Achu Wilson

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Research Interests

Robot Manipulation, Tactile Sensing, Grasping, In-hand Manipulation, Computer Vision, Reinforcement Learning for Robot Control, Design of Robot Actuators, Controllers and Mechanisms

Education

- **Government Engineering College** Sreekrishnapuram, India
  aff. University of Calicut, India; B.Tech in Electronics and Communication Engineering *August 2008 - May 2012*

Experience

- **Robert Bosch Centre for Cyber Physical Systems, Indian Institute of Science** Bangalore, India
  Technical Associate *September 2020 Onwards*
  - Developed a two finger robot hand which has tactile sensing on the inner and outer surfaces, provided by GelSight and a proximity sensor array respectively.
  - Working on reinforcement learning algorithms to explore and pick up objects in vision denied environments, especial, inside granular media.

- **Perceptual Science Group, CSAIL, MIT** Cambridge, MA, USA
  Research Assistant *Oct 2018 - Oct 2019*
  - Designed a fully actuated robot hand with multiple GelSight tactile sensors. It involved design of the mechanical system, electronics and software for simultaneous capture of multiple high resolution optical tactile sensors.
  - Developed point cloud processing software for fusion and registration of multiple point cloud data streams from the GelSight sensors on the robot hand.

- **Sastra Robotics** Cochin, India
  Co-Founder & Chief Technology Officer *Aug 2013 - Sept 2018*
  - As the technical guy of the founding team, designed and built the drive systems, kinematics, motion controllers and user software for the SCARA and 6 axis robots for device testing applications. Later built and managed a technical team of 20 engineers, designed product road-maps and oversaw the R&D.
  - Developed force control capabilities for robots to ensure that the devices are tested without even any cosmetic damage.
  - Developed a sensorized finger to analyze the haptic feedback generated on touchscreens.
  - Created image processing and machine learning systems to read and analyze state of devices for LCD screens, dials and status of switches of the devices.

- **Asimov Robotics (Energid Technologies)** Cochin, India
  Robotics Software Engineer *June 2012 - July 2013*
  - Developed ROS & LabVIEW interfaces for Cyton Gamma 7DOF manipulator through Energid Actin framework.
  - Designed electrical subsystems, motor controllers and sensor interfaces for a humanoid social robot.
  - Implemented kinematics and motion planning systems for a bi-manual anthropomorphic manipulator system using ROS.

Publications

Papers

- Radhen Patel, Rui Ouyang, Branden Romero, Achu Wilson, Edward Adelson, **Digger Finger: GelSight for Granular Media**, Accepted *International Symposium of Experimental Robotics (ISER) 2020 Malta*
- Achu Wilson, **Design and Development of a Magneto-Rheological Linear Clutch for Force controlled Human Safe Robots**, *IEEE International Conference on Robotics and Automation (ICRA) 2017, Singapore*

Posters

- Achu Wilson, Shaoxiong Wang, Branden Romero, Edward Adelson, **Design of a Fully Actuated Robotic Hand With Multiple Gelsight Tactile Sensors**, *RoboTac Workshop, International Conference on Intelligent Robotics and Systems (IROS)2019 Macau.*
- Daniel Fernandes Gomes, Achu Wilson, Shan Luo, **GelSight Simulation for Sim2Real Learning**, *ViTac: Integrating Vision & Touch Workshop, IEEE International Conference on Robotics & Automation (ICRA) 2019, Montreal.*
- Achu Wilson, **Modular, Whole Finger Tactile Sensing Gripper**, *ActiveTouch Workshop, IEEE International Conference on Robotics & Automation (ICRA) 2018, Brisbane.*

Skills

- Programming Languages: Python, C/C++
- Technologies and Frameworks: OpenCV, Open3D, ROS, Drake, Numpy, TensorFlow, Keras, Matlab, LabVIEW
- Embedded Systems: AVR, ARM Cortex-M0 & Cortex-M4, FreeRTOS
- Electronics: Schematic Design, PCB development, Eagle, KiCad, NI MultiSim, Ansys Maxwell
- Design & Fabrication: Solidworks/FreeCAD, 3D Printing, Laser & Waterjet cutting, CNC Lathe & Mill, Molding Soft Robots

Patents

- **Robot Arm for Testing of Touchscreen Applications** Pub. No.: WO/2017/051263, International Application No.: PCT/IB2016/053292

Accomplishments

- Finalist, Kuka Innovation Award 2021: Artificial Intelligence, Team: Blindgrasp, Role: Team Leader (finals ongoing).
- Winner, IEEE ICRA 2016 Humanitarian Robotics Challenge (HRATC), Team: Autobots, Role: Team Leader
- Best Project Award : MIT Class 2.12 (Introduction to Robotics) Spring 2019.
- Funding for side project by MIT Innovation Initiative under ProjX-2019 (Project: PulleyDrive).
- Best Undergraduate Project Award : High Altitude Platform based Communication System, 2011-2012, Government Engineering College, Sreekrishnapuram.
- Received TEQUIP funding from Government of India for Undergraduate Project.
- Winner of India Innovation Growth Program (IIGP) 2018 organized by Department of Science and Technology-India, MIT TATA Center and Lockheed Martin.
- Best First Line Entrepreneur Award 2017 from Kerala (State) Chief Minister.
- TiE Silicon Valley Top 50 Tech startups in world award 2017.
- First Prize, Circuit design competition at DHRUVA 2kX,2010 a national level tech festival.

Leadership Experience

- Reviewer and Program Committee Member - Advances in Robotics (AIR-2019) - an International biennial conference organized by Robotics Society of India, Indian Institute of Technology, Chennai.
- Voting Member, Bureau of Indian Standards: Production Automation Systems & Robotics Sectional Committee.
- Industry Member in drafting the Robotics & Automation Roadmap for India, IEEE-SA Industry Connections Workshop, Indian Institute of Technology (IIT)-Delhi, June 2017.
- Elected as Student Representative in College Union for 2011-2012.
- Coordinated Robotics Exhibition for INVENTO 2012, an intercollegiate tech festival.
- ECE Department Exhibition Convener, GHATECH-2011, an intercollegiate tech festival.
- Exhibited a self-navigating robot to showcase OpenCV at FOSS.in 2009, one of the largest FOSS events in Asia.
- Conducted workshops for undergraduate students in various colleges on Robotics, ROS, simulation using NI Multisim, Embedded Systems Programming.