Assignment 2

part B

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In this part of the assignment, it requires to provide an output to show thread safe when using three threads. In the program that is written, it has three threads that shares common buffers between each other. The accelerometer and gyroscope threads are generating samples at different paces and putting those samples into the buffers, the fusion thread get the sample value out of the buffer and do some calculations. Since all three threads uses common resources, one thread can reading a value to while another thread is changing the same value at the same time and that can lead to thread collision. To prevent threads from crashing into each other, a lock is used for to provide a thread-safe access.

In the program, there are two mutexs used to lock all the shared buffers. In each thread, every time a shared resource is used, the thread will acquired the mutex first to prevent other threads change the value while this thread is accessing it. After the thread is finished accessing the resource, the thread then will release the mutex and allows other threads to access the resources. If a threads try to access to the resource while the other thread with mutex is using it, the mutex will block the thread until the other thread is finish with the resource. This make sure that only one thread is accessing the mutex at a time. Since there is only one thread is using the resource, thread collision will not occur and the access to the resource will be thread safe. In the diagram below, it shows the output of the program.

