

Module 2: Mastering Robot Operating System

- ✓ **Mastering Robot Modelling using URDF**
 - Deep dive into ROS URDF and xacro
 - Discussing various tags in URDF
 - Creating your own URDF/xacro for your robot
 - Creating your URDF/xacro for a mobile robot
 - Creating your URDF/xacro for a robotic arm
 - Creating your URDF/xacro for a four legged robot
 - Working with Joint state publisher and robot state publisher
 - Working with Gazebo URDF tags and Spawning in Gazebo
 - Writing launch file to simulation and visualization
 - Assigning ros controllers to the robot moving robot

Module 2: Mastering ROS

- ✓ **Mastering Autonomous Navigation using ROS**
 - Deep dive into ROS Navigation stack
 - Configuring and fine-tuning navigation stack
 - Using different path planners in the Navigation stack: TEB planner
 - Deep dive into ROS move_base node
 - Deep dive into ROS SLAM Gmapping
 - Creating Map using ROS SLAM
 - Working with AMCL
 - Testing AMCL and Navigation stack
 - Testing Autonomous Navigation in real hardware: Turtlebot3

Module 2: Mastering ROS

✓ Mastering 2D and 3D SLAM

- ROS Cartographer
- Hector SLAM
- RTAB SLAM
- ROS ORB SLAM
- LOAM

✓ Mastering ROS MoveIt!

- Deep dive into ROS MoveIt!
- Configuring and fine-tuning MoveIt! for any robot
- Using different planners in MoveIt!
- Using different IK solvers in MoveIt!
- Interfacing perception in MoveIt!
- Complex motion planning and pick-place
- Interfacing MoveIt! in Gazebo and real robots
- Programming using MoveIt! APIs
- FlexBE and MoveIt! planning

Module 2: Mastering ROS

- ✓ **Mastering ROS Perception**
 - Deep dive into ROS interface of OpenCV and PCL
 - Creating ROS nodelets for working with PCL
 - 2D & 3D Object detection using ROS
 - YOLO 2D and 3D Object detection using ROS
 - ROS-Perception projects

- ✓ **Creating Web application using ROS**
 - Introduction to Robot Webtools
 - Introduction to ros bridge server
 - Introduction to roslibjs, ros2djs and ros3djs
 - Introduction to roslibpy and rosbag.js
 - Introduction to worldview and Webviz
 - Working with ROS Control center
 - Creating web based teleop app for your robot

Module 2: Mastering ROS

- ✓ **Reinforcement Learning in ROS using OpenAI Gym**
 - Introduction to ROS and OpenAI Gym
 - Interfacing OpenAI Gym and ROS
 - Turtlebot3 and OpenAI

- ✓ **Developing a Social robot in ROS**
 - Modeling the CAD of the robot
 - Simulating social robot in Gazebo
 - Assigning ROS controllers
 - Designing the circuit of the robot
 - Creating hardware prototype
 - Writing speech recognition and TTS in ROS
 - Creating Face tracker in ROS
 - Creating face animation using OpenCV
 - Testing robot

Module 2: Mastering ROS

✓ ROS Industrial

- Introduction to ROS Industrial
- Creating URDF for the robot
- Creating IK solver for industrial robot
- ROS Industrial MoveIt!: ABB, Fanuc, Motoman

✓ Docker for ROS App deployment

- Mastering Docker concepts and commands
- Working with Docker-ROS container
- Deploying your ROS app in docker
- Working with NVIDIA Docker and ROS
- Working with ROS Gazebo with Docker
- ROS Docker in Raspberry Pi

Module 2: Mastering ROS

- ✓ **Testing and Deployment of your Code**
 - Mastering GitHub and Travis CI for ROS project
 - Creating and pushing a ROS project in GitHub
 - Integrating Continuous Integration using Travis CI
 - Releasing your ROS package
 - Adding your own package in ROS distro