Liam Dugan

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Education

University of Pennsylvania — Philadelphia, PA
Ph.D, Computer Science (Advisor: Chris Callison-Burch) — *Aug. 2021 – Present*
M.S.E, Robotics (GPA: 3.80/4.00) — *Aug. 2017 – Dec. 2020*
B.S.E, Computer Engineering & East Asian Studies (GPA: 3.63/4.00) — *Aug. 2015 – Aug. 2020*

Doshisha University 同志社大学 — Kyoto, Japan
(Study Abroad) Kyoto Consortium of Japanese Studies (GPA: 3.70/4.00) — *Jun. 2017 – Aug. 2017*

Work Experience

Roblox — San Mateo, CA
PhD Research Intern — *Jun. 2022 - Aug. 2022*
- Developed a simultaneous speech-to-speech translation system with speaker preservation for Roblox in-game chat.
- Compared cascaded ST+TTS systems to end-to-end S2UT and S2SPECT. Work accepted to INTERSPEECH

John's Hopkins University — Baltimore, MD
Visiting Research Scholar — *Jun. 2021 - Aug. 2021*
- Worked on training Machine Translation for Cross-Lingual IR by ignoring non-content words in training data
- Trained model from scratch and improved NDCG' in Russian-English, Farsi-English, and Chinese-English.

NVIDIA — Santa Clara, CA
Autonomous Driving Software Intern — *Jun. 2019 – Aug. 2019*
- Assisted development of a platform for on-demand downloads of self-driving car software
- Custom docker images are requested by engineers through a Jenkins server and images come pre-installed with latest software and can then be flashed onto vehicle hardware. Deployed to 500+ developers on NVIDIA DRIVE.

Robotic Research LLC — Clarksburg, MD
Software Engineering Intern — *Jun. 2018 – Aug. 2018*
- Worked on Velodyne VLP-16 LIDAR at the driver level for Autonomous Ground Resupply convoys
- Developed and prototyped novel object classifiers for sun speckles, dust, and vegetation
- Used a PCA-based volumetric analysis to tag neighboring points in a point cloud as possible vegetation or humans

Technical Skills

Natural Languages: English (native), Japanese (advanced - 5+ years [JLPT N2]), Korean (elementary - 0.5 years)
Programming Languages: Python, C/C++, bash, CUDA, Java, JavaScript, Go, HTML/CSS, Verilog, MATLAB
Frameworks: PyTorch, Tensorflow, OpenCV, DXR, Vulkan, OpenGL, WebGL, React, Node, Gatsby, Django
Developer Tools: Git, Docker, Google Cloud Platform, VS Code, emacs, Atom, tmux

Publications

Liam Dugan, Anshul Wadhawan, Kyle Spence, Chris Callison-Burch, Morgan McGuire, Victor Zordan. Learning When to Speak: Latency and Quality Trade-offs for Simultaneous Speech-to-Speech Translation with Offline Models. In *Proc. Interspeech 2023*, Dublin, Ireland, August 2023. (To Appear)

Hannah Gonzalez, **Liam Dugan**, Eleni Miltsakaki, Zhiqi Cui, Jiaxuan Ren, Bryan Li, Shriyash Upadhyay, Etan Ginsberg, Chris Callison-Burch. Enhancing Human Summaries for Question-Answer Generation in Education. In *Workshop on Innovative Use of NLP for Building Educational Applications*, Toronto, Canada, July 2023. (To Appear)

Li Zhang*, **Liam Dugan***, Hainiu Xu*, Chris Callison-Burch. Exploring the Curious Case of Code Prompts. In *Workshop on Natural Language Reasoning and Structured Explanations*, Toronto, Canada, July 2023. **Selected for Oral Presentation**

Liam Dugan*, Daphne Ippolito*, Arun Kirubarajan, Sherry Shi, Chris Callison-Burch. Real or Fake Text?: Investigating Human Ability to Detect Boundaries between Human-Written and Machine-Generated Text. In *Proceedings of the AAAI Conference on Artificial Intelligence*, volume 37(11), pages 12763–12771, Washington, D.C., Jun. 2023. **Selected for Oral Presentation**

Aarohi Srivastava, Abhinav Rastogi, and **(440 others)**. Beyond the imitation game: Quantifying and extrapolating the capabilities of language models. *Transactions on Machine Learning Research*, May 2023

S. Upadhyay, E. Ginsberg, **Liam Dugan**, E. Miltsakaki, H. Gonzalez, D. Choi, C. Yuan, and C. Callison-Burch. Question generation for textbook flashcards. In *EDULEARN22 Proceedings*, 14th International Conference on Education and New Learning Technologies, page 3412. IATED, July 2022

