

# Abrar Anwar

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Education	<b>University of Texas at Austin</b> <i>Bachelor of Science</i> , Computer Science, GPA: 3.66 <ul style="list-style-type: none"><li>• Thesis: <i>Learning Consistent Space-Time Representations for Predictive Physical Simulations</i> (expected Dec. 2020)</li><li>• Relevant Coursework: Machine Learning (G), Geometric Foundations of Data Science, Computer Vision, Autonomous Robotics I/II, Wireless Networks, Predictive Analytics, Compilers</li><li>• Current Coursework: Advanced Probability (G), Quantum Computing (H)</li></ul>	Austin, TX May 2021
	<b>National University of Singapore</b> Exchange Program funded by Gilman Scholarship <ul style="list-style-type: none"><li>• Relevant Coursework: AI and Decision Making (G), Natural Language Processing</li></ul>	Singapore Fall 2019
	(G) = Graduate course, (H) = Honors	
Interests	<ul style="list-style-type: none"><li>• Neural networks</li><li>• Robotics</li><li>• Evolutionary optimization</li></ul>	<ul style="list-style-type: none"><li>• Computer vision</li><li>• Neuromorphic computing</li><li>• Human-robot interaction</li></ul>
Academic Works	<p>[1] <b>A. Anwar</b>, C. Vineyard, W. Severa, S. Musuvathy, S. Cardwell. “Evolving Spiking Circuit Motifs using Weight Agnostic Networks”. <i>Computer Science Research Institute Summer Proceedings</i>. Technical Report, Sandia National Laboratories. 2020. (in review)</p> <p>[2] <b>A. Anwar</b> et al. “Evolving Spiking Circuit Motifs using Weight Agnostic Neural Networks.” Poster presented at the <i>International Conference on Neuromorphic Systems</i>; July 2020.</p> <p>[3] F. Wang, J. B. Aimone, <b>A. Anwar</b>, and S. Musuvathy. “BrainSLAM: Robust autonomous navigation in sensor-deprived contexts”. Technical Report SAND2019-11302R, Sandia National Laboratories. 2019.</p> <p>[4] <b>A. Anwar</b>, B. Holman., C. Sheehan, J. Huang. “Using Human-Inspired Signals to Disambiguate Navigational Intentions.” Poster presented at the <i>UT Undergraduate Research Forum</i>; April 2020.</p> <p>[5] <b>A. Anwar</b>, B. Holman, M. Shaposhnikov. “Bounding Box SLAM: A Fast, Selective SLAM.” Poster presented at the <i>UT Undergraduate Research Forum</i>; April 2019.</p>	
Talks	<p>[1] <b>A. Anwar</b>. “Weight-Agnostic Neural Networks and Neural Architecture Search.” Talk for the <i>NERL Summer Seminar Series</i> at Sandia National Laboratories. June 2019.</p> <p>[2] <b>A. Anwar</b> “Grover’s Algorithm: An Introduction to Quantum Algorithms.” Presentation session for <i>Spring Directed Reading Program Symposium</i> at UT Austin. May 2019.</p>	

