**Keshav Bimbraw**

<bimbraw.github.io> | +1-(678)-436-9426 | [bimbrawkeshav@gmail.com](mailto:bimbrawkeshav@gmail.com) | Georgia Tech & WPI Robotics | [linkedin.com/in/bimbraw/](http://www.linkedin.com/in/bimbraw/)

**EDUCATION**

****

**Worcester Polytechnic Institute**, Worcester, MA

Candidate for Ph. D. in Robotics Engineering (Medical FUSION Lab) Aug ‘20 – now

Concentration – Medical Robotics, Ultrasound Image Processing and Machine Learning 4.00/4.00 GPA

**Georgia Institute of Technology**, Atlanta, GA

M. S. with Robotics Focus (Music Technology, Computer Software & Media Applications) Aug ‘17 – May ‘19

Concentration – Human Augmentation, Medical Robotics and Robotic Musicianship 3.56/4.00 GPA

**Thapar University,** Patiala, India

Bachelor of Engineering in Mechatronics Engineering (Research Intern - IIT Delhi from Jan – Jul ‘16) July ‘13 – June ‘17

Concentration – Robotics and Mechatronics GPA - 4.00/4.00 GPA (8.34 CGPA)

**EXPERIENCE**

****

**Worcester Polytechnic Institute** Worcester, MA

**Graduate Research Assistant (Medical FUSION Lab)**  March 2020 – now

* Working on developing a deep learning based algorithm for predicting finger angle based on forearm ultrasound images.
* Developed a novel Augmented Reality based Lung Ultrasound Scanning Guidance system. [Link](https://vimeo.com/463333665).

**Agile Resources Inc.** Peachtree City, GA

**Audio DSP Engineer at Panasonic Automotive Systems of America** Oct 2019 – March 2020

* Worked on Qualcomm’s Hexagon SDK for audio applications in Eclipse on Android framework development.
* Utilized Qualcomm tools to evaluate audio modules such as Bass Mid Treble, Parametric Equalizer, Fade & Balance etc.

**Bose Corporation** Stow, MA

**Active Noise Control Engineering Intern in Automotive Systems Division** May 2019 – Oct 2019

* Worked on sound synthesis for electric vehicles and implementing processor optimized signal processing algorithms.
* Implemented and evaluated a variable bandwidth shifting bandpass filter (in MATLAB) on an electric vehicle with a random noise source. Developed a physical car sound simulation system using Logitech pedals to evaluate models and reduce testing time.

**Georgia Tech** Atlanta, GA

**Graduate Research Assistant in Robotics** Aug 2017 – May 2019

* Lead the Skywalker project from Aug ’18 – May ’19. My robot and code were featured in the first episode of The Age of A.I. [Link](https://youtu.be/UwsrzCVZAb8?t=1079).
* Investigated a combination of ultrasound & EMG data using supervised learning algorithms to enhance assistive robot control. [Link](https://drive.google.com/file/d/1PYHPMrOLP6-12o97rCuxAX5ZVvhJofBY/view?usp=sharing).
* Took an initiative to improve expressivity of Shimon (Marimba playing robot) by replacing its actuators and control scheme. [Link](https://smartech.gatech.edu/handle/1853/60602).
* Translated Piano playing to robots using a single DOF system and designed a robotic hand with one DOF per finger. [Link](https://drive.google.com/file/d/1bLGMaNiJcKgj9wzIZIy0YlRz8Kj3OJXE/view?usp=sharing).
* Developed an ultrasound in the loop tendon based wearable exoskeleton for upper extremity rehabilitation of stroke survivors. [Link](https://drive.google.com/file/d/10ZK2K1fI90I0AVr5jjTlthfDECNXcPIK/view?usp=sharing).
* Computer-Aided Design (CAD), Fusion 360, 3D printing and Mechatronics Instructor for Project Studio Course. [Link](https://vimeo.com/444132536).

**Autonomous Robotics Laboratory, IIT Delhi** New Delhi, India

**Research Intern** Fall and Summer 2016

* Programmed two KUKA KR-5 robotic arms to collaboratively play a guitar. [Link](https://vimeo.com/174093155).
* Developed a Control Module for RoboAnalyzer using C# to simulate control of mass spring damper & single link robotic arm systems.
* Improved performance of a 6 DOF motion platform at Simulator Development Division, Secunderabad, India. [Link](https://ieeexplore.ieee.org/abstract/document/7931899).
* Developed a Teach pendant to control virtual robots in RoboAnalyzer. [Link](https://ieeexplore.ieee.org/abstract/document/7931881).
* Modified the mechanical and electrical design of Tulsi Bead making device under rural development initiative of IIT Delhi.

**ACADEMIC PROJECTS**

****

**Navigation of a Raspberry-Pi based Robot using various sensors** Fall 2018

* Used data from Raspberry Pi camera to find center of a ball and track it by actuating Dynamixel motors attached to the robot.
* Used Lidar data to avoid obstacles and maintaining a specific distance from them while moving towards a goal.
* Achieved goal position by classification & real time prediction of various waypoints using support vector machine.

**Design of an ultrasound guided vein cannulation robot** Spring 2018

* Worked with a 5-person multi-discipline team to develop a medical robot that can hold an ultrasound probe to detect jugular vein.
* PRRRP configuration Robot manufactured and programmed so that end effector can reach specific positions in the robot workspace.

**Development of a Hybrid Stewart platform using Arduino** Spring 2017

* Developed a hybrid two stage Stewart platform system as an improvement over the conventional Stewart platform.
* Arduino Mega microcontroller used to control 12 servo motors simultaneously. Control Interface developed in Visual Studio (C#).

