LIAM DUGAN

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Research Interests
Applying NLP to Education
Formality Estimation
Dialogue Systems
Text Generation

EDUCATION

M. S. E., University of Pennsylvania, 2017-2020 – GPA: 3.74
Primary Major: Robotics
Research Concentration: Natural Language Processing
Advisors: Chris Callison-Burch, Ph.D., Camillo Jose Taylor, Ph.D.

B. S. E., University of Pennsylvania, 2015-2020 – GPA: 3.62 (Excluding 1st yr. – **3.83**)
Primary Major: Computer Engineering
Secondary Major: East Asian Languages and Civilizations – Japanese Concentration
Certificate: Japanese Language Proficiency
Advisor: Boon Thau Loo, Ph.D., Insup Lee, Ph.D., David Spafford, Ph.D.

PUBLICATIONS

Dugan, L., Kriz, R., Gross, G., Huang, T., Callison-Burch, C., (Under Review). "Semi-Formal: Semi-supervised formality estimation with Japanese-English parallel corpora" *Annual Conference of the Association for Computational Linguistics (ACL 2020)*

Luo, Z., Small, A., **Dugan, L.**, Lane, S. (2019). "Cloud Chaser: real time deep learning computer vision on low computing power devices" *Eleventh International Conference on Machine Vision (ICMV 2018)*

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Pennsylvania, 2019-2020
Currently leading efforts with Dr. Chris Callison-Burch to analyze errors in how transformer based text generation models such as GPT-2 maintain world state. Previously worked with Dr. Callison-Burch on project Semi-Formal leveraging English-Japanese parallel corpora to allow for a semi-supervised approach to formality estimation.

Undergraduate Research Assistant, University of Pennsylvania, 2018
Worked under Dr. Boon Thau Loo and Nik Sultana on DeDOS, a project to mitigate distributed denial-of-service attacks.

WORK EXPERIENCE
Autonomous Driving Software Intern, NVIDIA Corporation, Santa Clara CA, 2019
Assisted development of platform to pre-install software and flash car hardware within an on-demand docker container through a Jenkins server. Deployed to over 500 developers

Software Engineering Intern, Robotic Research LLC, Clarksburg MD, 2018
Worked with Velodyne VLP-16 LIDAR at driver level developing and prototyping novel object classifiers for sun speckles, dust, and vegetation—requiring extensive paper surveys.

TEACHING EXPERIENCE
Head Teaching Assistant, University of Pennsylvania, 2019
(Fall 2019) CIS380 -- Operating Systems, 144 Students

Teaching Assistant, University of Pennsylvania, 2017-2020
(Spring 2020) CIS530 -- Computational Linguistics, 150 Students
(Spring 2019) CIS548 -- OS Design and Implementation, 89 Students
(Fall 2018) CIS380 -- Operating Systems, 125 Students
(Spr. '18, Fall '17, Spr. '17) CIS240 -- Introduction to Computer Architecture, ~150 Students
(Summer 2017) SD4x – Programming for the Web with Javascript, 7,000+ Students

PROJECTS & PRESENTATIONS
(December 2019) **"Semi-Formal"** Achieved 2% improvement over SOTA binary formality classification models through leveraging Japanese-English parallel corpora to train a BERT model. Paper submitted to ACL 2020

(May 2019) **"Scene++"** Presented a method for feasibly adding computer vision to AR/VR environments *without* incurring nauseating performance drops. Objects are identified through a cloud-based R-CNN model and localized through depth-based feature mapping in a pass-through AR/VR environment – all while experiencing *virtually no decrease in FPS.* Demoed live with an Oculus Rift/ZED mini prototype rig. Won 3rd Place in Computer Science Senior Design. Qualified for one of 15 spots in the school-wide competition.

(December 2018) **"RTX-Explore"** Presented the first open source Path Tracer built within the new DirectX Raytracing (DXR) Graphics API. This allowed our path tracer to run much faster than was previously possible. The associated github repository has over 40 stars.

(January 2018) **"Cloud Chaser"** Presented at PennApps XVII -- The largest student run collegiate hackathon in the world. Created a platform for offloading computer vision tasks to cloud servers to allow low powered IoT robots to do high level inference. Won Grand Prize and Best use of Cloud Computing. Paper accepted to ICMV 2018. (News Article #1 #2)

(September 2017) "**[Todd: The Interdimensional Robot](#)**" Presented at PennApps XVI -- The largest student run collegiate hackathon in the world. Demonstrated our idea of pairing elements from the real and virtual world for a new type of multiplayer game experience by linking Arduino and Unity3D in a novel way. <u>Won 3rd Prize</u>.

(August 2017) **"自動運転"** Talk given (in Japanese) at Doshisha University (同志社大学) as part of the Kyoto Consortium of Japanese Studies on the rate of adoption of Self-Driving cars in Japanese Society.

(May 2017) **"Fix Yourself"** Presented at Embedded Microprocessor Systems class demo day. Introduced a low power posture tracker device that attaches to a user's back, vibrates when posture is off, and transmits posture data to a web server. This idea would later be taken separately to market by startups such as Upright and Lumo Lift.

GRANTS AND FELLOWSHIPS
Foreign Language and Area Studies Undergraduate Fellowship -- Japanese (2018-19)

AWARDS AND HONORS
Penn Engineering Exceptional Service Award
3rd place -- Computer Science Senior Design competition
1st place, Best use of Cloud Hosting -- PennApps XVII
3rd place -- PennApps XVI
Dean's List 2017-2018
Dean's List 2016-2017

CERTIFICATIONS
Japanese Language Proficiency Test: N2

TECHNICAL SKILLS
Programming: Python, C++, C, PyTorch, CUDA, Java, Javascript, bash, Docker, ROS, PCL, MATLAB, Go, OpenCV, OpenGL, Vulkan, WebGL, DXR, Verilog, React, Node
Business Fluent in Japanese, can speak, read, and write at advanced level

REFERENCES

Boon Thau Loo, RCA Prof. of Comp. Sci.
Director – Distributed Systems Lab
University of Pennsylvania
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Chris Callison-Burch, Assoc. Prof of Comp. Sci.
Natural Language Processing
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