

# Sulabh Kumra

Robotician | Controls Engineer

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## EDUCATION

**Doctor of Philosophy (Ph.D.)** in Engineering May 2020 (Expected)  
Rochester Institute of Technology Rochester, NY  
Thesis: Antipodal Robotic Grasping

**Master of Science (M.S.)** in Electrical Engineering August 2015  
Rochester Institute of Technology Rochester, NY  
Thesis: Robot Learning Dual-Arm Manipulation Tasks by Q-Learning and Multiple Human Demonstrations

**Bachelor of Technology (B.Tech.)** in Electronics and Instrumentation Engineering May 2013  
Institute of Technology & Management Gurgaon, India  
Final Project: DextoEka – The Teleoperated Humanoid Robot

## EXPERIENCE

**Robot Control Software Engineer** August 2018 – Present  
Osaro Inc. San Francisco, CA

- Designed and developed high-performance control interfaces to a suite of industrial robots and sensors that enable modern machine learning based robotics applications.
- Lead development of the interfaces between Osaro's production-level control and sensing algorithms and the lower level controls of robot platforms.

**Controls Engineer** November 2017 – August 2018  
Tesla Inc. Fremont, CA

- Lead a team of engineers to commission doors on and doors off automations cells.
- Improved control algorithms for automation cells in general assembly area to ramp-up Model 3 production.

**Robotics and Controls Engineer** June 2015 – November 2017  
Xerox Corporation Webster, NY

- Programmed, setup, integrated and commissioned automation systems for toner filling and packaging plant.
- Programmed Fanuc and Epson robots for various pick and place tasks.
- Planned, setup and commissioned the OPC PI interface for Allen-Bradly controllers to monitor controller tags.
- Developed an automated system to shake bags of the fill room dust collection system.
- Configured Lexium servo motor drivers using SoMove software for index conveyors and fillings systems.
- Developed automated techniques for quality check and product verification using Cognex vision systems.
- Optimized robotic applications to maximize production output and reduce downtime.
- Supported maintenance team in troubleshooting difficult breakdowns and chronic equipment failures.

**Graduate Research Assistant** November 2014 – May 2015  
Multi-Agent Biorobotics Lab, RIT Rochester, NY

- Worked for MKS Instruments to build a GUI for Fault detection toolkit.
- Developed a novel technique to call functions in Matlab script from C#.
- Developed a python script to automatically make conditional changes in data stores in csv files.

**Founder and Director** May 2011 – August 2014  
Team Humanoid ITMU Gurgaon, India

- Built and led a team of 14 multidisciplinary engineers.
- Designed and developed India's first low-cost human-scale tele-operated humanoid robot called 'Dexto:Eka.'
- Prepared a 3-D model of the humanoid robot to present my idea to the sponsors and other team members.

**Graduate Teaching Assistant** August 2014 – May 2015  
Rochester Institute of Technology Rochester, NY

- Instructed and graded student lab activities for courses: Principles of Robotics and Advanced Robotics.
- Developed a new lab on Baxter robot for Advanced Robotics course.

**Control and Electrical Engineer Intern** June 2014 – August 2014  
Xerox Corporation Webster, NY

- Wrote PLC ladder logic to interface auger servo motor controller to Modicon PLC for the filling process.
- Designed, configured and commissioned operator control screens for the Magelis HMI.
- Implemented the Cognex vision system to verify proper bottle cap presence and placement.

**Electrical Engineer Trainee** May 2012 – August 2012  
Indraprastha Power Generation Power Ltd. New Delhi, India

- Designed and implemented alarm system for boiler of a coal based power plant using SCADA software.
- Improved fault detection and diagnostics system by adding features to existing Allen-Bradley interface.

**Controls Engineer Intern** June 2011 – August 2011  
Bharat Electronics Ltd. Ghaziabad, India

- Redesigned the control system of antenna scanner test system to decrease the test time by 32%.
- Acquired and validated test data using DAQ National Instruments Hardware and LabVIEW Software.

## RESEARCH PROJECTS

- **Robotic Grasp Detection:** Developed a grasp prediction algorithm for RGB-D input using Deep Convolutional Neural Network. Achieved world leading results in robotic grasp detection using deep learning.
- **Collaborative Robot Learning from Demonstration:** Developed a novel RLfD approach to learn trajectory based skills from human demonstrations. Robot learned pick and place tasks using Hidden Markov Model.
- **Baxter Learns like a Child to Dance:** Designed a Reinforcement Learning framework for a robot to learn dance on its own using Q-learning.
- **Robotic Arm Shadowing:** Build a human machine interface to make a 6-DOF robotic arm mimic a human arm.

