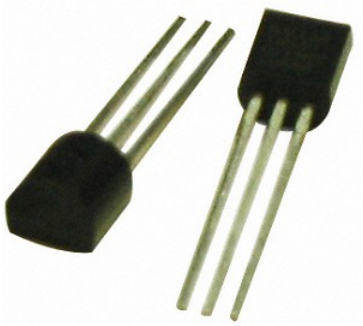
# CSCI 4415 Lab # 7



## Bit Bang

Created: February 27, 2011

### Objective:

- Learn how to write a low-level bit-bang interface for a single-wire device (1-wire or UNIO)..

### Time Estimate:

- 10 hours.
- You should be prepared to start this after class 9 (serial interfaces and 1-wire devices) and this will be due by Midnight class 14.

### Specific Requirements:

For this lab you will connect one of the single-wire interface devices to the Z16. There are two in your parts kit that will work. You will need to find the proper datasheet for the device you choose so that you can read the details on how to connect it and how to write software to communicate with the device. .

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1. In the lab kit you will have 2 3-pin TO-92 memory devices (like the picture above) in addition to the temperature sensors you used in lab5.:
    - **DS2433** (1-wire 4K-bit memory)
    - **11AA160/11** (marked 11A160, is a UNI/O 16K-bit memory)
2. You will need to read the marking on the chips, determine which is which, and then find the detailed datasheet for each. The data sheet will identify the pins and explain how to connect the sensor to a microcontrioller and how a software applications needs to interact with it.
3. **PICK ONE of these for your Lab. I think 1-wire is easier.**
4. Insert the chip into the prototype board and connect them to the appropriate pins on the Z16. There is no 1-wire hardware interface. Use PA0 if you selected the 1-wire device, use PA1 is you selected the UNI/O devicet.
5. Write a bit-bang library to communicate with the device. This should include low-level functions to enable reading and writing on the single wire bus.
6. Write a device specific application library to read and write from the memory chip using the bit-bang library you developed.
7. You should read/write from your memory device and display your results in a similar way to how you completed lab 5.
8. Create a file named readme.txt file that includes any notes about the lab and answers to the questions below.
9. In the main.c file include the following information in a comment block

```
Author: [Your name]
Email:  [Your email]
Class:  [CSCI-4415]
Date:
Lab:    [Lab number]
Description: [short description of program. Include changes you made and
note any enhancements that you made to the lab]
Other files: [list other files that are necessary for this program]
Compile: [provide any special instructions for compiling. Only necessary if
there are special instructions]
Problems: [explaining what you did, what problems you had, how you solved them,
and what you might do differently if you had to do it again]
Comments: [Feel free to provide comments on how this lab went, what you think
is good or bad about it and how it could be improved or anything else you want
to say.]
Enhancements: [describe the enhancements you added to this lab]
```

10. Turn in a zip file (lastname-lab6.zip) of the entire project directory (include the entire ZDSII project directory and the readme.txt). Use BlackBoard to submit assignments (or if thats not working for some reason email the ZIP file).

## References


1. 11AA160 memory device. http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en535108
2. Maxims 1-wire page http://www.maxim-ic.com/products/1-wire/


## Grading

- On time, in proper format (Zip file), named <lastname>-lab1.zip
- Compiles and runs without problems
- Meets lab requirements
- Reasonable code (partitioning of function, coding standard, readable
- Reasonable comments
- Single-wire interface library
- Memory specific application library
- Modular code (no side effects)
- Error detection and handling
- Proper use of Z16
- Answered questions

## Enhancements:

- Implement the 1-wire search algorithm in software (you have a DS18B20 1-wire temperature sensor in your parts kit so you can search for that).
- Implement both single-wire interfaces.
- Something you thought of

## Questions

Include with your lab submission (in the comments of your main.c file):

1. Which device did you implement a bit-bang library for? Why did you select that one?
2. Give me a simple schematic (ASCII art is good) showing how you connected your memory to the Z16. Label all pins with signal name an pin numbers. Whats voltage is Vdd.
3. Did you have any problems finding the datasheets or getting the necessary  information?
4. Did you need any pull up resistors? Why or why not?
5. How did you verify your delays?
6. What was the hardest part of this lab?