Remember, uploading and sharing your Lab 15 code is completely optional.

We have spent the whole course teaching you that modular design is the proper way to develop large systems. However, to configure the game for others to play, you will need to modularize it in a very special way. You will have a SpaceInvaders.c file, and up to four subfiles. Each file must be less than 64k characters so they can be pasted into CodePad. The system must compile with the standard project without having to make changes to the project structure. For example, if you add Subfile1.c, Subfile2.c, Subfile3.c and Subfile4.c modules, then you need to create the SpaceInvaders.c file that will include these components when compiled

```
// SpaceInvaders.c
// Runs on LM4F120/TM4C123
// put your name here
#include "..//tm4c123gh6pm.h"
#include "Nokia5110.h"
#include "Random.h"
#include "TExaS.h"
#include "SubFile1.c"
#include "SubFile2.c"
#include "SubFile3.c"
#include "SubFile4.c"

//*********************************
// put rest of SpaceInvaders.c here
```

Put up to 64k characters (800 lines into Subfile1.c)

```
//*********************************
// Subfile1.c
```

Put up to 64k characters (800 lines into Subfile2.c)

```
//*********************************
// Subfile2.c
```

Put up to 64k characters (800 lines into Subfile3.c)

```
//*********************************
// Subfile3.c
```

Put up to 64k characters (800 lines into Subfile4.c)

```
//*******************************
// Subfile4.c
```

After you have created this these files, make sure it compiles and make sure it still runs.

Help

In order to encourage other students to try your game, you should write a short (500 character or less) description, and create a YouTube video. Please make the video 1 minute or less. The YouTube video is optional. However, we will create a YouTube channel with all the YouTube videos that students submit, and then use the *Like* feature to select the best game of the class. To win the class competition your game must satisfy all the requirements listed in this Lab 15.

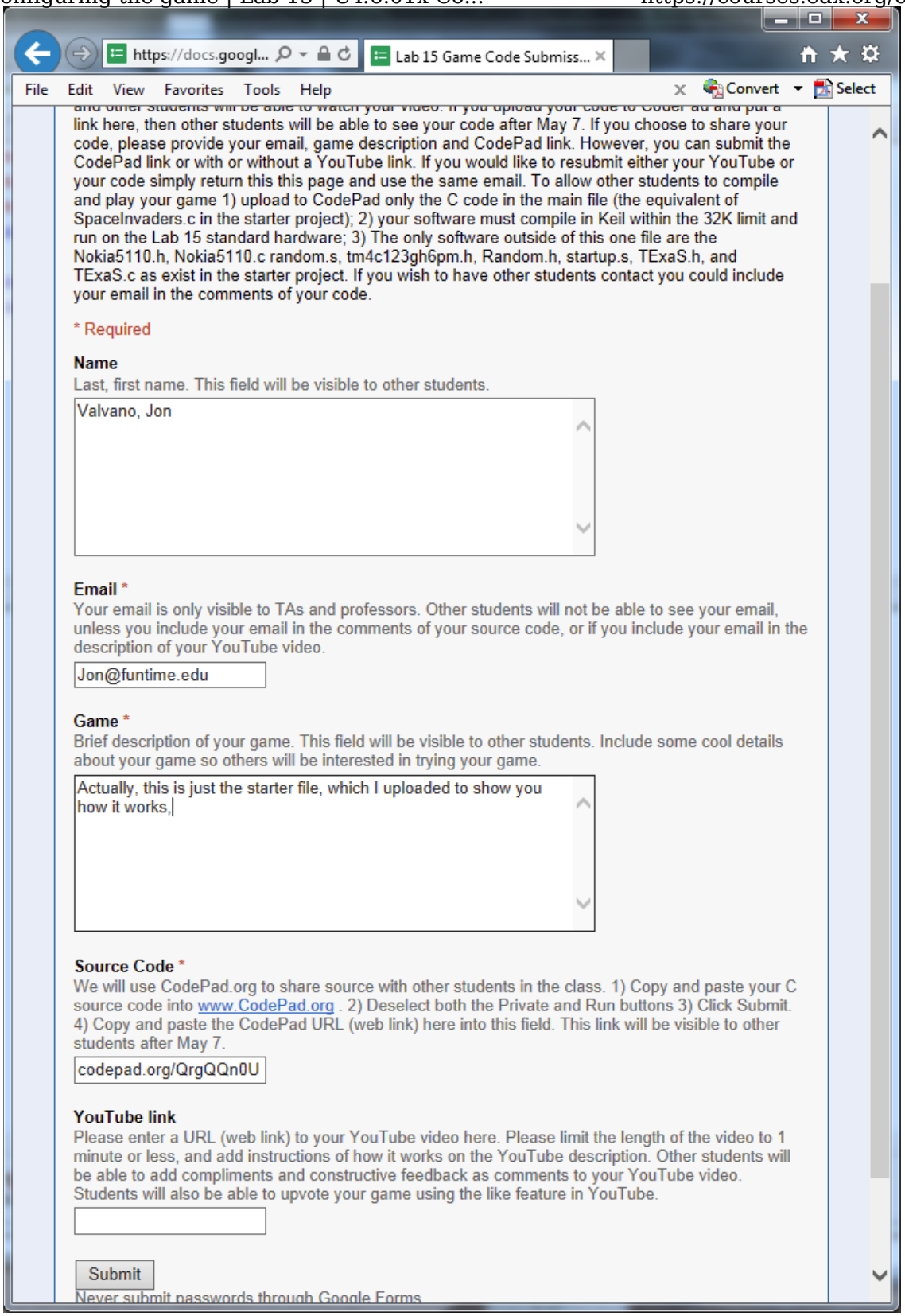
Copy all the C code in the SpaceInvaders.c, go to www.codepad.org (http://www.codepad.org), paste the code into the field. Make sure both Private and RunCode are not checked.

