

Laboratory Assignment #8

Objectives

The objective of this lab is to leverage intellectual property you have previously developed to implement a video game. You are encouraged to be as creative as possible to differentiate your design from that of others and improve your grade relative to your peers. Unlike previous semesters, this semester everyone must attempt a game based on the “invaders” concept, an example of which is shown in Figure 1.

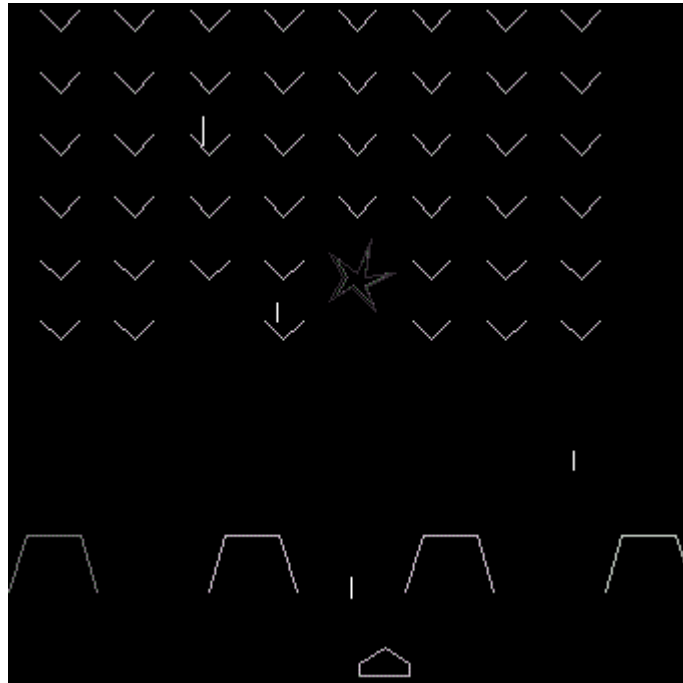


Figure 1: You Are On The Way To Destruction

You have two options for implementation. The recommended option is to integrate previous lab assignments as peripherals for PicoBlaze, and then to use the processor to implement the game logic and control the peripherals. This option involves minimal hardware development, but substantial software development.

The other option is to integrate previous lab assignments as peripherals for a custom FSM you design, to implement the game logic and control the peripherals. This option involves substantial hardware development, but no software development.

This is a group project. Each group is responsible for a single implementation. Groups are allowed to use modules from any and all group members to complete this assignment. The development effort should be partitioned to allow group members to work in parallel, where possible.

When you successfully complete this lab, you will have completed a substantial synchronous digital system design.

Bibliography

This lab draws heavily from documents on the Diligent website <http://www.diligentinc.com>. I would like to thank Diligent for making this material available.

I'd also like to thank John Dondzila, author of various homebrew games for the Vectrex. His "invaders" themed games are the inspiration for this assignment, including the artwork in Figure 1. You can find some of his games at <http://www.packratvg.com/vechbrews.html>.

In completing this lab, you will have integrated modules created for previous lab assignments. Therefore, the bibliographical citations in the previous lab assignments also apply to this lab assignment.

Project Specification

This specification is intentionally vague to provide you the most freedom. Your result will not be evaluated by comparison to any commercial or homebrew game in publication – it will be compared to the results of the other groups in the class.

In your use of previous lab assignments as peripherals for your design, you are PROHIBITED from making additions or modifications. In other words, you must use those modules "as-is". This requirement exists to preserve some level of commonality between designs so that the instructor can provide effective advice and debug assistance. It also ensures you are basing your "new" work on a stable set of peripherals which are assumed to work correctly.

Project Proposal

The group must generate and submit a short project proposal. The purpose of this proposal is to document your plans for the instructor, for each other, and to outline how you will approach the design challenge.

- Will you use PicoBlaze or an FSM?
- What game play and visual elements will you implement?
- What work breakdown to you plan on using, to share the load?
- What are the task assignments, who is doing what?
- Advance meeting schedule – days, times, and locations?

One person from each group must create a project discussion thread on the course discussion group with a name like "Group # Final Project". Post your proposal. If the proposal is not acceptable, the instructor will iterate with your team through the discussion thread to arrive at an approval. There is no score associated with the proposal, it is simply a milestone for the instructor to approve your plans before you begin.

