Ammar Husain

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Publicly shared second-brain

Experienced software engineer, tinkerer and technology lead with deep expertise in embodied and general AI/ML. I thrive in roles that involve developing state of the art AI and are at the intersection of applied research with a product focus.

GOOGLE, EVERYDAY ROBOT PROJECT @ X - Mountain View, CA

DRI - Humans-in-the-loop : Jan 2022 - March 2023

- Created the HitL vision along with a decomposed technical paradigm of awareness, assistance and learning for robots to seek help, get assistance and learn from failure.
- Led a cross functional team to build a tool, framework and analytics for measuring requested and unrequested robot interventions.
- Led the design and development of a remote robot assistance system to complement the autonomous capabilities.
- Implemented open vocabulary detectors and fine tuned VLM models to query for environmental anomalies. Explored Language x Actions as a mode for human instruction leveraging LLMs for high level reasoning.
- Co-led the development of autonomy roadmaps and the constituent milestones the team needs to meet in order to deliver customer value.
- Filed 7 patents

Tech Lead - Navigation Perception : Jan 2019 - Jan 2022

- Created & managed the north-star vision for enabling smoother robot navigation. Enlisted various stakeholders to deliver in service of that vision.
- Designed and implemented algorithms to enable navigating over ramps.
- Drove the execution, implementation & deployment of AutoLook, a feature that enables the robot to actively perceive the environment via moving its head to explore areas of interest. Augmented this active perception module to periodically collect data for annotation.
- Demonstrated initiative and provided technical leadership, from conception to production, for a framework for triaging field issues by robot operators. This enabled massively scaling operations and has grown into a self-sustained & growing team of < 8 people, analyzing < 100 reported issues per day.
- Implemented a scenario evaluation pipeline to test the robustness of the robot perception system and detect regressions early.
- Fully owned & implemented a library for synchronizing messages of differing frequencies given various criteria. This removed boiler plate synchronization logic and encapsulated it within a library thereby reducing bug likelihood, improving code readability and performance. Added extensive unit test coverage for not only the runtime checks but also compile test assertions of the library.

MARBLE - San Francisco, CA

Robot Perception Lead, Founding Software Engineer : June 2017 - November 2018

- Led the overall design & architecture of the robot perception system.
- Drafted feature lists & product roadmaps and managed work of several SWEs.
- Set software engineering principles like C++ standards, git version control workflow etc.
- Wrote several ROS related tools, such as: (i) Leveraging Protobufs for message transport, (ii) RViz plugin for quick & dirty point cloud annotations.

APPLE - Cupertino, CA

Senior Software Engineer, Autonomous Systems R&D : Jan 2015 - June 2017

- Given the nature of the project, most of my specific work at Apple is highly confidential. More broadly though, I work in the core algorithms group building software libraries (in C & C++) for algorithms in computer vision, computational geometry etc. Also heavily interfaced with ROS, OpenCV, PCL & other robotics frameworks.

ROBOTICS INSTITUTE, CARNEGIE MELLON UNIVERSITY - Pittsburgh, PA

Software Engineer : Jan 2013 - Dec 2014

- ***Perceptual Boosting:*** Developed algorithms to correlate vehicle slip behavior with perceptual cues. Implemented a Naïve Bayes classifier with a Gaussian mixture assumption for supervised learning and Gaussian Mixture Models for unsupervised learning. Features included L*, a*, b* color and texton bag of words. Achieved ~30% improvement in prediction error on heterogeneous terrains and ~38% improvement on separated homogeneous terrains. This provides enormous benefits in path planning for autonomous vehicles. Software design involved processing over 10k images.

Past Software Engineering Internships:

BANK OF AMERICA (MERRILL LYNCH) - Chicago, IL

GENERAL ELECTRIC (HEALTHCARE) - Barrington, IL

CATERPILLAR INC - Urbana, IL

AMERICA READS PROGRAM - Urbana, IL

EDUCATION

CARNEGIE MELLON UNIVERSITY - Pittsburgh, PA

MS in Robotic Systems Development - School of Computer Science : MAY 2013

Research Topic: Prototype an autonomous aerial search and rescue platform.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN - Champaign, IL

BS in General Engineering - Robotics (Honors) : MAY 2011

PRINCESS SUMAYA UNIVERSITY OF TECHNOLOGY - Amman, JORDAN

Undergraduate Exchange Program : SUMMER 2008

SKILLS

High: Python, PyTorch, C++, C, MATLAB, Linux, Git, Emacs, Obsidian

Proficient: LaTeX, Bash, Robot OS (ROS), Point Cloud Library (PCL), CGAL, Boost, CMake, Qt, Mercurial, GDB, SQL, LISP

Familiar: Java, HTML, OpenGL, wxPython, DreamWeaver, Amazon Web Services EC2, GCP, Django, Netbeans

GRADUATE COURSEWORK

Stanford - Artificial Intelligence Professional Program

Natural Language Processing with Deep Learning : *XCS224N* ; Natural Language Understanding : *XCS224U* ; Machine Learning : *XCS229* ; Reinforcement Learning : *XCS234*

Stanford - Product Management Professional Program

Natural Language Processing with Deep Learning : *XCS224N* ; Natural Language Understanding : *XCS224U* ; Machine Learning : *XCS229* ; Reinforcement Learning : *XCS234*

Carnegie Mellon University

Computer Vision : *16-385* ; Machine Learning : *10-701* ; Robot Autonomy : *16-662* ; Statistical Techniques in Robotics : *16-831* ; Sensing & Sensors : *16-722* ; Manipulation, Mobility & Control : *16-642* ; WebApp Development : *15-637* ; Computational Learning Theory : *15-859(B)*

REFERENCES

Robots - Husky, HERB, ArduCopter, LAGR, Pioneer, Mobipulator, MarbleBot, EverydayRobot - MetA

Humans - Provided upon request