To the student who takes this course,

In the lectures scheduled on 24/July and 31/July, you will be requested to do practice of some software development for onboard attitude dynamics of satellites.

The purpose of this practice is to make you experience a process of making some ideas that you may have been taught in this class into an actual system; as examples in lecture, to write and run an executable program of a simple function of satellite control subsystem. Although there is little chance to get involved in some actual satellite development projects, there are plenty of rooms to get involved in projects where the embedded software plays important roles in the systems. So, this simple practice could become a basis of such activities by changing point of view and system structure of the models you would work on.

This lecture is focused on programming for embedded systems. When we write a program, we need a hardware system where the program can run. Recently, there're many cheap and easy-to-use micro-computer systems, such as Raspberry Pi, mbed, EPS-WROOM32, and sensors of IR-camera, MEMS-accelerometer, -gyro, -magnetometer. So, it is not hard to build a system for some purpose by gathering such devices. However, we do not need make such systems by ourselves just for software practices: almost everyone has such a sophisticated system; smart phones.

Smart phones have several sensors for measuring gravity vector and geomagnetic field vector, data processors that can calculate mathematical trigonometric and vector operations in real time, and programming capabilities that we can write and run our software on them. Thus, we can use them as our platform. And you will be requested to write (a fragment of) program of an attitude determination calculation using a smart phone.

The basic understandings of satellite dynamics, inertial and relative frames, and coordinate transferring operation are assumed. Supplementary lecture of "simple attitude determination algorithm" could be given in the lecture before the exercise, if needed. The target smart phone is iPhone, which will be provided by the lecturer, to validate whether or not your program has been written correctly. Note that if you have an iPhone/iPad, it cannot be used in the practice. To download a user program to an iPhone, such iPhone must have been registered and allowed to do so by Apple.

You are requested to bring your own laptop PC on the lectures. Since the PC will be used to type source code of the programs, Windows, Mac, Linux, and any OS can be used (It is better to be available some C compiler if possible). If you don't have suitable one, you can use the PC which the lecturer will bring. The practice will be performed step by step. It is assumed that you have elementary level knowledge of C language or MATLAB.

If you have some question and trouble to take the lecture, please contact the following address:

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