Push the submit button, and copy the URL generated. Other people who know this URL will be able to see your code. Also upload to CodePad your Subfile1.c, Subfile2.c, Subfile3.c and Subfile4.c as needed.

After each upload make sure CodePad has captured the entire file.

Go to this Google Form (https://docs.google.com/forms/d/15DYooNJRJnmJ_4cP22ym5fppvFORqP9u8WvK1OcYP6c/viewform) **(now closed)** and enter five to nine components

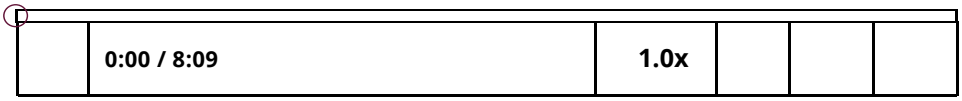
1. Optional. Name (this will be visible to other students)
2. Email (this will not be visible to other students, but we will use it to match you up with your record within the edX class. So use the same email with which you registered for the class.
3. A short description of your game to encourage others to look at, play and enjoy your game. There is a limit of 500 characters. (this will be visible to other students)
4. The URL to CodePad.org where you pasted your source code. For each subfile, add the CodePad URL. You can have 0 to 4 subfiles. (these links will be visible to other students)
5. Optional. Make a YouTube video of your game. If you are running in simulation or with the virtual display you code record a screen cast of you playing your game. Please limit the video to less than 1 minute. We will make a YouTube channel of the videos for you to watch. (this will be visible to other students)



You will be able to upload games until May 16 (now closed). You can use the following YouTube Playlist to view the YouTube submissions. After May 16, we will close the upload and post a page where you access the CodePad links for the games your fellow students have uploaded.

LAB 15 UPLOAD VIDEO

Help



PROFESSOR JONATHAN VALVANO: Hi.

In this video, I will show you how to submit your game for Lab 15.

The first step is to make sure that you can paste all of your code

into codepad, and one of the tricks we're going to do

is we'll take a big piece of your code and I'm going to cut it out of here.

I'm going to create a new file, and I'm going to save it as Subfile1.c.

And in the place where I just removed it here,

I'm going to now #include "Subfile1.c".

And so for each of the pieces that I've removed,

I am going to replace it with the include file.

So I'll take another chunk, just to illustrate a couple of chunks

that I've removed.

You can see here, I'm just playing with the starter file.

This is not the real game.

So I take another chunk here.

I click X, File, New, Paste, OK?

Save it as Subfile2.c.

And so, you can have up to 4 of these subfiles, so 5 total files.

The original file here, subfile2.c.

OK.

So now this game has got 3 files.

