ECGR4982/6185/8185, Spring 2005: Lab 2

Communicating between two dissimilar boards

Learning Objectives

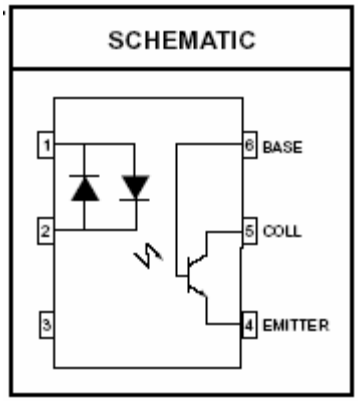
This lab will help you demonstrate how to build a project and load the executable onto the Texas Instruments-based MSP430 Stiquito Controlled board and a Renesas M16C board. You will send data between the two boards.

General Information

The general steps for this lab are:

1. Obtain parts from Prof. Conrad (parallel cables are now available).
2. Bread-board the connections between the boards (do not solder to the MSP430 board).
3. Build the project and load onto your board. Run the program and observe the operation.
4. Demonstrate for a TA and turn in a lab report.

An optical isolator (or opto isolator, or optical coupler, or optocoupler) is a device which will allow you to connect two different circuits logically, but not electrically. There are many variants: AC to DC, DC to DC, etc. You have been provided two H11AA1 parts, which is labeled an "AC input/phototransistor optocoupler". If you have difficulty, you can try a 4N25 (available from the ECE from a lab carts).



You will use these parts to communicate between the two bards since on runs at 5v and the other runs at 3v. The communications is simply a single byte each direction.

Prelab Activity

Look up the use of opto isolators and assess if the H11AA1 can be used. What about the 4N25? The 6N135?

Laboratory Assignments

1. Obtain the opto-isolators (or optical couplers) from Prof. Conrad.
2. Identify which ports on the Renesas board will serve as your communications pins.
3. Identify which ports on the TI board will serve as your communications pins.
4. Solder the wires onto the board which will be used for electrical supply or communications.
5. Search on the web for a suitable circuit.
6. Wire the opto isolators on a breadboard.
7. Write code for the TI board which will send a byte to the Renesas board when a byte is received from the Renesas board. Write code for the Renesas board which will display the byte, and send a byte to the TI board once a second. Verify that the new functionality works as specified.
8. Take an oscilloscope screen shot of the communications from the Renesas board to the response from the TI board. Include it in your lab report.

9. Complete your lab report.
10. Bring the new board to the lab TA and demonstrate the new code. When the TA checks your board, he will also take your lab report. You **will not** need to include a printout or soft copy all of the code – just "snippets".

Requirements

Req. 1 – The code generated is written in C for the TI MSP430F1122.
Req. 2 – The code is well commented and easy to follow
Req. 3 – Your lab report should include the final build output from the builder
Req. 4 – TI board: send a byte to the Renesas board when a byte is received from the Renesas board. The byte should be a value between 0 and 256, which represents the top eight bits of an A/D conversion (the potentiometer).
Req. 5 – Renesas board: display the byte sent by the TI board on the LCD.
Req. 6 – Renesas board: send a byte (xA5) to the TI board once a second.
Req. 7 – Renesas board: A timer MUST be used (no busy loops).
Req. 8 – Renesas board: Turn on the green LED when the byte is sent. Turn off the green LED when the data byte is received.
Req. 9 – Communications between the boards should have a start bit, a stop bit, and odd parity. Communicate at 300 bps.

Lab Report

Include in the checkout part of your lab report the lines:

1. LCDs displays value as specified _____
2. LCDs displays a changing value based on POT _____
3. LCDs displays value as specified _____

Include in your lab report observations and procedure like the following:

The general learning objectives of this lab were . . .

The general steps needed to complete this lab were . . .

Some detailed steps to complete this lab were . . . .
1. Step one
2. Step two
3. . . . .
Code generated or modified to complete this lab...
No need to include all the files for the lab. Just include the modified code.

Some important observations while completing/testing this lab were . . .
Here include the memory report given at the end of the compile process.

In this lab we learned . . . .