AME 30315; Spring 2015; Pendulum Project Logistics

Teams

You have been assigned to a team of three students; the team listings are posted on the course website. You will be given a team homework grade and, accordingly, you will submit one homework document and all work should be completed together. We realize that your schedules may not always allow for everyone working at the same time and the team may work without all members present; please be respectful to your teammates and put forth an honest effort in helping your team complete the project. To account for the situation where a student is not pulling their weight, your last assignment will include a team member evaluation which will determine the allocation of the homework grade.

Access to a pendulum

There is a set of 20 pendulums in the Stinson-Remick Learning Center supply closet (Room 214), accessible via ID swipe access. You will not be assigned a specific pendulum system because there will be system breaks throughout the project and we will need to be agile with pendulum allocation. Pendulums can be reserved using a google calendar system. Please let a TA or myself know if a pendulum ever stops working or behaves strangely (i.e. outputs unexpected values for angular position)

Google log-in: ndpendulumproject@gmail.com
Password: AME30315

Directions: log-in → select calendar → hit the "Create" button → make the event title "Pendulum #xx" and select the time you will use it for (maximum 2 hour reservation) → In the event details, change the "Calendar" drop down to the pendulum you will be using

Basic access rules: 2 hour limit on the reservation duration; you may not reserve your next session until after you have completed your most recent reservation; do not move any team’s reservation except your own (the google calendar system is not protected against malicious rescheduling; you will fail a given homework assignment if there is evidence that your team willfully moved someone else’s slot). Stinson-Remick outside doors are open via ID swipe access 24/7. The Learning Center is open via ID swipe access 24/7. Always return your pendulum setup to the supply closet after using it; if there is evidence that you did not return the system to the supply closet after your reservation you will fail a given homework assignment.

Help with pendulum operation

One TA and two undergraduate assistants have been assigned to help with the project. They will be in the Learning Center during the following time slots:

Spencer Kieffer (skieffer@nd.edu): M 6:00-9:00pm; Sa 3:00-5:00pm; Su 3:00-5:00pm
Kevin Leyden (kleyden@nd.edu): T 6:30-9:30pm; Th 6:00-8:00pm
Ryan Williams (rwilli31@nd.edu): M 5:00-8:00pm; T 3:30-6:30pm; Su 3:00-5:00pm

The other TAs who help with office hours will also be in the Learning Center during the normal office hours time periods. Note: You are free to use a pendulum system during other time windows; however there will not be trained personnel to assist you.
Information on the pendulum testbed

The pendulum and controller are shown in the picture below. It is comprised of

1. the pendulum,
2. a d.c. motor with optical encoder,
3. an H-bridge current controller,
4. Communication board
5. a Freescale 68hc11 8-bit microcontroller with peripherals, and
6. a usb-port for the logic analyzer.

The microcontroller is very inexpensive and has limited capability, as is realistic in industry where component costs are of significant importance.

The following elements are illustrated in the picture.

Fig. 1. Inverted pendulum experimental testbed.

You will need to use one of the desktop computers in 212 or 213 Stinson-Remick; the desktop computers throughout Stinson-Remick will work actually, but it will be best not scatter the pendulum systems throughout the building. Those computers should have the following software installed:

- the 68hc11 port of the gcc compiler,
- putty, to be able to communicate with the microcontroller over the serial port,
- notepad, for editing your programs, and
- the logic analyzer software.
All the software can be found in the start menu, except the compiler. To run that you need to open a command prompt (under Accessories) and type "m6811-elf-gcc". If it responds with "no input files" then it's installed. If it responds with "no recognized as an internal or external command" then it's not installed or is not in your path.