I'll make sure that it still compiles.

I build it, OK?

I could make sure it's still runs.

That's a good idea.

So now, the next step is to take the source code and upload it to the cloud.

Help

So I take all of this stuff here, Select All-- this is the first one, Copy,

and then I go to the cloud.

There's a couple of ways to find it.

From the EdX, so I can go this way and paste it in.

codepad is not part of edX.

It's a way for you to share with the rest of the world.

Since we're going to share this code, I don't want it to be private.

Since there's no hardware, I'm not going to actually run it.

codepad has a limit of about 64,000 characters,

so you got to break it into pieces so that you can submit the whole thing.

I scroll down to the bottom of it to make sure it got the whole thing.

There we go.

All right.

So this portion here we're going to need copied.

Copy.

I'm going to go now and start the pasting process.

Here in the Google form, I'm going to enter the entities that I need.

I'm going to put in my name.

It's not optional, but you can put whatever you want in here.

You can put your alias or your real name, either way.

The email is also required, but this is not

going to be shared with the rest of the students.

So we will not show this, but you need to put your real email in there

so that we can contact you.

And then this part lets other people know about your game.

So "Play my game, it is fun".

So figure out a way to encourage people

to try

your game by giving them a description.

You get about 500 characters.

Not 500 words, about 500 characters.

And then these are where the source codes will go.

Help

We did the first one already so I'm going to paste that in here.

That's the first one.

I got to go back to my program.

That was this one.

Now I'm going to take Subfile1.c, Select All, Copy.

I'm going to go to back to codepad.

Where are you codepad?

That's not codepad.

The internet.

There we go, codepad, here.

Create a new paste, paste it in.

Again, I'm just pasting in the starter code.

This is not a real game.

I don't want to run it.

And then I'm going to take the website here.

So that's the second one.

Remember, there's three of them.

I go back over here.

OK, not that one, this one.

And paste it in there.

There's Subfile1.c.

OK.

Go back to my game, take Subfile2.c, Select All, Copy,

Go back to codepad, create a new paste, paste it in, don't run it.

Again, after every time I paste it in, I can

check to make sure if the whole thing is there, not cut off at the bottom.

And then we go like that, copy this.

Copy.

Go over to my submission and I paste it in here.

OK.

So the code is broken into one, two, three, four, or five different parts

such that if a student downloads this

code,

they're going to call it Subfile1.c.

They download this one, it'll be Subifle2.c.

And then, in this case, I don't have a 3 and 4, so I'll leave it optional.

Help

One of the ways to win the competition is

to make a 60-second video of playing your game,

and you'll paste that in here.

And then we'll upload and make a YouTube channel,

and then students will vote up their favorite,

and that's how we'll tell who wins.

So you got to make a YouTube video, and upload the URL right there.

I didn't make one, so I'm going to leave that blank.

Again, the whole thing is optional.

And so once I got my name, my email, a description of the game,

my source code, which, again, is broken into one to five parts,

regular SpaceInvaders.c goes here.

And then subfile one, two, or three, or four go down there.

My YouTube link goes in here, and then I push Submit.

Now that's how it works.

If you'd like to resubmit your game, you might

want to take note of this link right here.

That allows you to go back and edit your file if you want to change it.

All right.

So in summary, what we're doing is making

a game that will compile such that you uploaded the entire source code.

And then when you download it, it fits this configuration

where the project remains exactly the same.

Everybody's project window will be the same.

And basically, the SpaceInvaders.c is the program that gets compiled.

And you don't change the Nokia, you don't change TExaS,

you don't change Random, and you don't add any other files here

into the project.

And when your second, third, fourth, or fifth file is added in using include,

quote "Subfile1.c, 2, or 3, or 4".

All right.

That's how it works.

Go ahead and try it.

And remember to be really nice to each other

when you're looking at each other's games.

Try to be constructive.

Try to have fun with it.

OK.

We'll show you another video later about how to download the codes,

Help

We have created a YouTube playlist with all the videos students have submitted.

https://www.youtube.com/playlist?list=PLyg2vmIzGxXGS3bdIkTF4uhaWy43kPaal (https://www.youtube.com/playlist?list=PLyg2vmIzGxXGS3bdIkTF4uhaWy43kPaal)

Other students in the class will watch the videos and choose the **winner** by clicking *Like* on YouTube. The winner will be awarded to the student whose YouTube video on this playlist has the most likes. To be eligible to win, the game must conform to all the hardware/software specifications listed here in Lab 15.

