

EE 4743/6743
COMPUTER AIDED DESIGN OF DIGITAL SYSTEMS
PROJECT ASSIGNMENT

This is a team project lasting approximately four weeks. The project will use the Basys development board. The first step is to come up with an idea and submit a proposal. The project must be interesting, practical, and employ design concepts discussed in the class. You can NOT use the same hardware a previous project has already used. See the class webpage for previous projects.

REQUIREMENTS

Use either a Keyboard or Mouse as input interface, or use the VGA output to a monitor. Using a solderless breadboard is recommended to connect the new hardware. This hardware can be an input device, such as a sensor chip, or an output device, such as a stepper motor. A good source for chips is catalogs such as Digikey or Maxim Semiconductor. If you exercise this option, make sure your hardware is available for delivery within the timeframe of the project. It must also be compatible with the Basys board.

TEAMWORK

The project must distribute the workload equally between the team members and must include at least one distinct module for every member in the team. Each team member will be responsible for developing their module and coming up with a verification plan. This verification plan could be a valid simulation, or actually downloading the design and proving it works on the Basys board. You may include other modules that have been developed during this semester (for example, vga_sync or ps2_core); however, each team member must create a unique module. These modules will come together to perform some specific function. If external hardware is used then one module could be the interface, one module could perform some computation on the data, and the third could manage the video memory to display it on the screen.

DELIVERABLES

The timetable for the project will be as follows:

- **Phase 1:** Complete first draft proposal.
- **Phase 2:** Complete final proposal.
- **Phase 3:** Complete individual modules. Provide the I/O interface description and the functional description of what the module does. Include any timing requirements. Be detailed and describe each segment within the module.
- **Phase 4:** Complete upper level design by bringing modules together. Provide results of the project in an online write-up.

All submissions will be done through a wiki webpage. The recorder will be responsible for maintaining the project webpage. The project documentation should be divided into four distinct parts – one for the proposal (phases 1 and 2), one for the individual modules (phase 3), one for the completed design (phase 4), and one for an analysis or summary after the project is completed (phase 4). The web page should be a very simple design. I would like all the information on one page. Use the provided template as an example for what it should look like. If you use pictures (I encourage it) try to make them an appropriate size and resolution. Don't change the proposed work if you made a change during implementation, but note the change in the current section. Provide in the third section the files for each module and in the fourth section the files for the entire completed project. If you can easily make a short video of your working project that would be a nice addition, but is not required.

GRADING

Your team grad for phases 1 and 2 will be determined on how well you met the project guidelines, if you included all the required information and for phase 2 if you made the required changes from phase 1. For phase 3, you will be graded for each module working correctly as is designated in the validation plan, and how well documented it is on the webpage. For phase 4, you will be graded on how well your project met the original proposal, and how well documented it is on the webpage. There will be mark deduction for failing to meet the project timeline.

PROJECT IDEAS

Possible project hardware

- Stepper motor
- Color LCD
- ADC/DAC
- Thermostat
- peizo buzzer
- microphone
- USB interface
- Bluetooth interface
- CompactFlash interface
- Magnetic card reader
- PCMCIA interface
- Analog joystick
- Onboard flash memory: used to store configuration data
Can also be used for user-configurable memory

See Xilinx Application Notes for more ideas.

PROJECT GUIDELINES FOR PROPOSAL FIRST DRAFT

OBJECTIVE

One sentence only

TEAM MEMBERS AND TEAM NAME

Include the team member names and the role assigned to each member. Also include a team name which you can come up with.

INTRODUCTION

Tell us the background of the project. If you're doing an Analog-to-Digital converter, tell us what one is and how it is used.

CONCEPT

Tell us what your project is going to be at the end. For example: use the VGA monitor to display the ADC waveform. For option 2: how it will meet learning objectives. If you're using hardware in option 1, tell us what part number, what voltage supply it requires, and what type of package it comes in. If you don't already have the part, then include where you can order it and how much it costs.

PROPOSED WORK

What will need to be done for the project to work? *MUST provide:*

- Datasheet for the part
- Which package you will be ordering
- Where the part is available
- How much the part costs
- What is the expected delivery date

Include a general description of the modules to be designed and who will work on each part. Also include a top-level block diagram of how the modules will work together. Include the critical I/O to each module on the diagram.

EXPECTED DELIVERABLES

What you intend to show at the end of the project. You must include the description of your future demonstration of your working project. You must provide a lab assignment write-up like the ones provided.

PROJECT GUIDELINES FOR PROPOSAL FINAL DRAFT

On approval of your first draft, your final draft should also include the following details:

- Any modifications required
- A specific description of each module and its operation. You should include a description for each input and output from the module. For example, a vga module must have a description of exactly what will be displayed on the monitor and how it will look. Including a sketch may help.
- A verification plan for each module. When you complete your individual module, it will be tested according to the verification plan. This is to ensure that your module will work correctly when connected with other modules.
- Verification that the parts have been ordered.