# Hands-On Tutorial on Robot Operating System (ROS) and Robot Manipulator (Cake Cutting)

**Resource Person:** Mr.Aditya Marathe, Business Head, Nugenix Pvt.Ltd, Prof. Gayathri Manikutty and AMMACHI Labs robotics researcher Akshay Nagarajan

**Venue:** N308 (MTech Robotics Classroom), Engineering Building, Amrita University, Amritapuri Campus

**Date:** July 28-30, 2017

**Attendees:** Students of the MTech Robotics and Automation program, undergraduates and researchers

Prof. Gayathri Manikutty and AMMACHI Labs robotics researcher Akshay Nagarajan conducted the ROS sessions and Mr. Aditya Marathe of Nugenix provided the Kinova demo. Ms. Gayathri Manikutty is currently serving as Haptic and Robotics Research Coordinator at AMMACHI Labs. She is also an Assistant Professor and coordinates the M.Tech program in Robotics and Automation at Amrita University. She graduated with an M.S. in Computer Engineering from the University of Texas at Austin in 2000. She was a verification engineer at Intel Corporation in Austin for 11 years, between 2002 to 2013. Since joining Amrita University in 2013, she has made fundamental contributions to the robotics and automation research and development at Amrita. Her research interest areas are in embedded systems, humanitarian robotics, and haptics.

**Introduction:**

Ever heard of ROS? ROS, short for Robot Operating System is being used extensively for many of the world's most leading and awe-inspiring robots, in both research and entertainment. Our workshop on ROS primarily introduced the participants to the key concepts behind ROS so as to enable them to build more capable robots. Also, for hands-on experience, simulations with Turtlebot were included.

**The topics covered include:**

1. Setting up ROS and running Basic ROS commands
2. Introducing the Gazebo simulation environment 3.

   Building and running packages supported by ROS

**Details:**

AMMACHI Labs conducted a full-day tutorial on Robot Operating System (ROS) and robot manipulator demonstration at the Amrita School of Engineering, Amritapuri. The sessions were attended by students of the MTech Robotics and Automation program, undergraduates and

researchers. The session provided a hands-on demo and tryouts of the Kinova Mico robot arm that can be controlled through ROS, and simulation packages for the Clearpath Husky, Parrot AR Drone and ABB manipulators. Prof. Gayathri Manikutty and AMMACHI Labs robotics researcher Akshay Nagarajan conducted the ROS sessions and a resource person Mr. Aditya Marathe of Nugenix provided the Kinova demo. A group of graduate students of the robotics and automation program will also be participating in the IEEE RAS Humanitarian Robotics and Automation Technology Challenge (HRATC) in the coming weeks and this tutorial marked the preparation for this event.

Packages we will cover include the TF package(managing multiple coordinate frames), the ABB IRB 1600 robot package, AR Drone Quadrotor TUM Simulator package, and the Husky robot package

After the session, students interacted with Mr. Adithya and discussed their final year projects. They had a healthy discussion on the application of ROS software for different real-time platforms. Few students showed interest in trying out the software and checking if it is useful for their project area. On a side note, the students even celebrated the resource person's birthday by cutting a cake using the robot arm!

Mr Adithya, showing demo of the Kinova Mico Robot Arm and Cake cutting using the robot