be seeing their video feed as well. During gameplay, players create an edible non-alcoholic drink by taking turns completing 1 step of the “perfect drink” recipe. Each player will be instructed to either a) pour 1 ingredient into another, b) mix multiple ingredients together, or c) garnish the drink appropriately. When each task is complete, they ring their service bell to move on to the
MJ LITERALLY MADE SPYRO AND WENT TO COMIC-CON TO TALK ABOUT IT
Kate Compton, Northwestern University
April Grow, Cal Poly San Luis Obispo
Joe Osborn, Cal Poly Pomona
Gillian Smith, Worcester Polytechnic Institute
Mike Treanor, American University
Josh McCoy, UC Davis
Ben Samuel, Univ. of New Orleans
Anne Sullivan, Georgia Institute of Technology
Peter Mawhorter, Wellesley College
AGPM

Our Partner Program

The Games + Playable Media BA is the partner program to the CS: Game Design BS.

You’ll take the 80x classes, the programming sequence, and CMPM120 with them.

You then ascend to your glorious Final Form together in the 170 sequence. 💞
MAJOR QUALIFICATIONS

Core courses: GPA of 2.8 or higher

Applied Discrete Mathematics: CSE 16

Calculus course: MATH 19A or MATH 20A

Programming sequence: CSE 30 + CSE 12 + (ECE 13 or CSE 13S)

No grade of C or lower in any major qualification course

[ See this page for more details ]
Students are required to take

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 16</td>
<td>Applied Discrete Mathematics</td>
<td>5</td>
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</tbody>
</table>

And one of the following calculus courses

**Either these courses**

<table>
<thead>
<tr>
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<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 19A</td>
<td>Calculus for Science, Engineering, and Mathematics</td>
<td>5</td>
</tr>
</tbody>
</table>

**or these courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 20A</td>
<td>Honors Calculus</td>
<td>5</td>
</tr>
</tbody>
</table>

And a core programming sequence to include one of the following group of classes

**Either these courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CSE 12</td>
<td>Computer Systems and Assembly Language and Lab</td>
<td>7</td>
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<tr>
<td>CSE 30</td>
<td>Programming Abstractions: Python</td>
<td>7</td>
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<tr>
<td>ECE 13</td>
<td>Computer Systems and C Programming</td>
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</tr>
<tr>
<td>CSE 13S</td>
<td>Computer Systems and C Programming</td>
<td>7</td>
</tr>
</tbody>
</table>

A GPA of 2.8 must be obtained in the foundation courses attempted at UCSC.

Declaration of the major can happen no sooner than the student's second quarter, and no later than the campus deadline.

No more than 7 credits of C-, D+, D, D-, F, or NP coursework are permitted for foundation courses.

[ See the CS:CGD Catalog for more info ]
BEHOLD THY CHAIN OF PRE-REQUISITE COURSES
Note: Not every class is here. This is just an example. 👍
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HEED THIS WARNING LEST YE BE DOOMED

12  101  111

Computer Systems & Assembly Language  Intro to Data Structures  Advanced Programming

THESE CLASSES REQUIRE A LOT OF TIME, EFFORT, AND STUDY
Note: Not every class is here. This is just an example. 👍
DON’T WORRY,
YOU’LL HAVE
THIS HANDY CURRICULUM CHART TO HELP YOU CHOOSE THE TRUE PATH
SUPPORTED COURSES
CSE 12, CSE 16, CSE 20, CSE 30
INDUSTRY ROLES

OR, WHAT CLASSES SHOULD I TAKE IF I WANT TO BE A [INSERT JOB HERE]?
I’d like to be a…

GAMEPLAY
PROGRAMMER

CSE 111: Advanced Programming
CMPM 120: Game Development Experience
CMPM 121: Game Technologies
CMPM 146: Game AI
CMPM 163: Game Graphics & Real-Time Rendering
CMPM 164: Game Engines
CSE 120: Computer Architecture
CSE 131: Introduction to Operating Systems
CSE 112: Comparative Programming Languages
CSE 115A: Introduction to Software Engineering
CSE 160: Introduction to Computer Graphics
I’d like to be a...

TECHNICAL ARTIST

CSE 111: Advanced Programming
CMPM 120: Game Development Experience
CMPM 25: Introduction to 3D Modeling
CMPM 26: Introduction to 3D Animation
CMPM 27: Substance Painter
CMPM 147: Generative Design
CSE 160: Introduction to Computer Graphics
CSE 161: Introduction to Data Visualization
CSE 162: Advanced Computer Graphics & Animation
CSE 163: Data Programming for Visualization
CMPM 163: Game Graphics & Real-Time Rendering
CMPM 164: Game Engines
CMPM 169: Creative Coding
I’d like to be a...

GAME DESIGNER

- ARTG 80I: Foundations of Play
- CMPM 80K: Foundations of Videogame Design
- CMPM 120: Game Development Experience
- CMPM 176: Game Systems
- CMPM 170/171/172: Game Design Studio I/II/III
- CMPM 146: Game AI
- CMPM 147: Generative Design
- CMPM 148: Interactive Narrative
- CMPM 164: Game Engines
- CMPM 178: Human-Centered Design Research
- CMPM 179: Game Design Practicum
I’d like to be a...

GAME DESIGNER

Note: If you find that you strongly prefer game design without the technical/programming components, you should consider whether the Art and Design: Games and Playable Media degree is a better fit.
I’d like to be a...

GAME AUDIO DESIGNER

CMPM 150: Creating Digital Audio
 CMPM 151: Algorithmic Music for Games
 CMPM 152: Musical Data

Apply to the Electronic Music Minor
Find like-minded students in GDA
Be very proactive!
GAME CAREER ADVICE
STEPPING OFF THE ESCALATOR
The data

• Around 900 games were released on Steam between July 5 – August 6, 2019
• Any game that did not achieve 10+ user reviews was removed (around 700 titles removed, i.e. around 78% of released titles will make less than $5,000 in their first year)
• AAA titles removed (not particularly useful knowing how Wolfenstein sold)
• Then, the top and bottom 5% (ranked by revenue made) were removed, to reduce noise from outliers
• The data left contains roughly 170 games released between these dates

Regardless, these are still all estimates, and should be treated as such.
How games were selling on Steam a year ago

In 2018, the average game on Steam:

• Sold 5,000 copies (5,000 median, 25,000 mean)
• Made $30,000 in revenue ($30,000 median, $275,000 mean)

In the first year on sale
At an average price point of $12 ($12 median, $13 mean)

(See my previous GDC talk Let's Be Realistic: A Deep Dive into How Games Are Selling on Steam for more info)
How games are selling on Steam now

According to the 2019 data, currently the average game on Steam:

• Sells 1,500 copies (1,500 median, 3,000 mean) (Down 70% yoy)
• Makes $16,000 in revenue ($16,000 median, $46,000 mean) (Down 47% yoy)

In the first year on sale
At an average price point of $10 ($10 median, $11 mean)

(Note that “revenue” here means money that hit the developer’s bank account, after Valve’s cut, refunds, chargebacks, estimated taxes etc)