## AWARDS

**Special Recognition** from Xerox for achieving world leading results in robotic grasping.

**IROS Travel Grant** funded by the IEEE Robotics and Automation Society to present at IROS-2017.

**Xerox sponsors award** at Imagine RIT 2015 for robotics lab projects.

**Best final year project** award at ITM for 'Dexto:Eka:- The Humanoid Robot'.

**Best project award** in Techexpo at Cerebration 2013.

**Best paper award** at International Conference on Electronics and Electrical Engineering, 2013.

**First position** at IEEE technical paper presentation Exgenesis 2013.

**Best presenter award** at International Conference on Electronics and Computer Engineering, 2012.

## PROFESSIONAL AFFILIATIONS

<i>Technical Program Committee, IEEE International Conference on SoSE</i>	2016 – present
<i>Reviewer, IEEE Robotics and Automation Letters</i>	2016 – present
<i>Reviewer, IEEE System, Man, and Cybernetics Magazine</i>	2015 – present
<i>Member, IEEE Robotics and Automation Society</i>	2010 – present
<i>Member, Institute of Electrical and Electronics Engineers</i>	2009 – present
<i>Joint Secretary, IEEE-ITMU chapter</i>	2012 – 2013
<i>Founder member, Robotics Society of ITM</i>	2011 – 2013

## PUBLICATIONS

- S. Kumra and C. Kanan, "Robotic Grasp Detection using Deep Convolutional Neural Networks", IEEE/RSJ International Conference on Intelligent Robots and Systems, Vancouver, Canada, Sept. 24–28, 2017
- S. Kumra and F. Sahin, "Dual Flexible 7 DoF Arm Robot Learns like a Child to Dance using Q-Learning", *IEEE International Conference on System of Systems Engineering*, San Antonio, USA, May 17-20, 2015.
- S. Kumra, M. Mohan, S. Gupta and H. Vaswani, "Conception and development of Dexto:Eka: The humanoid robot - Part IV", *IEEE International Conference on Robotics, Automation, Control and Embedded system*, Chennai, India, Feb. 18-20, 2015.
- S. Kumra, M. Mohan, S. Gupta and H. Vaswani, "Conception and development of Dexto:Eka: The humanoid robot - Part III", *44th International Symposium on Robotics*, Seoul, South Korea, Oct. 24-26, 2013.
- S. Kumra, M. Mohan, S. Gupta and H. Vaswani, "Governance of humanoid robot using master exoskeleton", *44th International Symposium on Robotics*, Seoul, South Korea, Oct. 24-26, 2013.
- S. Kumra, M. Mohan, S. Gupta and H. Vaswani, "Human Machine Interface For Dexto:Eka: -The Humanoid Robot", *IEEE International Conference on Human Computer Interactions*, Chennai, India, Aug. 23-24, 2013.
- S. Kumra, M. Mohan, S. Gupta and H. Vaswani, "Design and Development Part 2 of Dexto:Eka: - The Humanoid Robot", *IEEE International Conference on Mechatronics and Automation*, Japan, Aug. 4-7, 2013.
- S. Kumra, S. Mehta, R. Singh, "Development of anthropomorphic multi-D.O.F master-slave manipulator", *IEEE International Advance Computing Conference*, Ghaziabad, India, Feb. 22-23, 2013.
- S. Kumra, S. Mehta, R. Saxena, R. Singh, "Simulation Based Design of Robotic Arm and Omni Directional Drive Mechanism of Dexto:Eka:", *International Journal of Computer Science Engineering and Information Technology Research*, Vol.2, Issue 4, Dec. 2012 pp. 93-103.
- S. Kumra, R. Saxena and S. Mehta, "Design and Development of 6-DOF Robotic Arm Controlled by Man Machine Interface", *IEEE International Conference on Computational Intelligence and Computing Research*, Coimbatore, India, Dec . 18 – 20, 2012.
- S. Kumra, R. Saxena and S. Mehta, "Navigation System for Omni-directional Automatic Guided Vehicle with Mecanum Wheel", *IOSR Journal of Electrical and Electronics Engineering*, Volume 2, Issue 3, pp. 35-39.
- S. Kumra, T. Rao, "A Novel Design for a Palm Prints Enabled Biometric System", *IOSR Journal of Computer Engineering*, Volume 7, Issue 3, pp. 1-8.
- S. Kumra and S. Mehta, "3D Modeling and Designing of Dexto:Eka:", *International Conference on Computational Vision and Robotics*, Bhubaneswar, India, August 19, 2012, pp. 43-47.
- S. Kumra and S. Mehta, "Singular Axis Self Balancing Robot", *International Conference on Electrical Engineering and Computer Science*, Delhi, India, August 12, 2012.
- S. Kumra and S. Mehta, "Design and Development Part 1 of Dexto:Eka: - a Teleoperated Humanoid Robot", *International Conference on Electrical and Electronics Engineering*, Jaipur, India, July 29, 2012.
- S. Kumra, "A Brief Review on Humanoid Robots", *National Conference on Artificial Intelligence, Robotics and Embedded Systems*, Visakhapatnam, India, June 29-30, 2012.