Liam Dugan

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EDUCATION

UNIVERSITY OF PENNSYLVANIA — Philadelphia, PA

Ph.D, Computer Science — *Aug. 2021 - Present*
  Advisor: Dr. Chris Callison-Burch

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*

RESEARCH EXPERIENCE

Roblox Research — San Mateo, CA
PhD Research Intern — *Jun. 2022 - Aug. 2022*

- Developed a 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 systems. Work ongoing

John's Hopkins University — Baltimore, MD
Visiting Research Scholar — *Jun. 2021 - Aug. 2021*

- Developed a novel way of fine-tuning MT models for IR by ignoring non-content words in training data
- Improvement in NDCG' observed in Russian-English, Farsi-English, and Chinese-English pairs.

University of Pennsylvania — Philadelphia, PA
Graduate Research Assistant — *Jun. 2019 – Aug. 2021*

- Led the Real or Fake Text project http://roft.io which measures how well humans can detect generated text.
- Used BERT classifiers and Adversarial Decomposition to predict English formality by training on Japanese
- Worked on the BETTER project using Machine Translation for Arabic-English cross-lingual event extraction

WORK EXPERIENCE

NVIDIA Corporation — 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
- Service was deployed to over 500 developers on the NVIDIA DRIVE Team

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

Hannah I. Gonzalez, **Liam Dugan**, Eleni Miltsakaki, Zhiqi Cui, Jiaxuan Ren, Bryan Li, Shriyash K. Upadhyay, Etan Ginsberg, Chris Callison-Burch. Enhancing Human Summaries for Question-Answer Generation in Education. In *Association for Computational Linguistics: ACL 2023*, Toronto, Canada, July 2023. (In Submission)

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 *AAAI Conference on Artificial Intelligence: AAAI 2023*, Washington D.C., United States, February 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

Aarohi Srivastava, Abhinav Rastogi, and **(440 others)**. Beyond the imitation game: Quantifying and extrapolating the capabilities of language models. *ArXiv*, abs/2206.04615, June 2022

Liam Dugan, Eleni Miltsakaki, Shriyash Upadhyay, Etan Ginsberg, Hannah Gonzalez, DaHyeon Choi, Chuning Yuan, and Chris Callison-Burch. A feasibility study of answer-unaware 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, University of Pennsylvania, 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
- 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: "Optimizing ML with CUDA" & "Introduction to ML" – Fall 2021, Fall 2022
- CIS380: "Linux Page Replacement Algorithms and Belady's Anomaly" – Fall 2019

Authored Homework Assignments
- CIS530: "HW7: Transformers and State-of-the-Art Language Models" – Nov. 2020
- CIS530: "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) Penn Engineering Computer Science Senior Design Award Third Prize

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
- (September 2017) Third Prize: PennApps XVI

PRESENTATIONS, POSTERS AND TALKS

Invited Talks
- "Intro to Machine Learning and AI Research" - St. Joe's Prep High School, Philadelphia PA, Feb. 2022
- "Can Humans Detect Boundaries Between Human-Written and Machine-Generated Text?" - University of Pennsylvania, Philadelphia PA, Jan. 2022

Poster Presentations
- "The Case for a Model that can both Generate Continuations and Fill in Blanks" - NAACL 2022
- "A Feasibility Study of Answer-Agnostic Question Generation for Education" - ACL 2022
- "RoFT: A Tool for Evaluating Human Detection of Machine Generated Text" - EMNLP 2020

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

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
- **(45+ 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**
- 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**
- 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, Research Scientist
Google
dei@google.com

Lyle Ungar, Professor
University of Pennsylvania
ungar@cis.upenn.edu

Morgan McGuire, Chief Scientist
Roblox Research
morgan@roblox.com