Achu Wilson

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Research Interests

Robot manipulators, manipulation in clutter, novel actuators and controllers for robots, personal robots, tactile manipulation, computer vision, machine learning.

Education

University of Calicut, Govt. Engineering College (GEC) Palakkad, Kerala, India
Bachelor in Electronics and Communication Engineering, June 2012

Experience

C.T.O/Co-Founder, Sastra Robotics (Sept 2013-Present)

- Engineered and developed the drive system, control and application software of a 3DOF SCARA robot for device testing applications, which is currently being used by many OEMs & integrators including Robert Bosch, HCL Technologies, Honeywell Technologies, Audience, Knowles etc
- Development of a 2-axis force control system for deburring of machined parts using a SCARA robot.
- Developed the drive and control system and software for a 6DOF research grade manipulator.
- Development of an analytical IK solver and motion planning software for the 6DOF SR-6D-Hx manipulator.

Robotics Software Engineer, Asimov Robotics (July 2012-Aug 2013)

- Developed NI LabVIEW interface for Cyton Gamma 7DOF manipulator through Actin toolkit
- ROS interfaces for 7DOF and 14 DOF anthropomorphic manipulators.
- Designed a system to clean contaminated planar surfaces using a Kinect sensor for surface estimation and Cyton Gamma manipulator for actuation.
- Implemented bipedal gait generation and walking algorithms on Kondo KHR-3HV and Robotis Bioloid Humanoid robots.

Publications

Achu Wilson. *Design and Development of a Magneto-Rheological Linear Clutch for Force controlled Human Safe Robots*. IEEE International Conference on Robotics & Automation 2017, Singapore, DOI:10.1109/ICRA.2017.7989076

Patents

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

Awards & Recognition

- **First Place, IEEE ICRA-2016 Humanitarian Robotics Challenge (HRATC)**- Team Autobots
- Best Project Award for High altitude platform based communication system, 2011-2012, Government Engineering College
- First Place, Circuit design competition at DHRUVA 2kX,2010 a national level tech festival.

Invited Talks

A Robotics & Automation Roadmap for India, *IEEE-SA Industry Conections Workshop*, Indian Institute of Technology (IIT)-Delhi, June 2017

Skills

Software: Proficient in Python and C++, ROS, OpenCV, Matlab, LabVIEW
Robot simulation in Gazebo, VREP and pyBullet
Embedded Programming – AVR, ARM Cortex-M, FreeRTOS
Electronics: Schematic and PCB design, circuit simulation, electromagnetic FEM analysis, Eagle, Proteus, NI MultiSim, Ansys Maxwell
Mechanical: CAD design and FEM analysis. Quick prototyping skills. Solidworks, FreeCAD.
Language: English (TOEFL 112),Malayalam, Hindi

Projects

- ***BlindGrasp – Exploration and grasping of objects from clutter using tactile sensing* (ongoing)**
  - Exploring the usage of noval tactile sensors, exploration policy and machine learning to grasp objects in clutter without using vision**.**
- ***Cat like mid air inertial reorientation for safe landing of quadruped jumping robots using an active spine (ongoing)***
  - This project involves using an active spine controlled inertial reorientation to make quadrupeds land safely on all for limbs, just like a cat.
- ***Magneto-Rheological linear clutch* (2016)**
  - A clutch for force control of linear actuators was developed, making use of the change in physical properties of MR fluids under a magnetic field.
- ***2048 game player robot* (2014)**
  - Built a solver for 2048 game using alpha-beta pruning algorithm and used computer vision to get the current values from a smartphone screen. A scara robot was used to play the game on the smartphone.
- ***Robot control using Kinect skeleton tracking*(2012)**
  - A simulated NASA-Robonaut in Gazebo was controlled by skeleton tracking using Kinect.
- ***High Altitude Platform based Communication system*(2012)- Best undergraduate project award.**
  - Designed a 2.4 Ghz, beyond line of sight, communication system that uses high altitude tethered balloons to carry a repeater which will relay data between numerous ground based nodes. The system is fastly deployable and can be used in emergency scenarios.
- ***Chippu* (2011)**
  - A interactive personal assistant social robot with speech recognition, person recognition and autonomous navigation using SLAM.
- ***Picker-Bot (2011)***
  - Built a mobile robot with a gripper, that could be trained to detect any object using computer vision. When commanded the robot will search for the object, picks it up and return it if found. Object detection was done using K-Nearest Neighbours on SURF features of the image.
- ***Object detection using Haar-Cascade classifier*.(2010)**
  - Trained a Haar-Cascade classifier from thousands of positive and negative samples to detect a custom object (coke bottles), with an accuracy of 95.6%.
- ***Self-parking robot car*.(2010)**
  - Developed a system using a mobile robot and IR distance sensors to gather information about surroundings and plan a path to park the car in an empty parking slot.
- ***Roller Bot* (2010)**
  - A two wheeled roller robot inspired by Recon Scout Throwbot, RC controlled and providing live audio-video feedback
- ***Sound localization robot*(2010)**
  - Using an array of microphones to triangulate and moves towards a robot and follow an ultrasonic beacon.
- ***Object tracking robot (2009)***
  - Built an object tracking and following mobile robot using simple color thresholding in MATLAB

Leadership and Responsibilities

- IEEE Young Professional member.
- IEEE Robotics and Automation Society (RAS) Member.
- Built and maintains pyherkulex - an open source library to communicate with servo motors.
- Built gspeech - an open source library for speech recognition on the cloud.
- Coordinated Robotics Exhibition INVENTO 2012, an intercollegiate tech festival.
- Elected as Student representative in College Union for 2011-2012.
- ECE Department Exhibition Convener, GHATECH-2011, an intercollegiate tech festival.
- Exhibited an OpenCV based obstacle avoiding mobile robot at FOSS.IN 2009, one of the largest FOSS events in Asia.
- Conducted hands on workshops for student in various colleges on simulation using NI Multisim, Raspberry-Pi, Arduino and embedded C programming of AVR microcontrollers.