Keshav Bimbraw

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SKILLS

- **Software Skills:** MATLAB, Simulink, Python, ROS, Arduino, C/C++, C#, Linux, Microsoft Office, Microsoft PowerPoint, Microsoft Excel, Microsoft Word, LaTeX, Robotics programming, OpenCV, SolidWorks, Inventor, AutoCAD, PTC Creo, Fusion 360, exposure to Java and HTML.
- **Electronic/manufacturing skills:** Arduino, Raspberry Pi, FSR, Distance sensor, interfacing, circuit design, DC motors, Stepper motors, Servo motors, linear actuators, Hardware & software interfacing, experience with Real world Robotics applications, Mechanical Engineering, Robot Design, 3D printing, agile development, rapid prototyping, Electro-mechanical systems, familiarity with wide range of manufacturing processes; hardware, software, and mechanism integration, Machine Learning integration with Robotics.
- **Communication/Writing:** Technical papers, Research presentations, Public speaking, technical reports, interaction with people from different backgrounds & disciplines, written & verbal communication skills, creating & leading teams, creating & teaching curriculum.
- **Research:** Writing experimental proposals, carrying out experiments, analyzing data, presenting results, composing scientific reports.

EDUCATION

Georgia Institute of Technology, Atlanta, GA
Candidate for 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

Agile Resources Inc. Peachtree City, GA
Active DSP Engineer at Panasonic Automotive Systems of America Oct 2019 – now
- Working on Android framework development & implementing various digital signal processing algorithms in Audio Domain Team.

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 various processor optimized signal processing algorithms to a Simulink model used to generate audio output for electric vehicle sound enhancement.
- Implemented a variable bandwidth shifting bandpass filter in MATLAB. Tested it on an electric vehicle with a random noise source.
- Developed a physical car sound simulation system using Logitech pedals to test out models and reduce testing time.

Georgia Tech Atlanta, GA
Graduate Research Assistant in Robotics Aug 2017 – May 2019
- Investigated a combination of ultrasound and EMG data using supervised learning algorithms to improve control of assistive robots.
- Took an initiative to improve expressivity of Shimon (Marimba playing robot) by replacing its actuators and control scheme.
- Translated Piano playing to robots using a single DOF system and designed a robotic hand with one DOF per finger.
- Developed an electric actuator driven, tendon based wearable exoskeleton for upper extremity rehabilitation of stroke survivors. Designed to be actuated by data from ultrasound images classified through supervised learning algorithms.
- Computer-Aided Design (CAD), Fusion 360, 3D printing and Mechatronics Instructor for Project Studio Course.

Adaptive Robotic Manipulation Lab Atlanta, GA
Research Assistant Summer 2018
- Integrated ultrasound & EMG for development of robust multifunctional prosthesis (youtube.com/watch?v=rNyZeR29j_c).

Autonomous Robotics Laboratory, IIT Delhi New Delhi, India
Research Intern Fall and Summer 2016
- Developed a Control Module for RoboAnalyzer, using C# to simulate control of systems such as mass spring damper, etc.
- Improved performance of a 6 DOF motion platform at Simulator Development Division, Secunderabad, India.

- Developed a Teach pendant to control virtual robots in RoboAnalyzer.
- Programmed two KUKA KR-5 robotic arms to collaboratively play a guitar (https://vimeo.com/174093155).
- Modified the mechanical and electrical design of Tulsi Bead making device under rural development initiative of IIT Delhi.
- Worked on development of line and circular interpolation techniques at MTAB Engineers Pvt. Ltd., Chennai, India.

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.
- Worked on reaching goal position by classification & real time prediction of various waypoints using support vector machines.

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.
- Robot designed as a passive prismatic joint followed by 5-DoF segments in a PRRRP configuration using stepper motors.
- Robot links manufactured and stepper motors programmed so that end effector can reach specific positions in the robot workspace.

Development of a Hybrid Stewart platform using Arduino Spring 2017
- Worked on developing 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#).

LEADERSHIP

Vertically Integrated Projects Instructor at Robotic Musicianship Lab Fall 2017 - Present
- 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
- Leading 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.

Event Organizer at Thapar University, Patiala July '13 – June '17
- Organized various musical, career guidance and motivational events at Thapar University, Patiala, India.
- Managed components such as budget procurement, sound-testing & audience/performer satisfaction with tight deadlines.

HONORS AND AWARDS

- Selected to be Diversity and Inclusion Fellow by Georgia Tech Institute Diversity (Stipend - $1000) February 2019
- Won third place and $500 in the 3-minute thesis competition held at Georgia Tech November 2018
- $1500 award for being selected as NSF-NRT ARMS (Accessibility, Rehabilitation, & Movement Science) Trainee August 2018
- Scholarship to pursue masters at Georgia Tech August 2017
- Awarded merit scholarships and grants totaling INR 336,000 at Thapar University. June 2017

PUBLICATIONS & PRESENTATIONS

[1] Bimbraw, K., Fox, E., Hammond, F. L., & Weinberg, G. (2019, April). Sonomyography (SMG) based real-time hand grasp configuration identification via supervised learning to control a soft robotic gripper. In *2019 Spring School on Medical Robotics (SSMR) and 2019 International Symposium on Medical Robotics (ISMR)*. IEEE. (poster and technical presentation)

[2] Rosa, L., Bimbraw, K., Hammond, F. L., & Weinberg, G. (2018, October). Comparison and Integration of SMG and EMG. In *BMES Annual Meeting 2018*. BMES. (technical presentation)

[3] Bimbraw, K. (2015, July). 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.

[4] Mehta, I., Bimbraw, K., Chittawadigi, R. G., & Saha, S. K. (2016, December). 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.

[5] Bimbraw, K., Mehta, I., Venkatesan, V., Joshi, U., Sabherwal, G. S., & Saha, S. K. (2016, December). Performance improvements of a 6-DOF motion platform. In *2016 International Conference on Robotics and Automation for Humanitarian Applications (RAHA)* (pp. 1-5). IEEE.

[6] Kaur, M., Singh, G., Bimbraw, K., & Uniyal, P. (2015, August). 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.