A common complaint about group projects is that "so-and-so never showed up to meetings". To help mitigate this, your group is required to plan meetings in the discussion group and record attendance. This way, group members will have increased motivation to attend. There is no score directly associated with attendance and it will only be reviewed should complaints arise.

Feel free to discuss technical information related to your project via the discussion thread – but stop short of posting code as other groups will be able to view what you are posting.

Free Advice

Start planning immediately. You must implement at least some form of baseline game (that is, if you turn in something that cannot be "played" you won't earn many points). Differentiate your implementation for a better score.

As noted previously, you may use previous lab assignments from any group member – so if you observe incorrect behavior from one of the modules you’ve integrated, try swapping it out with a comparable module from another member of the group.

Please find, use, and cite any references you wish in development of this project – I highly recommend searching the internet for working examples of “invaders” type games, regardless of how they are implemented, and scan through them in search of ideas for the implementation of your design.

Laboratory Hand-In Requirements

This lab requires a group presentation. The presentation must be submitted as a professional-looking document in a single electronic file. The only acceptable file format for submission is PDF. The body of the presentation must be written in English and contain the following sections:

- Title page containing group number, student names, the lab title, game name, and the date.
- Introduction containing a brief summary of the problem the group set out to solve and your final results. Please include a table or chart that shows each group member’s initial work assignment and some measure of how much was completed.
- Design details documenting how the group achieved the final result. This is the most important part of the lab presentation. Illustrate understanding of the project and explain how it was implemented.
- Final results. Include information such as maximum frequency, resource usage, etc...
- Conclusion containing a brief summary and constructive criticism of the lab.

The presentation should be no more than eight pages, total. Budget four pages for the design detail and then one page for each of the other sections outlined above. The goal is to have a presentation that lasts about twelve minutes. Do not include project source code listings in the presentation. Do not waste valuable “presentation space” reproducing information that the audience already knows. For example, regurgitating information about previous lab assignments is a waste of space because everyone already knows what they were. Avoid huge “paragraphs” of text, keep it short and simple and use graphics where appropriate to illustrate.

Once your group has completed a working design and created a presentation, prepare for the presentation and demonstration process. During the scheduled final exam time, all groups will give their presentations. Unless you are bringing your own projector, you will only have access to the projection system used by the instructor during lectures. In advance of the scheduled final exam time, make sure at least one member of our group can connect to it for presentation purposes. Following the presentations, all groups will exhibit their hardware.

Prior to the scheduled final exam time, your group must submit the entire project directory and presentation in the form of a compressed ZIP archive. The presentation must be in the project directory with the file name lab8_group#.pdf. Use WinZIP to archive the entire project directory, and name the archive lab8_group#.zip. For example, if I were responsible for group three, the submission name would be lab8_group3.zip and contain lab8_group3.pdf along with the entire project directory. Then email the archive to the instructor. Only WinZIP archives will be accepted.

Given the amount of simulation in this lab, the ZIP archive may be extremely large. Often, you can reduce the ZIP archive size if you review the ZIP archive contents and delete any WDB, waveform data base, files in the simulation directories.

No late submissions are accepted. You are advised to submit your archive in advance of the scheduled final exam time. If your circuit is not completely functional, you should write a presentation documenting what you have accomplished and demonstrate what you have implemented to receive partial credit.

Name: _____

Group: _____

Instructor Notes on Presentation:

Score Components for Presentation Grade (50%) _____

_____ out of 50 Group illustrated understanding of the work and described how it was implemented. Group provided appropriate level of technical detail and used block diagrams, flow charts, tables, figures, or other forms of graphical communication.

_____ out of 25 Quality of presentation slides. Does it look like effort was expended?

_____ out of 25 Individual delivery. Does it look like you know what you are talking about?

Score Components for Demonstration Grade (50%) _____

_____ out of 25 Observable individual work contribution in demonstration and submitted files.

_____ out of 25 Cross-team evaluation: ____, ____, ____, ____, ____, ____, ____, ____, ____, ____, ____, ____

_____ out of 50 Instructor evaluation of overall demonstration result.