Ammar Husain

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OBJECTIVE

Experienced (~9 YOE) product lead and software engineer with deep expertise in software for robotics, artificial intelligence and machine learning.

GOOGLE EXPERIENCE

EVERYDAY ROBOT PROJECT - Mountain View, CA

Product Lead, Senior Software Engineer, Robot Perception : Jan 2019 - Present

Humans-in-the-loop DRI

- Leading the design and development of a remote robot assistance system to complement the onboard autonomous capabilities.
- Created the HitL vision followed by a roadmap of milestones to meet various requirements for robots to seek help, get assistance and learn from failure.

Navigation Perception DRI

- Created a list of north-star features that enable smooth robot navigation. Enlist 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 bugs by robot operators. This enabled scaling operations and has grown into a self-sustained team of 8 people.
- 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.

Miscellaneous

- Filed Patents:
    - X-51285-00: Using adjustable vision component for on-demand vision data capture of areas along a predicted trajectory of a robot
    - X-51286-00: Generating and/or using training instances that include previously captured robot vision data and drivability labels
    - X-51705-00: Joint training of a narrow field of view sensor with a global map for broader context
    - X-51836-00: Spotting navigation regressions using logged trajectories
    - X-51977-00: AutoLook: Learning from demonstration for head motion
    - X-52505-00: Active on-robot data collection
    - X-52506-00: Learning an ego state model through perceptual boosting

PRE-GOOGLE EXPERIENCE

MARBLE - San Francisco, CA

Robot Perception Product 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:
    - Leveraging Protobufs for message transport.
    - 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 fields such as 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.

BANK OF AMERICA (MERRILL LYNCH) - Chicago, IL

Software Engineering Intern : Summer 2010

- Wrote tools to automate the process of submitting and approving trades from the Front to Middle and Back offices for the capital derivatives business. Collaborated with a global team of traders and developers from London, Charlotte and Hyderabad.

GENERAL ELECTRIC (HEALTHCARE) - Barrington, IL

Software Engineering Intern : Summer 2010

- Created software tools like widgets for production planning & triggering, thereby saving time & waste. Eliminated a manual error checking process in manufacturing work orders guaranteeing over 95% accuracy up from 65%.

CATERPILLAR INC- Urbana, IL

CAD Designer at Champaign Simulation Center : Spring 2008 - Spring 2010 (Part-time)

AMERICA READS PROGRAM - Urbana, IL

Tutor at Leal Elementary School : Spring 2007 (Part-time)

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: C ++, C, MATLAB, Python, Linux, Git, OpenCV, Emacs, Standard Template Library

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, 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* (Ongoing)

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

Humans - Provided upon request