Daphne Ippolito, **Liam Dugan**, Emily Reif, Ann Yuan, Andy Coenen, and Chris Callison-Burch. The case for a single model that can both generate continuations and fill-in-the-blank. In *Findings of the Association for Computational Linguistics: NAACL 2022*, pages 2421–2432, Seattle, United States, July 2022

Liam Dugan, Eleni Miltsakaki, Shriyash Upadhyay, Etan Ginsberg, Hannah Gonzalez, DaHyeon Choi, Chuning Yuan, and Chris Callison-Burch. A feasibility study of answer-agnostic question generation for education. In *Findings of the Association for Computational Linguistics: ACL 2022*, pages 1919–1926, Dublin, Ireland, May 2022

Liam Dugan. Learning Formality from Japanese-English Parallel Corpora. Master's thesis, U. of Penn, December 2020

Liam Dugan*, Daphne Ippolito*, Arun Kirubarajan*, and Chris Callison-Burch. RoFT: A Tool for Evaluating Human Detection of Machine-Generated Text. In *Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing: System Demonstrations*, pages 189–196, Online, October 2020. Association for Computational Linguistics

Zhengyi Luo, Austin Small, **Liam Dugan** and Stephen Lane. Cloud Chaser: Real Time Deep Learning Computer Vision on Low Computing Power Devices. *Eleventh International Conference on Machine Vision (ICMV 2018)*, Mar 2019

Teaching Experience

Teaching Assistant

- CIS700 (Interactive Fiction & Text Generation) – Spring 2022
- CIS565 (GPU Programming & Architecture) – Fall 2021
- CIS530 (Computational Linguistics) – Spring 2020, Fall 2020, Summer 2023
- CIS380 (Operating Systems) – Fall 2018, Spring 2019, Fall 2019 (Head TA)
- CIS240 (Introduction to Computer Systems) – Spring 2017, Fall 2018, Spring 2018

Guest Lectures

- CIS565 (GPU Programming): "Optimizing Machine Learning with CUDA" – Fall 2021, Fall 2022
- CIS565 (GPU Programming): "Introduction to Machine Learning" – Fall 2021, Fall 2022
- CIS380 (Operating Systems): "Linux Page Replacement Algorithms and Belady's Anomaly" – Fall 2019

Authored Homework Assignments

- CIS530 (Computational Linguistics): "HW7: Fine-Tuning Pre-Trained Language Models" – June 2023
- CIS530 (Computational Linguistics): "HW7: Transformers and State-of-the-Art Language Models" – Nov. 2020
- CIS530 (Computational Linguistics): "HW10: Neural Machine Translation" (with Li "Harry" Zhang) – Apr. 2020

Fellowships, Awards And Honors

Fellowships and Grants

- (August 2022) Roblox Research Grant – $100,000
- (October 2021) Google Cloud Platform Research Grant – $5,500
- (October 2018) FLAS: Foreign Language and Area Studies Undergraduate Fellowship (East Asia) – $15,000

Academic Honors & Awards

- (May 2020) Penn Engineering Exceptional Service Award
- (May 2020) Moore School Council Cwikla Award (Most Improved Student) [Nominated]
- (May 2019) Third Place: Penn Engineering Computer Science Senior Design

Hackathon Awards

- (February 2018) Most Innovative Use of Technology: Wharton Undergrad FinTech (WUFT) Hacks
- (January 2018) Grand Prize & Best use of Cloud Hosting: PennApps XVII **(1st out of 156 teams)**
- (September 2017) Third Prize: PennApps XVI **(3rd out of 158 teams)**

Presentations, Posters and Talks

Conference Talks

- "Exploring The Curious Case of Code Prompts" - NLRSE Workshop @ ACL 2023, Toronto Canada
- "Real or Fake Text: Investigating Human Ability to Detect Boundaries between Human-Written and Machine Generated Text" - AAAI 2023, Washington D.C. (video) (slides) (poster)

Invited Talks

- "Should we still use Text for Speech-to-Speech Translation? Promise meets Practice" - John's Hopkins University HLTCOE Seminar, Baltimore MD, May 2023 (slides)
- "Real or Fake Text: Investigating Human Ability to Detect Boundaries between Human-Written and Machine Generated Text" - Brown University, Providence RI, March 2023 (slides)
- "Detecting Generated Text from ChatGPT and other LLMs" - Penn Critical Writing Seminar, Philadelphia PA (Virtual), Feb. 2023 (slides)
- "Intro to Machine Learning and AI Research" St. Joe's Prep High School, Philadelphia PA, Feb. 2022 (slides)

