**Day 3**

**Content**

* **Ros File System**
* **Ros master**
* **Nodes**
* **Topics**
* **Massage**
* **Services**
* **Bags**

**ROS File System:**

**catkin workspace in ROS**

**• ROS workspace** is a folder to organize ROS project files. **• catkin -** a build tool that compiles source files to binari**es.   
• catkin workspace –** a ROS workspace where catkin is used as the build tool.

**catkin workspace in ROS**

* **$ mkdir -p ~/catkin\_ws/src**
* **$ cd ~/catkin\_ws/src**
* **$ catkin\_init\_workspace**
* **$ cd ~/catkin\_ws/**
* **$ catkin\_make**
* **$ source devel/setup.bash**

# **Creating a ROS Package**

* $ cd ~/catkin\_ws/src
* catkin\_create\_pkg auc\_robotics std\_msgs rospy roscpp
* $ cd ~/catkin\_ws
* $ catkin\_make

**install ROS package deps**

**install dependencies of a ROS package (listed in package.xml)**

$ cd <path\_package>

$ rosdep install <package\_name>

**install dependencies of all ROS packages in your source space**

$ cd <path\_ros\_workspace/src>

$ rosdep install --from-paths . --ignore-src -y

**catkin workspace - the “devel” space**

• (binary executable) Files for testing our development.

• Files for setting up project specific ROS environment

**catkin workspace - the “build” space**

* Where you can deal with C++ packages

### **Adding a Package**

## Cloning the simple\_arm Package:

$ cd ~/catkin\_ws/src

$ git clone https://github.com/udacity/simple\_arm\_01.git simple\_arm

## Building the simple\_arm package

$ cd ~/catkin\_ws

$ catkin\_make

I see a CMake Error. "Could not find a package configuration file provided by controller\_manager"

Let’s solve this problem:

$ sudo apt-get install ros-kinetic-controller-manager

Another solve:

$ source devel/setup.bash

$ rosdep install simple\_arm

$ catkin\_make

# **Dive Deeper into Packages:**

* scripts (python executables)
* src (C++ source files)
* msg (for custom message definitions)
* srv (for service message definitions)
* include -> headers/libraries that are needed as dependencies
* config -> configuration files
* launch -> provide a more automated way of starting nodes
* CMakeLists.txt -> the build system of ROS, uses CMake by default.
* Package.xml -> contains package information that describes the package name, author, license,and dependent packages.

Other folders may include

* urdf (Universal Robot Description Files)
* meshes (CAD files in .dae (Collada) or .stl (STereoLithography) format)
* worlds (XML like files that are used for Gazebo simulation environments)