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**
♦ *Intermediate Deep Learning* ♦ *Robot Localization & Mapping* ♦ *ML for Large Dataset* ♦ *Computer Vision*

Thapar Institute of Engineering & Technology, India **Jun 2019**
Bachelor of Engineering in Mechatronics Engineering GPA **9.09/10.0**
♦ *Robotics Engineering* ♦ *Industrial Automation* ♦ *Digital Signal Processing* ♦ *Machine Design*

WORK EXPERIENCE

Research Fellow, Computational Engineering and Robotics Laboratory, **CMU** **Jan 2020 - Present**
♦ *Developing machine learning algorithms for Point Cloud data.*
♦ *Object detection and warpage measuring using PCL.*
♦ *Developing algorithms to generate 3-D reconstruction using multi-light 2-D images.*

Teaching Assistant, Machine Learning & Artificial Intelligence for Engineers (24-787), **CMU** **Aug 2020 - Present**
♦ *Preparing and teaching recitations, Holding Office Hours to assist students clarifying doubts.*
♦ *Mentor groups of students with their course project, Prepare and Grade assignments.*

Course Assistant, Intro to Scientific Computing (24-281), **CMU** **Jan 2020 - May 2020**
♦ *Assist professor with Homework, Quizzes, Projects and Tests*

Robotics Intern, BioMechatronics Lab**, National University of Singapore**, Singapore **Feb 2018 - Jul 2018**
♦ *Hand-on experience with soft material fabrication.*
♦ *Designed robotic hand gripper and an ultra-sensitive tactile sensor using 3-D printing and soft material.*
♦ *Soft gripper could lift 200 times its own weight and sensor was sensitive to 0.5 mN force.*

Robotics Intern, Robotics Lab, **Universidad Carlos III de Madrid**, Spain **May 2017 - Jul 2017**
♦ *Hands-on experience with ROS, C++, and Linux.*
♦ *Programmed Arduino to control mini robots.*
♦ *Developed automatic wireless communication between micro and mini robot.*

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**
♦ *Developed a pipeline for a large-scale dataset (~1Tb)*
♦ *Algorithms based on Linear Regression, Decision Tree, Random Forest and XGBoost. RMSE: 0.73$*

Multi-View Keypoint 3D-Reconstruction to track object's orientation and motion (CMU) **Jan 2020 – May 2020**
♦ *Developed a pipeline involving fundamental, essential matrices and triangulation to extract epipolar correspondences.*
♦ *Integrated the pipeline with bundle adjustment to 3D reconstruct keypoint to track object's state.*

KeyDetect - Detection of anomalies and user based on Keystroke Dynamics (CMU) **Oct 2019 – Dec 2019**
♦ *Developed a 2-step authentication model to learn and verify the user based on the typing patterns.*
♦ *Algorithms based on SVM, Neural Networks (1-D Conv., with Negative Class), Decision Trees.*

Controller Design for an Autonomous Vehicle to track the route (CMU) **Oct 2019 – Dec 2019**
♦ *De-noised the input sensor data using Kalman Filter.*
♦ *Developed PID, Feedback, Optimal controller for the vehicle and bagged position in top 20 %.*

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** Jul 2018
***Abhishek Bamotra**, Pushpinder Walia, A.V. Prituja & H. Ren* 10.1109/ICARM.2018.8610688

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** Aug 2019
*G. Ponraj, A.V. Prituja, **Abhishek Bamotra**, Zhu G., H. Ren, et al.* 10.1109/COASE.2019.8842882