

EGR326 F'09

Course Project Mentor Guidelines

August 30, 2009

School of Engineering
Grand Valley State University

Thank you for your interest in mentoring a course project for EGR326 Embedded System Design at Grand Valley State University. This document explains many aspects of the project, but if you have additional questions please contact the course instructor Andrew Sterian at <steriana@gvsu.edu> or 616-331-6756. The course projects are greatly enhanced through industry mentorship and your participation in the education of our students is very much appreciated.

1 Basics

- Students are required to design and build a complete electronic embedded system which typically involves:
 - A microcontroller
 - Interfaces to analog components
 - Interfaces to external inputs/outputs/sensors/actuators
 - Firmware
 - PCB design/build
- EGR326 is a required course for Electrical and Computer Engineering juniors.
- The course project begins during the first week of class and ends during the last week (December 7-11).
- Students work in groups of 2 or 3.
- Sponsor pays for the cost of electronic components and printed circuit boards (\$50 for qty. 1).
- Sponsor owns the project upon course completion.
- A working project is worth 35% of the students' grade, thus a large emphasis is placed on meeting the project requirements. A working project, however, cannot be guaranteed.

2 Timeline

- September 9: all projects are finalized, student teams are assigned
- Week of September 9-15: students meet with Sponsor to identify project requirements, constraints, deliverables, etc.
- September 28: students submit a Functional Specification describing all functional and interface aspects of the project. This must be approved by the Sponsor.
- November 2 and 4: students orally present their design proposal to the Sponsor, the class, and the instructor. The Sponsor is invited to attend, ask questions, and critique the design (2:15-5:00).

- November 6: students are expected to order all electronic parts by this date
- November 13: students are expected to order PCB's by this date
- December 10: projects are due

3 Project Examples

For samples of previous course projects please visit:

<http://claymore.engineer.gvsu.edu/~steriana/326/hof.htm>

4 Good Projects

Attributes of a good project are:

- Complex enough to require a microcontroller, some analog interfaces, some digital interfaces
- Fulfills a real need for the sponsor (i.e., not an intellectual exercise)
- Goals and requirements are well-defined

5 Bad Projects

The following attributes would not be desirable in an EGR326 project:

- Projects requiring significant mechanical design/build
- Projects requiring extensive software or firmware
- Projects that are on the critical path of another project
- Software-only projects
- Projects that require extensive research, pre-evaluation, or experimentation
- Projects that require demanding PCB design (e.g., more than 4 layers, controlled impedances, flex boards, BGA packages, <6mil trace/space, <12mil holes, etc.)
- Projects that require fundamental knowledge not yet learned by students, including:
 - Fourier transforms, frequency analysis (students take Signals & Systems after EGR326)
 - AC power, 3-phase circuits etc. (students take Power Systems after EGR326)
 - FPGA's/CPLD's (students take EGR426 Integrated Circuit System Design in their senior year)
 - Complex or sensitive analog circuits (students take EGR436 Analog Circuit Design in their senior year)
- Projects that require strict control over intellectual property – the students' schematics and parts list will be made public.
- Projects that require high voltage (>120VAC)
- Projects with deadlines earlier than December 10

If you have a project that you feel may be too extensive or advanced for EGR326, please consider sponsoring a Senior Project instead. Please contact me at <steriana@gvsu.edu> for more details on this program.

6 Sponsor Expectations

As the Sponsor of an EGR326 project you will be expected to:

- Meet with the students briefly during the week of Sept. 2-9 to introduce yourself and your company and present the project requirements to ensure the students fully understand the project.
- Answer occasional e-mails from students to clarify the project requirements or discuss design alternatives (excessive or poorly-researched e-mails should be reported to the instructor and will be dealt with accordingly)
- Read through and provide comments on the Functional Specification submitted by the students (around September 28).
- (Optional but desirable) Attend the group oral design reviews (either November 2 or 4) 2:15-5:00 (arrangements can be made in advance for a specific time block)
- Meet with the students at the end of the semester to review and take possession of the completed project
- Reimburse students for electronic component and PCB purchases.
- Commit to the project's expectations and deliverables at the beginning of the semester – substantial changes to the project mid-semester cannot be accommodated.

7 Intellectual Property

- Student work developed in EGR326 is implicitly considered “work made for hire” thus the intellectual property so developed becomes the property of the Sponsor. **If the Sponsor is specifically concerned about this issue then the Sponsor should clearly inform the students during their first meeting that their project is “work made for hire”.** Without a clear agreement, the students may be able to claim intellectual property ownership in their designs, according to University policy. Please see the following link for more details (Section 1.10):

http://www.gvsu.edu/admin_manual/index.cfm?id=000483B0-E85C-1EBF-8B8C80E71566014E

- Since University resources are used in the development of the projects, the University retains a non-exclusive license to use the intellectual property.
- In general, projects that are sufficiently sensitive such that they require formal intellectual property agreements with students or faculty are not a good fit for EGR326

8 Purchasing

Due to the tight timings of the deadlines during the semester, the best method for purchasing components and PCB's is to have the students use their personal credit cards and then submit invoices for reimbursement to the sponsor. Using the Sponsor's internal company purchasing procedures is usually a much slower purchasing path and presents delays that can greatly slow down the students' progress.

At your first meeting with the students, please specify clearly:

- the methods for purchasing and reimbursement, including documentation required
- hard limits on project costs
- whether or not purchases must be previously approved by the Sponsor (perhaps for purchases that exceed a dollar limit)