David Durst

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EDUCATION

Stanford University, Stanford, CA — 2017 – 2024
Degrees: Ph.D. in Computer Science (2024); M.S. in Computer Science (2021) — GPA: 4.00
Dissertation: Efficiently Imitating Human Movement in Counter-Strike
Advisors: Kayvon Fatahalian, Pat Hanrahan

Princeton University, Princeton, NJ — 2011 – 2015
Degree: B.S.E. in Computer Science with Certificate (Minor) in Finance, *summa cum laude* — GPA: 3.95
Advisors: Mark Braverman, Kai Li

ACADEMIC RESEARCH

Efficiently Imitating Human Movement in Counter-Strike — 2021 – Present
Advisors: Kayvon Fatahalian and Pat Hanrahan
github.com/David-Durst/csknow, davidbdurst.com/blog/

- Analyze human behavior traces and train model to imitate humans
- Train transformer-based learned movement controller in AI performance constraints of a commercial video game
- Curate 123-hour dataset of expert human movement
- Design and execute user study demonstrating learned movement model best imitates humans
- Create quantitative metrics evaluating similarity to human behavior distribution
- Manage online community of subject matter experts for user study and general feedback

Aetherling: Type-Directed Scheduling of Streaming Accelerators — 2018 – 2021
Advisors: Kayvon Fatahalian, Pat Hanrahan, and Marco Patrignani
aetherling.org

- Created languages: express image processing applications that compile to statically scheduled, streaming hardware accelerators
- Developed space-time type system: express trade-offs between throughput and resource utilization
- Implemented auto-scheduling compiler: trade-off throughput and resources while preserving semantics with type-directed rewrite rules
- Generated FPGA designs: use fewer resources than designs created by comparable systems

SELECT RESEARCH PROJECTS

Revisiting Structure vs. Learning — 2023
davidbdurst.com/blog/csknow_revisiting_structure_vs_learning_tradeoff.html
Narrowly defined bot behavior components fail to capture the full complexity of human behavior

A Hand-Crafted Structure for Imitation Learning — 2022
davidbdurst.com/blog/csknow_behavior_tree_bots_0_1.html
A structure for bots that imitates human behavior to enable an understanding of human behavior

Computing Good Crosshair Placements Using RLpbr's GPU Ray Tracing — 2021
davidbdurst.com/blog/csknow_cover_edge.html
Compute analytics for where humans are likely to look based on map geometry

PUBLICATIONS AND INDUSTRY WHITE PAPER

Learning to Move Like Professional Counter-Strike Players
Durst, Xie, Sarukkai, Shacklett, Frosio, Tessler, Kim, Taylor, Bernstein, Choudhury, Hanrahan, Fatahalian
Symposium on Computer Animation (SCA) 2024

Hallucinations: Baiting Cheaters Into Self-Identifying by Reversing Detection
Durst, Taylor
activision.com/cdn/research/hallucinations 2023

Type-Directed Scheduling of Streaming Accelerators
Durst, Feldman, Huff, Akeley, Daly, Bernstein, Patrignani, Fatahalian, Hanrahan
Programming Language Design and Implementation (PLDI) 2020

AHA: An Agile Approach to the Design of Coarse-Grained Reconfigurable Accelerators and Compilers
Koul, Melchert, Sreedhar, Truong, Nyengele, Zhang, Liu, Setter, Chen, Mei, Strange, Daly, Donovick, Carsello, Kong, Feng, Huff, Nayak, Setaluri, Thomas, Bhagdikar, **Durst**, Myers, Tsiskaridze, Richardson, Bahr, Fatahalian, Hanrahan, Barrett, Horowitz, Torng, Kjolstad, Raina
ACM Transactions on Embedded Computing Systems (TECS) 2023

Creating an Agile Hardware Design Flow
Bahr, Barrett, Bhagdikar, Carsello, Daly, Donovick, **Durst**, Fatahalian, Feng, Hanrahan, Hofstee, Horowitz, Huff, Kjolstad, Kong, Liu, Mann, Melchert, Nayak, Niemetz, Nyengele, Raina, Richardson, Setaluri, Setter, Sreedhar, Strange, Thomas, Torng, Truong, Tsiskaridze, Zhang
Design Automation Conference (DAC) 2020

PRESENTATIONS

Hallucinations: Baiting Cheaters Into Self-Identifying by Reversing Detection, 2023
Game Developers Conference (GDC) 2023 – Online Game Technology Summit

Aetherling: Type-Directed Scheduling of Streaming Accelerators, PLDI 2020
youtu.be/hsFMzMnbugk

TopNotch: Systematically Quality Controlling Big Data, Spark Summit East 2016
youtu.be/PViAlNQ1q5s

PROFESSIONAL ACTIVITIES

The First Workshop on Computer Vision for Video Games (CV^2) 2024
Program Cmte Member, European Conference on Computer Vision

Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE) 2021 2021
Program Cmte Member, Architectural Support for Programming Languages and Operating Systems

TEACHING EXPERIENCE

CS 348K: Visual Computing Systems, Course Assistant, Stanford University 2021

CS 149: Parallel Computing, Course Assistant, Stanford University 2020

COS 318: Operating Systems, Teaching Assistant, Princeton University 2013

WORK EXPERIENCE

Roblox Corporation, San Mateo, CA 2024 – Present
Senior Machine Learning Engineer, Creator Services Natural Language Processing
- Leading project on human-like agents trained from human demonstrations
- Optimizing translation model inference cost

Activision Blizzard, Inc., Remote 2021 – 2022
Student Associate, Global Analytics
- Developed software for behavioral anti-cheat feature and deployed in production Call of Duty game
- Modeled player churn using survival analysis techniques

Adobe Inc., Remote 2020
Creative Technologies Lab Intern
- Prototyped Halide-to-FPGA compilation toolchain, modeled performance on FPGAs, CPUs, GPUs, and DSPs

BlackRock, Inc., New York, NY 2014, 2015 – 2017
Financial Modeling Group Intern & Analyst
- Led software development for big data quality control and visualization systems using Spark

Bridgewater Associates, LP, Westport, CT 2013
Technical Associate Intern, Research Technology

SELECT SKILLS

Python (PyTorch, NumPy, etc) C/C++, Haskell, Java, Scala, Spark, Linux, Databases, Cloud Computing, Chisel, Magma

AWARDS HONORS ACTIVITIES

National Science Foundation Graduate Research Fellowship 2017 – 2022
Stanford Graduate Fellowship in Science & Engineering 2017 – 2022
Phi Beta Kappa (early induction for 27 members of graduating class) 2014
Mentor, Stanford Undergraduate Research Association 2020 – 2023
Code/Interactive, a Code.org Partner, Mentor NYC High School Students 2015 – 2017