

ABHISHEK BAMOTRA

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EDUCATION

Carnegie Mellon University, Pittsburgh, PA	Dec 2020
Master of Science in Computational Design and Manufacturing	GPA 4.0/4.0
♦ <i>Intermediate Deep Learning*</i> ♦ <i>Robot Localization & Mapping*</i> ♦ <i>ML for Large Dataset</i> ♦ <i>Computer Vision</i>	
Thapar Institute of Engineering & Technology, India	Jun 2019
Bachelor of Engineering in Mechatronics Engineering	GPA 9.09/10.0
♦ <i>Robotics Engineering</i> ♦ <i>Industrial Automation</i> ♦ <i>Digital Signal Processing</i> ♦ <i>Machine Design</i>	

WORK EXPERIENCE

Research Fellow , Computational Engineering and Robotics Laboratory, CMU	Jan 2020 - Present
♦ <i>Developing machine learning algorithms for Point Cloud data.</i>	
♦ <i>Object detection and warpage measuring using PCL.</i>	
♦ <i>Developing algorithms to generate 3-D reconstruction using multi-light 2-D images.</i>	
Teaching Assistant , Machine Learning & Artificial Intelligence for Engineers (24-787), CMU	Aug 2020 - Present
♦ <i>Preparing and teaching recitations, Holding Office Hours to assist students clarifying doubts.</i>	
♦ <i>Mentor groups of students with their course project, Prepare and Grade assignments.</i>	
Course Assistant , Intro to Scientific Computing (24-281), CMU	Jan 2020 - May 2020
♦ <i>Assist professor with Homework, Quizzes, Projects and Tests</i>	
Robotics Intern , BioMechatronics Lab, National University of Singapore, Singapore	Feb 2018 - Jul 2018
♦ <i>Hand-on experience with soft material fabrication.</i>	
♦ <i>Designed robotic hand gripper and an ultra-sensitive tactile sensor using 3-D printing and soft material.</i>	
♦ <i>Soft gripper could lift 200 times its own weight and sensor was sensitive to 0.5 mN force.</i>	
Robotics Intern , Robotics Lab, Universidad Carlos III de Madrid, Spain	May 2017 - Jul 2017
♦ <i>Hands-on experience with ROS, C++, and Linux.</i>	
♦ <i>Programmed Arduino to control mini robots.</i>	
♦ <i>Developed automatic wireless communication between micro and mini robot.</i>	

SKILLS

ML Stack: Python (OpenCV), Apache Spark, SQL, TensorFlow, PyTorch, PCL, Amazon web services, Microsoft Azure

Intermediate: C/C++, MATLAB, Java, OpenGL

Software: NI Multisim, ROS, Keil, Arduino, PTC Creo, RSLogix, AutoCAD, SolidWorks

PROJECTS

New York City Taxi Fare Prediction (CMU)	Jan 2020 – May 2020
♦ <i>Developed a pipeline for a large-scale dataset (~1Tb)</i>	
♦ <i>Algorithms based on Linear Regression, Decision Tree, Random Forest and XGBoost. RMSE: 0.73\$</i>	
Multi-View Keypoint 3D-Reconstruction to track object's orientation and motion (CMU)	Jan 2020 – May 2020
♦ <i>Developed a pipeline involving fundamental, essential matrices and triangulation to extract epipolar correspondences.</i>	
♦ <i>Integrated the pipeline with bundle adjustment to 3D reconstruct keypoint to track object's state.</i>	
KeyDetect - Detection of anomalies and user based on Keystroke Dynamics (CMU)	Oct 2019 – Dec 2019
♦ <i>Developed a 2-step authentication model to learn and verify the user based on the typing patterns.</i>	
♦ <i>Algorithms based on SVM, Neural Networks (1-D Conv., with Negative Class), Decision Trees.</i>	
Controller Design for an Autonomous Vehicle to track the route (CMU)	Oct 2019 – Dec 2019
♦ <i>De-noised the input sensor data using Kalman Filter.</i>	
♦ <i>Developed PID, Feedback, Optimal controller for the vehicle and bagged position in top 20 %.</i>	

PATENTS & PUBLICATIONS

Kirigami-Inspired soft end-effector with layer jamming for stiffness control (Patent)	Under review
Abhishek Bamotra, Pushpinder Walia, A.V. Prituja & H. Ren	Jun 2018
Tri-axial Force Sensor (Patent)	Under review
Pushpinder Walia, Abhishek Bamotra & H. Ren	Jun 2018
Layer-Jamming Suction Grippers with Variable Stiffness	ASME JMR
Abhishek Bamotra, Pushpinder Walia, A.V. Prituja & H. Ren 10.1115/1.4042630	Jan 2019
Fabrication and Characterization of Novel Soft Compliant Robotic End-Effectors with Negative Pressure and Mechanical Advantages	IEEE ICARM
Abhishek Bamotra, Pushpinder Walia, A.V. Prituja & H. Ren 10.1109/ICARM.2018.8610688	Jul 2018
Design and Fabrication of Soft-bodied 3-D Tactile Sensors with Magnetometers	IEEE ICIA
Pushpinder Walia, Abhishek Bamotra, A.V. Prituja & H. Ren 10.1109/ICInfA.2018.8812448	Aug 2018
Active Contact Enhancements With Stretchable Soft Layers and Piezoresistive Tactile Array for Robotic Grippers	IEEE CASE
G. Ponraj, A.V. Prituja, Abhishek Bamotra, Zhu G., H. Ren, et al. 10.1109/COASE.2019.8842882	Aug 2019