Research Experience	<b>Sandia National Laboratories</b>	May 2020 - Present
	Research Intern	Albuquerque, NM
	<i>Neural Exploration and Research Lab - PI: Craig Vineyard</i>	
	<ul style="list-style-type: none"> <li>• Developed evolutionary method to generate spiking-like neural network circuits for low-power neural network-hardware co-design, specifically neuromorphic computing</li> <li>• Experimented on classification, control, and Atari with a ResNet extractor</li> <li>• Implemented parallel, asynchronous evolutionary training to speed up training process by 2x on HPC systems using OpenMPI</li> </ul>	
	<b>Computational Visualization Center</b>	April 2020 - Present
	Undergraduate Researcher	Austin, TX
	<i>PI: Chandrajit Bajaj</i>	
	<ul style="list-style-type: none"> <li>• Developed an optical flow estimation neural network by reconstructing the Helmholtz-Hodge Decomposition</li> <li>• Developing Gaussian processes for implicit surfaces to reconstruct meshes, with the goal of generating temporally consistent, robust mesh tracking</li> </ul>	
	<b>Building Wide Intelligence Lab</b>	January 2020 - Present
	Undergraduate Research Intern	Austin, TX
	<i>PI: Peter Stone. Supervisor: Justin Hart.</i>	
	<ul style="list-style-type: none"> <li>• Managed and lead several projects, mentoring students in research</li> <li>• Trained GANs and developed a vision pipeline for semantic mapping for a robot</li> <li>• Created a word embedding model with triplet-loss training that allows for predicting generalizable human-like object shelving</li> <li>• Gathered eye tracking data in virtual reality to model social gaze cues in social navigation scenarios</li> <li>• Designed experiments to quantify humans' ability to interpret the gaze of virtual/physical agents</li> </ul>	
	<b>Sandia National Laboratories</b>	May - July 2019
	Autonomy Intern	Albuquerque, NM
	<i>Neural Exploration and Research Lab - PI: Brad Aimone</i>	
	<ul style="list-style-type: none"> <li>• Designed brain-inspired localization methods for a hypersonic glide vehicle</li> <li>• Architected a lightweight, rotation-invariant feature for elevation data</li> <li>• Trained a rotation-invariant feature extraction autoencoder to reduce storage of place recognition maps.</li> <li>• Explored hierarchical, dense coding approaches to allow for sub-linear growth in map storage</li> </ul>	
	<b>Building Wide Intelligence Lab</b>	July 2018 - May 2019
	Undergraduate Researcher/Summer Research Fellow	Austin, TX
	<i>PI: Peter Stone. Supervisor: Justin Hart.</i>	
	<ul style="list-style-type: none"> <li>• Combined semantic info from object detection with visual SLAM to increase SLAM accuracy by 60% in dynamic environments by reducing drift</li> <li>• Implemented active facial recognition system for RoboCup@Home</li> <li>• Developed motion planning and simulation models for UR5 robot arm</li> </ul>	

Significant Projects	<ul style="list-style-type: none"> <li>• “<i>Detecting Muscle Cocontraction Through Sliding Window Gaussian Processes</i>”. In ”Machine Learning” graduate course (Spring 2020).</li> <li>• “<i>DeepHHD: Learning Helmholtz-Hodge Decomposition to Predict Optical Flow</i>”. In ”Geometric Foundations of Data Science” undergraduate course (Spring 2020).</li> </ul>
Teaching Experience	<p><b>Freshman Research Initiative:</b> January 2019 - Present  <b>Autonomous Robotics I/II</b>  Teaching Assistant/Peer Mentor Austin, TX</p> <ul style="list-style-type: none"> <li>• Taught first/second year CS students to conduct robotics research</li> <li>• Mentored students on formulating their research projects</li> </ul> <p><b>UTCS Robotics Camp</b> July 2018  Residential Advisor Austin, TX</p> <ul style="list-style-type: none"> <li>• Designed the first curriculum for a robotics camp for high school students</li> <li>• Created hands-on activities ranging from soldering to Arduino programming</li> </ul> <p><b>High School Research Initiative</b> September 2017 - May 2018  Student Intern Austin, TX</p> <ul style="list-style-type: none"> <li>• Facilitated students to explore biology research with UT faculty</li> <li>• Led discussions on student projects to encourage inquiry</li> </ul> <p><b>UTeach Natural Sciences</b> August 2017 - May 2018  Student Teacher Austin, TX</p> <ul style="list-style-type: none"> <li>• Taught elementary, then later middle school students computer science at underprivileged schools to facilitate interest in the field</li> </ul>
Awards & Honors	<ul style="list-style-type: none"> <li>• Princeton Pathways to Graduate School Admitted Participant</li> <li>• Benjamin A. Gilman International Scholarship, Fall 2019</li> <li>• FRI Summer Research Fellowship, Summer 2018</li> <li>• Horatio Alger Honeywell Scholar, 2018</li> <li>• University Honors, Spring 2018 - Spring 2020</li> </ul>
Skills	<p><b>Languages:</b> C/C++, Python, MATLAB, Java, R, JavaScript, L<sup>A</sup>T<sub>E</sub>X</p> <p><b>Technologies:</b> PyTorch, Tensorflow, ROS, OpenMPI, scikit-learn, OpenCV</p>