Poster Presentations

- "Learning When to Speak: Latency and Quality Trade-offs for Simultaneous Speech-to-Speech Translation with Offline Models" - Interspeech 2023
- "Enhancing Human Summaries for Question-Answer Generation in Education" - BEA Workshop @ ACL 2023
- "The Case for a Model that can both Generate Continuations and Fill in Blanks" - NAACL 2022 (video)
- "A Feasibility Study of Answer-Agnostic Question Generation for Education" - ACL 2022 (video) (slides) (poster)
- "RoFT: A Tool for Evaluating Human Detection of Machine Generated Text" - EMNLP 2020 (poster)

Project Presentations

- "Learning Formality from Japanese-English Parallel Corpora" Master's Thesis Defense (video) (slides)
- "Scene++ VR" Penn Engineering Senior Design Demo Day (video) (poster) (slides)
- "Cloud Chaser" PennApps XVII Closing Ceremony (video)
- "Todd: The Inter-Dimensional Robot" PennApps XVI Closing Ceremony (video)

Media Appearances

News Articles

- (4/26/23) "Alien Minds, Immaculate Bullshit, Outstanding Questions" - The Pennsylvania Gazette (link)
- (4/18/23) "How can people navigate AI-generated misinformation?" - Canvas 8 (link unavailable)
- (4/11/23) "Reddit Moderators Brace for a ChatGPT Spam Apocalypse" - Vice (link)
- (3/10/23) "Real or fake text? We can learn to spot the difference" - Penn Today (link)
- (3/8/23) "A Bot Isn't Going to Take Your Place, But AI Will Make Your Job Harder" - CCI (link)
- (3/8/23) "New Study Shows People Can Learn to Spot Machine-Generated Text" - UniteAI (link)
- (3/6/23) "How can humans detect AI writing? These Penn researchers have some tips" - Technically Philly (link)
- (3/3/23) "Can Humans Detect Text by AI Chatbot GPT?" - Psychology Today (link)
- (3/2/23) "People can learn to detect AI writing" - Cosmos Magazine (link)
- (1/23/18) "Object-Seeking Robot Wins PennApps XVII" - Penn Engineering Today (link)
- (9/10/17) "At PennApps XVI, students made inter-dimensional robots and hung out with the founder of Quora" - The Daily Pennsylvanian (link)

Projects

Scene++ VR | *Oculus Rift, ZED Mini, Unity 3D, Python, YOLOv3, Paperspace* May 2019

- **Won 3rd Prize in Penn Computer Science Senior Design Competition**
- We developed a Unity API that allows VR & AR Developers to query real-world objects around the user
- Hardware: Oculus Rift headset with head-mounted ZED mini depth camera for pass-through Augmented Reality
- We use Spatial Feature Mapping of environment to allow localization and stabilization of queried objects in depth
- Offloading object detection to cloud server allows Scene++ to run on any platform with *virtually no drop in FPS*

RTX Explore | *C++, DirectX Raytracing, NVIDIA TitanV* December 2018

- **(50+ stars on GitHub)** Built the first open-source path tracer in the DirectX Raytracing GPU framework

- Features include: Dynamic model loading from .gltf and .obj, support for texture and normal maps, live editing of scene transformations through GUI interface, specular/refractive/dispersive/transmissive materials, subsurface scattering, anti-aliasing, depth of field

Banking with a Vision | *Python, Javascript, TCP, Bootstrap* February 2018

- **Won Most Innovative use of Technology at WUFT Hacks**
- Use facial key-point mapping algorithm to perform face recognition through front facing webcam
- Faces are used to access database of customer information to save bank tellers having to pull up user information

Cloud Chaser | *Python, C, TCP, AWS, YOLOv3, Alexa, Raspberry Pi, 3D Printing* January 2018

- **Won Grand Prize and Best use of Cloud Hosting at PennApps XVII (1st out of 150 teams)**
- Presented a platform that allows low resource IoT devices to do high level image processing on the cloud
- Hardware: Raspberry Pi + camera, 3D printed robot chassis & camera mount, 4 servo motors, Amazon Echo Dot
- Built robot "Chase" to demonstrate our platform. Commands are given to Chase through Echo Dot
- Paper outlining our techniques to reduce latency of streaming for IoT image detection accepted to ICMV 2018

Todd: The Inter-Dimensional Robot | *C, HC-05 Bluetooth, Arduino, Unity 3D* September 2017

- **Won Third Prize at PennApps XVI (3rd out of 158 Teams)**
- Made multiplayer game where player controlling Todd has to dodge objects only visible in virtual world
- Hardware: Arduino, breadboard, 2 servo motors, Bluetooth HC-05 controller
- USB connected Bluetooth controller allows Unity to communicate with "Todd" the robot

References

Chris Callison-Burch, Associate Professor
University of Pennsylvania
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Daphne Ippolito, Assistant Professor
Carnegie Mellon University
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