41012 Programming for Mechatronic Systems

Tutorial: Week 6

Process vs Thread

- Do we need threading?
  - Accessing data?
  - Synchronisation?
  - Time critical (nondetermenistic / stochastic)
- A process is a collection of threads and the associated program
  - https://www.youtube.com/watch?v=O3EyzlZxx3g

Task 1: Threading / Mutex

- Create Two threads that access a variable
1. First prints variable (Consumer)
2. Increments variable (Producer)
   - What is best approach?

- Refer: http://www.cplusplus.com/reference/thread/thread/thread/

Task 2: Threading / Atomic

- Create Two threads that access a variable
- Both threads read and increment variable only if it is greater than random number drawn by the function (0-100)
  - What is best approach (atomic variable)
  - What happens if the variable is not atomic?
  - Can we use mutexes to protect variable?

- Refer: http://www.cplusplus.com/reference/thread/thread/thread/

Task 3:

- Three threads should access same class
- Class contains:
  - string name
  - vector of doubles
- Thread 1
  - adds random number (from uniform distribution 0-100) to the vector of doubles
- Thread 2
  - Removes numbers less than 20 and greater than 80
- Thread 3
  - Keeps size of vector to max 20 elements, removes oldest element

- Questions:
  - How best to protect data?
  - What should a efficient implementation do?