

# Keshav Bimbraw

(678)-436-9426 | [bimbrawkeshav@gmail.com](mailto:bimbrawkeshav@gmail.com) | <https://www.linkedin.com/in/bimbraw/> | Georgia Tech Center for Music Technology

---

## EXPERTISE

---

### Audio and DSP Programming and Control

- Using agile development methodology to simplify complex systems into simple prototypes;
- Audio DSP programming in MATLAB and Python;
- Using MATLAB/Simulink, Arduino/Raspberry Pi, Python, LabVIEW for analysis and integrating digital/analog sensors, camera etc.

### Rapid Mechatronics Prototyping

- Proficient in Computer-Aided Design (CAD) software such as SolidWorks, AutoCAD, Inventor and PTC Creo.
- Experienced in building test systems, integrating data from multiple sensors and hands on laboratory equipment operating experience.

### Technical Communication

- Experienced with producing exhaustive technical presentations for diverse audiences and writing and presenting research papers.
- Expertise in working independently as well as collaborative project work, exhaustive documentation & Microsoft Office.

## EDUCATION

---

### Georgia Institute of Technology, Atlanta, GA, USA

Candidate for M. S. with Robotics Focus (Music Technology, Computer Software & Media Applications)

Aug '17 – May '19

**Concentration** – DSP, Mechatronics, Robotics (Rehabilitation and Human Augmentation) & 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

8.34 CGPA (4.0 GPA)

## EXPERIENCE

---

### Bose Corporation

#### Active Noise Control Engineering Intern in Automotive Systems Division, Stow, MA

May 2019 - Now

- Working on sound synthesis for electric vehicles and adding additional features to a Simulink model used to generate these sounds.
- Developing a physical simulation system to test out Simulink models and programming various algorithms to generate sounds.

### Georgia Tech

Atlanta, GA

#### Graduate Research Assistant in Georgia Tech Center for Music Technology

Aug '19 - May '19

- Investigated a combination of ultrasound and EMG data using artificial intelligence 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.
- 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 and electromyography for development of robust multifunctional prosthesis.

### 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 an Arduino based 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 a final position by classifying and real time prediction of pictures of directions using support vector classifier method.

#### **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 be used to 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 as actuators.

#### **Developing an Indian Classical Music teaching application using Max/MSP**

Fall 2017

- Developed an accompaniment and pedagogical tool centered around North Indian Classical Music in Max/MSP with the ‘teacher’ playing several notes while the student sings, so that the teacher can evaluate the student performance by providing a score and highlighting errors.
- Added an ultrasound distance sensor to the set-up to control the amplitude of the sounds generated by the teacher.

#### **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 GUI developed in Visual Studio using C#.

### **SKILLS**

---

- **Software Skills:** SolidWorks, Inventor, AutoCAD, PTC Creo, Fusion 360, MATLAB, Simulink, Python, ROS, Arduino, C, C#, Linux, Microsoft Office, Microsoft Visual Studio, Microsoft Excel, Microsoft Word, LaTeX, Robotics programming, OpenCV, exposure to Java, C++ and HTML.
- **Electronic/manufacturing skills:** Arduino, Raspberry Pi, FSR, Distance sensor, interfacing, circuit design, DC motors, Stepper motors, Servo motors, linear actuators, Analog & Digital Systems, Hardware & software interfacing, experience with Real world Robotics applications, Mechanical Engineering, Robot Design, 3D printing, agile development, Rapid Prototyping, Electro-mechanical systems, DSP/Signal Processing, 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 and disciplines, written and verbal communication skills, creating and leading teams, and creating & teaching curriculum.
- **Research:** Writing experimental proposals, carrying out experiments, analyzing data, presenting results, and composing scientific reports.

### **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 members in on campus activities related to promoting a diverse & inclusive community on campus.

#### **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, documentation, sound testing and audience/performer satisfaction within 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
- Award of \$1500 for being selected as NSF-NRT ARMS (Accessibility, Rehabilitation, and 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. (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.