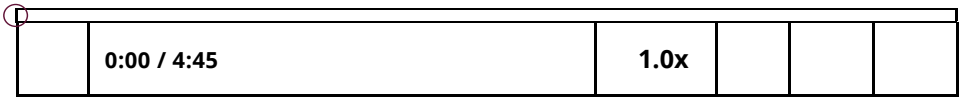
Please give feedback on the YouTube page that is either positive or constructive.

Thanks again for taking this class. Professors V and Y.

Students can now download and play each others games. Process
1) Make a copy of the Lab 15 starter project folder
2) Build the standard hardware as described in Lab 15
3) Go to this web site https://docs.google.com/spreadsheet/ccc?key=0AuBzSLNB7L15dHZ5THdSQXh2WHhLcXF5djZYa3labVE&usp=sharing (https://docs.google.com/spreadsheet/ccc?key=0AuBzSLNB7L15dHZ5THdSQXh2WHhLcXF5djZYa3labVE&usp=sharing)
4) Click on codepad link for SpaceInvaders.c, copy all C code, paste into SpaceInvaders.c file
5) Create new files SubFile1.c, SubFile2.c, SubFile3.c as needed for the game
6) Click on CodePad links for each of the subfiles, copy all C code, paste into subfiles as needed
7) Compile, download and run
8) Leave constructive feedback on YouTube video posting

DOWNLOAD OTHER STUDENTS' CODE

Help



DR. JONATHAN VALVANO: Hi, Jon Valvano here.

Let me show you how to download a game from another student, and play it.

This begins by making a copy of the starter file.

So I do a Copy, Paste.

And this is going to create a copy of the starter file.

The game I'm going to run is this one here, by Mr. Storchi.

OK, so I'm going to change the name of this directory to Storchi.

So I'll know which game it is.

So again, it's just the starter file.

So we're going to have to paste in the actual code.

So I open it up.

I go to the website here.

And I see that the Storchi game, which is Defender,

has a main program and three subfiles.

You can go to CodePad.

So this is his.

Click at the beginning.

This is this spaceinvaders.c.

I go to the end, shift-click.

Copy.

Go over to Keil.

The spaceinvaders.c file, I'm going to select it all, and delete it.

And then paste in the code for Mr. Storchi.

I'm going to need some subfiles.

So this will be my first one.

Go back to the website here, and get the

second one right there.

This is subfile one.

Click right there.

Slide down to the end, shift-click.

Copy.

Go over Keil.

Paste.

This is subfile one.

So I'm going to save it as-- make sure it's in the right spot, yes.

Subfile1.c.

All right.

Here we got.

That's the second file.

Let's go get the next one.

Here's the next one.

This is going to be subfile two.

Copy.

Shift click here at the end.

Copy.

New file.

Paste.

Again, this is going to be subfile two.

One more.

Here's the third one.

Click at the beginning.

Scroll down to the end.

Shift click at the end.

Copy.

Go back over to Keil New file.

Paste.

Save as subfile3.c.

OK, now if all goes well this should compile.

Now, if Mr. Storchi did a good job, this should compile.

And it does.

Now I've built the standard hardware.

He built the standard hardware.

And so I can download, debug.

Let's see if we're in the real board.

I want to debug it, I could debug it.

But I'm going to download it to my program.

And now I can play.

All right.

Over here we have the game.

And so I'll push the reset button.

And look, it's working.

Defender, press Fire.

Now I should have read the directions.

I guess that's the fire button.

It is.

All right, defender.

Get him.

All right.

Get him.

Get him.

Get him.

And there I am, playing Mr. Storchi's game.

Help

Help


WHAT'S THIS?
ARM
PA
PB3
PB2
PB1
PB0
PB4
PE0
PE2/
AIN1
LCD
DAC
+3.3V
Switch
470Ω
LED
10kΩ
+3.3V
Potentiometer
10kΩ
Texas Instruments TM4C123
Electrical and Computer Engineering
The University of Texas at Austin
BEST DESIGN
Valvano's
Embedded Systems Competition
THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School
Electrical and Computer
Engineering