**SKILLS**

****

* **Software Skills:** MATLAB, Simulink, Python, ROS, Arduino, C, C#, Linux, MicrosoftOffice, Microsoft PowerPoint, Microsoft Excel, Microsoft Word, LaTeX, Robotics programming, OpenCV, SolidWorks, Inventor, PTC Creo, Fusion 360, exposure to Java, C++ and HTML.
* **Electronic/manufacturing skills:** Arduino, Raspberry Pi, FSR, Sensors, Circuit Design, DC motors, Motors, linear actuators, Hardware & software interfacing, 3D printing, rapid prototyping, Electro-mechanical systems, Machine Learning integration with Robotics.
* **Communication/Writing:** Technical papers, Research presentations, Public speaking, technical reports, interaction with people from differentbackgrounds & disciplines, written & verbal communication skills, creating & leading teams, creating & teaching curriculum.
* **Research:** Writing experimental proposals, conducting experiments, analyzing data, presenting results, composing scientific reports.

**LEADERSHIP**

****

**Vertically Integrated Projects Instructor** at Robotic Musicianship Lab Fall 2017 – Spring 2019

* Vertically Integrated Project Instructor leading teams of undergraduates to involve them in research on robotics and Mechatronics.
* Mentoring students to help them work on real life robotics projects as well as development of their presentation skills.

**Diversity and Inclusion Fellow** at Georgia Institute of Technology Spring 2019

* Lead efforts in making Georgia Tech a more inclusive campus by organizing student and faculty activities at GTCMT.
* Took an initiative to enroll students & faculty in campus activities related to promoting a diverse & inclusive community.

**Diversity and Inclusion Fellow** at Georgia Institute of Technology Spring 2019

* Lead efforts in making Georgia Tech a more inclusive campus by organizing student and faculty activities at GTCMT.
* Took an initiative to enroll students & faculty in campus activities related to promoting a diverse & inclusive community.

**HONORS AND AWARDS**

****

|  |  |
| --- | --- |
| • Awarded PhD positions at WPI & Georgia Tech. Accepted the WPI offer. (Tuition support & $31824 yearly award) | March 2020 |
| • Selected to be Diversity and Inclusion Fellow by Georgia Tech Institute Diversity ($1000 award) | February 2019 |
| • Selected as NSF-NRT ARMS (Accessibility, Rehabilitation, & Movement Science) Trainee ($1500 award) | August 2018 |
| • Scholarship to pursue masters at Georgia Tech (Tuition support & $14100 yearly award) | August 2017 |
| • Awarded merit scholarships and grants totaling INR 336,000 at Thapar University. | June 2017 |

**PUBLICATIONS**

****

1. Tsumura, R., Hardin, J. W., **Bimbraw, K.**, Odusanya, O. S., Zheng, Y., Hill, J. C., Hoffmann, B., Soboyejo, W., Zhang, H. (2020). Tele-operative Robotic Lung Ultrasound Scanning Platform for Triage of COVID-19 Patients. In: *arXiv preprint arXiv:2010.12335*. [Paper Link](https://arxiv.org/abs/2010.12335). [Video](https://www.youtube.com/watch?v=_Zr0HbDOzEc).
2. **Bimbraw, K.**, Ma, X., Zhang, Z., Zhang, H. (2020). Augmented Reality-Based Lung Ultrasound Scanning Guidance. In: *Medical Ultrasound, and Preterm, Perinatal and Paediatric Image Analysis. ASMUS 2020, PIPPI 2020*. Lecture Notes in Computer Science, vol 12437. Springer, Cham. doi.org/10.1007/978-3-030-60334-2\_11. [Paper Link](https://link.springer.com/chapter/10.1007/978-3-030-60334-2_11). [Video](https://vimeo.com/463333665).
3. **Bimbraw, K.**, Fox, E., Weinberg, G. and Hammond, F. L. (2020). Towards Sonomyography-Based Real-Time Control of Powered Prosthesis Grasp Synergies. In: *2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, Montreal, QC, Canada, 2020, pp. 4753-4757, doi: 10.1109/EMBC44109.2020.9176483. [Paper Link](https://ieeexplore.ieee.org/document/9176483). [Video](https://vimeo.com/444131445).
4. Mehta, I., **Bimbraw, K.**, Chittawadigi, R. G., & Saha, S. K. (2016). A teach pendant to control virtual robots in Roboanalyzer. In: *2016 Int. Conference on Robotics and Automation for Humanitarian Applications (RAHA)* (pp. 1-6). IEEE. [Paper Link](https://ieeexplore.ieee.org/abstract/document/7931881).
5. **Bimbraw, K.**, Mehta, I., Venkatesan, V., Joshi, U., Sabherwal, G. S., & Saha, S. K. (2016). Performance improvements of a 6-DOF motion platform. In: *2016 International Conference on Robotics and Automation for Humanitarian Applications (RAHA)* (pp. 1-5). IEEE. [Paper Link](https://ieeexplore.ieee.org/document/7931899).
6. Kaur, M., Singh, G., **Bimbraw, K.**, & Uniyal, P. (2015). Study of phase transformation and microstructure of alcohol washed titania nanoparticles for thermal stability. In: *AIP Conference Proceedings* (Vol. 1675, No. 1, p. 030049). AIP Publishing. [Paper Link](https://aip.scitation.org/doi/10.1063/1.4929265).
7. **Bimbraw, K.** (2015). Autonomous cars: Past, present and future. In: *2015 12th International Conference on Informatics in* *Control, Automation and Robotics (ICINCO)* (Vol. 1, pp. 191-198). IEEE. [Paper Link](https://ieeexplore.ieee.org/document/7350466).