

EE 299 Lab 3 Second Steps to Design

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Introduction:

In this lab, we will continue to learn and practice the formal design process as we specify and develop a more complex system. We will also continue to build on the designs that we developed earlier.

This project is based upon one of the ideas submitted by a number of people at the start of the quarter. Our project will take the form of a two-player game.

Prerequisites:

Designed a number of the bits and pieces and a simple system in the first two labs that we'll now need and use. Have become quite proficient at spelling and pronouncing C and can say UNO with unbridled enthusiasm and with both hands. Ready to continue to extend and develop your design skills.

Postrequisites:

Sorry, still, only if you are twenty-one or more.

Thoughts and Reflections – Things People want to Know

Does anything really grow in the beer gardens in Muchen?

Do they really have a lot of ice in Iceland?

Are they always in a hurry in Russia?

What do they eat for thanksgiving in Turkey?

Do they have a 4th of July in France?

If you went to the Olympics in China, what kinds of plates did they use?

Were the Olympics in China taller than those in Washington?

If I have a squeak in my car, where should I go?

Do they have to water the grass to keep it green in Greenland?

Are the streets and sidewalks slippery in Greece?

Do you really have to wear a tie everywhere in Thailand?

Do they really have whales in Wales or is that just a joke?...perhaps a whale of a joke...

What kind of a sound does a Puget make...has anyone ever actually heard one?

Cautions and Warnings

As you gain more experience with developing software for the Arduino, make sure that your code has approximately an equal number of 1's and 0's. Because 0's are fatter than 1's, if you have too many 0's, your memory will fill up very quickly and not leave room for the 1's. However, 1's, on the other hand, are very thin and can fall in the cracks in your memory and get lost if they don't have 0's to lean on.

Background

In the second lab project, we observed that embedded systems development required several things. To do the job, we need,

1. To recognize the problem we are trying to solve.
2. A good understanding of that problem and the requirements.
3. A specification of what and from which we are to design.
4. Some tools to work with.
5. A target platform on which to develop the application.
6. A mechanism for programming the target platform.

Such requirements really apply to the design of any kind of system.

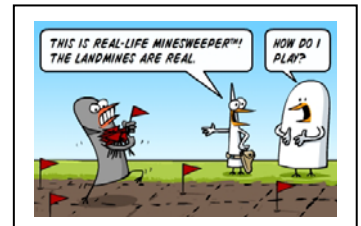
In this lab, we will provide a high-level description of the intended project. Using what we learned from Lab 2, we begin from such a high-level statement of the necessary requirements. Following the process we introduced in Lab 2, you will then put together the appropriate design documents, do the functional decomposition, design the architecture for the system, and finally bring the design together and test it.

We will develop the system in two phases. The deliverables for the first phase will be a one-player game and the final deliverable will be a two-player version. As with Lab 2, the one-player game will be on a single Arduino and the two-player game will utilize one Arduino for each player.

Project Overview

You've all seen this game on your PCs....it's the ole *Minesweeper* game. This project is a variation on that game.

As a bit of history for you, the original game was called *Mines* and was developed in one engineer's spare time. He (Tom Anderson - UW graduate) wanted to learn X Windows programming on a Sun workstation and used this game as a target. He posted his design to the web for anyone who was interested and the rest is history.



This is not Tom, but his favourite boat. Good for avoiding mines. The designer of the Hobie cat, Hobart Alter, just passed away this spring

The goal of the game is to reach a destination through a minefield – just like the real world, filled with challenges. A player may be 'only wounded' by a mine twice. Three times and it's Valhalla with Hagar the Horrible.

For single player version, your system will 'randomly' place 4 mines on a 4 by 4 grid. You must start in one of the 4 corners and get to the diagonally opposite corner without getting blown up...it's a blast, try it.

For two-player version, each player will place 4 mines on a 4 by 4 grid. Play must start in one of the 4 corners on your opponent's board. You then must get to the diagonally opposite corner without getting blown up.

Do you want to include a time requirement for a player to make their move?



Thoughts and Specifications

First step, ... think about the design and develop the specification that identifies and quantifies all the requirements.

Your first job, wahoo !!!!!!!!!!!!!!!!



Some things to think about,

1. How do you want to set up the game for ~~one or two players initially~~?
2. How do you want to enter a player's move?
3. What inputs might you have for the system? What outputs?
4. How do you want to indicate that a player has hit a mine?
5. What kind of display do you want to use?
6. How do you want to communicate between the two Arduino boards?
7. How do you win or lose?
8. Can you handle illegal moves?
9. Do you have other requirements or features?

Now that we have a specification that we can design from...let's do it.

Design

Your next job, cool !!!!!



Once the design is complete, we test it to make sure that it does what the specification requires. Sure hope that it does.

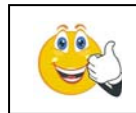
Test

Another job for you !!!!!. Oh, ok but I need some special help.



Demo

Show your stuff



Finally writing the final report.

Report

Your job too, bwa ha ha !!!!!!!

What!!!!!! Can't my partners just do it??????



Done – turn it in eeeeeeeee haaaaaaaaaaaaa !!!!!!! Hey, bring on Lab 4, we're good.

Deliverables

A lab report containing

1. The annotated source code for all your *programs* / *sketches* for the UNOs.
2. Screen shots showing the results of executing the applications on the PC.
3. A short user's manual explaining the rules of the game and how to play it.
4. Remember, your report has to be your original work, not just made up of sections borrowed from the lab spec.