Dominic Roberts

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EDUCATION

07/2021 **PhD in Computer Science,** UIUC, Urbana, IL, USA.
- Advisors: David Forsyth and Mani Golparvar-Fard
- Thesis: Vision-based monitoring and design of built environments
- GPA: 3.97/4.00

09/2015 **MSc in Applied Mathematics,** Université de Lille 1, Lille, France

09/2015 **BSc/MSc in Data Science,** École Centrale de Lille, Lille, France

PROFESSIONAL EXPERIENCE

07/2021 – present **Applied Scientist II @ Amazon**, Seattle, WA, USA
- I am developing and productionizing computer vision models for Just Walk Out technology in Amazon Go stores.

01/2016 – 07/2021 **Graduate Research Assistant @ UIUC,** Urbana, IL, USA
- Built Django- and Unity-based tools for crowdsourcing and QC'ing 2000 man-hours of per-frame pose/activity annotation in videos
- Used deep learning object detection (YOLOv3, Faster R-CNN, RetinaNet)/tracking (FCNT) and pose estimation (AlphaPose, OpenPose)/ tracking (PoseFlow) methods to determine construction resource bounding boxes and body joints
- Designed frameworks for categorizing construction activities from visual data based on SVMs/HMMs/Temporal Convolutional Networks
- Devised means of encouraging boundaries between semantic classes in outputs of semantic segmentation methods (GSCNN, HRNet, PSPNet) to lie along lines

05-08/2020 **Research Intern @ Autodesk AI Lab**, Toronto, ON, Canada
- Developed generative models for 3D part hierarchies using PyTorch

05-08/2017 **Research Development Intern @ AutonomouStuff,** Peoria, IL, USA
- Implemented models for detecting and localizing pedestrians/cars/trucks, based on YOLOv2, on the NVIDIA PX2

05-08/2015 **Software Engineering Intern @ Bluefern,** Christchurch, New Zealand
- Designed software for developing equations modelling neurovascular coupling

01-07/2014 **Web Development Intern @ Rookiz**, Paris, France
- Performed front-end and back-end development for a Kickstarter-style crowdfunding website

07-12/2013 **Image Processing Intern @ Arcelor-Mittal,** Maizières, France
- Compared software for detecting defects in hot-strip steel from videos

IT SKILL SET

Languages:	Python, C/C++, MATLAB, JavaScript, Java, R, Swift
Deep learning:	PyTorch, TensorFlow, Caffe, MatConvNet
Other:	GNU/Linux, Unity, Google Tango, ROS, SQL, HTML, CSS

SELECTED PUBLICATIONS

2021 **LSD-StructureNet: Modeling Levels of Structural Detail in 3D Part Hierarchies**
D. Roberts, A. Danielyan, H. Chu, M. Golparvar-Fard, D. Forsyth
ICCV 2021

2020 **Synthesizing pose sequences from 3D assets for vision-based activity analysis**
W. Torres Calderon, *D. Roberts*, M. Golparvar-Fard
Journal of Computing in Civil Engineering

2020 **Vision-based construction worker activity analysis informed by body posture**
D. Roberts, S. Tang, W. Torres Calderon, M. Golparvar-Fard
Journal of Computing in Civil Engineering

2020 **Human-object interaction recognition for automatic construction site safety inspection**
S. Tang, *D. Roberts*, M. Golparvar-Fard
Automation in Construction

2019 **End-to-end vision-based detection, tracking and activity analysis of earthmoving equipment filmed at ground level**
D. Roberts, M. Golparvar-Fard
Automation in Construction

2019 **An annotation tool for benchmarking methods for automated construction resource pose estimation and activity analysis**
D. Roberts, M. Wang, W. Torres Calderon, M. Golparvar-Fard
2019 International Conference on Smart Infrastructure and Construction

2019 **Annotating 2D imagery with 3D kinematically configurable assets of construction equipment for training pose-informed activity analysis and safety monitoring algorithms**
D. Roberts, Y. Wang, A. Sabet, M. Golparvar-Fard
2019 ASCE International Conference on Computing in Civil Engineering

2018 **Vision-based construction activity analysis in long video sequences via Hidden Markov Models: experiments in earthmoving operations**
D. Roberts, M. Golparvar-Fard, J. Carlos Niebles, J. Gwak, R. Bao
2018 Construction Research Congress

2017 **Detecting and classifying cranes using camera-equipped UAVs for monitoring crane-related safety hazards**
D. Roberts, T. Bretl, M. Golparvar-Fard
2017 ASCE International Workshop on Computing in Civil Engineering