Pre-class Collection

Week 07: Data Structures and Algorithms

Data structures were partially covered in STL (using STL containers). Additional readings for this topic cover non-linear data structures, which are essential for searching algortitms in robotics. Data structures that are exploited are:

- Trees
- Graphs

The most essential algorithms that exploit these structures are Depth First Search (DFS) and Breadth First Search (BFS)

Week 08: Threading and Synchronisation

Material for Threading and Synchronisation pre-class readings

- Process vs Thread
- C++11 Threading Introduction
- Thread Management
- Race Conditions - Mutex
- Conditional Variables

Week 09 : Unit Testing and Doxygen

Attached Files: week09_doxygen.zip(25.575 KB)
week09_unit_test.zip(1.081 MB)

Unit Testing

- Video "CppCon 2014: Matt Hargett "Pragmatic Unit Testing in C++" from 6:58 - 34:37
- Attached Unit Testing Example to get you started
- Video guide for the example

Doxygen

- Starting using Doxygen https://www.stack.nl/~dimitri/doxygen/manual/starting.html
- Attached Doxygen example, to compile the code (*cmake* and then *make doc*) should produce documentation
- Documenting your code tips https://www.stack.nl/~dimitri/doxygen/manual/docblocks.html
- Video guide related to example

Week 10 : Component Based Software Engineering (CBSE) and ROS

Component Based Software Engineering (CBSE)

- Davide & Scandurra, Chapters 1 & 2 (essential Chapter 2) from Brugali, Davide, and Patrizia Scandurra. "Component-based robotic engineering (part i)[tutorial]." *IEEE Robotics & Automation Magazine* 16.4 (2009): 84-96. link

ROS

- General overview and installation notes (We will be using ROS version Indigo)
- Publisher Subscriber Walkthrough

Week 11 : ROS ecosystem and using libraries (OpenCV)

OpenCV

- Basic using OpenCV http://docs.opencv.org/2.4/doc/tutorials/introduction/linux_gcc_cmake/linux_gcc_cm
- Operations on images http://docs.opencv.org/2.4.13.2/doc/user_guide/ug_mat.html

ROS Advanced

- Service / Client http://wiki.ros.org/ROS/Tutorials/WritingServiceClient%28c%2B%2B%29

ROS + OpenCV

- Creating an image publisher http://wiki.ros.org/image_transport/Tutorials/PublishingImages
- Writing an image subscriber http://wiki.ros.org/image_transport/Tutorials/SubscribingToImages
- Bridge between ROS Images and OpenCV http://wiki.ros.org/cv_bridge/Tutorials/UsingCvBridgeToConvertBetweenROSImagesAndOpe