FLYING AND ROBOTICS CLUB

NITK SURATHKAL

ROS KEP Content Guide

#farcnitk

Week 1

Topics to Cover

- What is ROS and some related technologies.
- Intro to the theory of master, connection with master, publisher and subscriber.
- Writing a chatterbot in ROS.
- Using terminal commands to see topics, nodes, messages and their info using *turtlesim* as a reference.
- Using *turtlesim* to trace out a circle.

Theory Learnt

- ROS computation graph
- Master and *roscore*
- Nodes and their connection over topics and messages
- How ROS manages different nodes
- Using the terminal to see info
- Using the documentation to see info

Week 2

Topics to Cover

- Introduction to *gazebo* and *rviz* package.
- Creating launch file for gazebo and rviz.
- *Introduction to URDF, xacro, collision and joint properties.* URDF plugins in SolidWorks/Fusion 360.
- More information on plugins. Introduce GUI of *robot_state_publisher* and *joint_state_publisher.*
- Use *rostopics* to set the values of joint and robot state publisher. Introduction to *RQT.*
- Controllers and teleops and apply that to a bot.

Theory Learnt

- Popular important packages
- Gazebo and Rviz
- Creating URDFs
- Other visualization tools

Week 3

Topics to Cover

- Basics of *OpenCV*, need for it, real-life applications.
- Writing a simple code to open an image/use camera for the image/video and displaying it in a window.
- *Blurring, thresholding, edge detection* and some technical info as to how things work.
- Masking and a green screen assignment.
- *CVBridge* and what it is. Adding OpenCV capability to the bot made till week 2. Basic applications and implementing those ideas.

Theory Learnt

- Introduction to image processing and the OpenCV library.
- Integration of OpenCV with ROS.

Week 4

Topics to Cover

- Studying the ROS environment with a *Differential drive robot.*
- Adding sensors, cameras, etc.
- Looking at *robot behaviours.*
- Studying *services*, *actions* and *messages* in ROS .
- Learning how to read documentation pages.

Theory Learnt

- ROS messages, services, actions.
- Adding sensors and plugins.
- Robot behaviours..

Weeks 5 & 6

Guest lectures by alumni.

They will be explaining their projects, some packages like *rosserial*, *moveit* and more.

NOTE: ***Due to end-semester exams, we will be taking a break after week 2 and resume from November last week with week 3 content.***