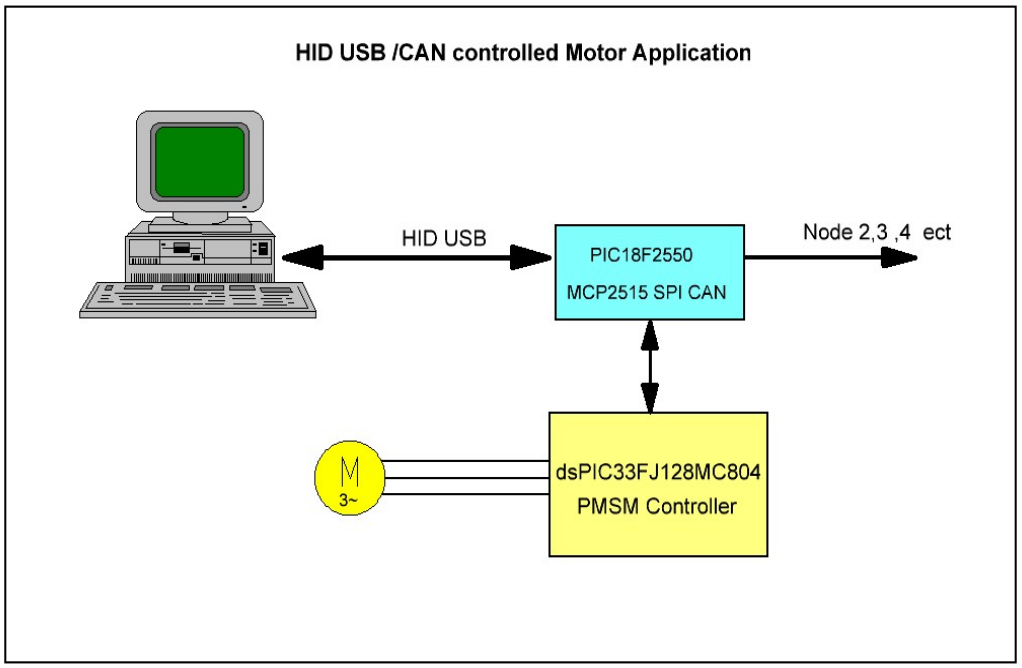
PMSM Servo Motor Application Example

This example consist of 3 software projects for the CAN nodes

- mikroBasic Project for PIC18F4550 USB device
- mikroC Pro for dsPIC Project for the Motor Control dsPIC33FJ128MC804
- Visual Basic Project with MCHP dll for HID USB communication

The Sketch below shows the electrical interconnection of the application



The Example is based on a 2 Node CAN system Controlled by a PC.

Hardware Configuration

- PC Node Connects to PIC18F4450 Node over USB HID Class ,
- CAN Node A PIC18F4450 Connects to CAN bus through SPI CAN Controller MCHP2515
- CAN Node B dsPIC33FJ128MC804 Connects to the CAN and Controls a PMSM Servo Motor by the Commands it receives from the CAN node A.

Basic Functionality

The User Can input the Control commands for the PMSM motor in the PC GUI, these commands are send to the PIC18F through USB HID communication .The PIC18F converts these commands into CAN messages and send the CAN messages to the dsPIC33, The dsPIC33 except these messages and execute the commands received.

The PMSM motor is commutated by Bock communication in 2 Quadrants Forward and Reverse with Closed loop speed control.
The user CAN adjust the P and I parameter of the speed control in the dsPIC33 Code Project.

The HID USB communication is achieved through the Microchip HID dll which needs to be referenced in the Visual Studio Project.

Note The MPHID.dll is the property of Microchip and are allow the user to use it only and exclusively with Microchip Products.

CAN Messages

ID	Message
0x210	PMSM Motor Status Report back from dsPIC33 to PIC18
0x310	Open dummy messages from dsPIC to PIC18
0x211	Control Message to dsPIC33
0x311	Open Dummy Messages to dsPIC33

The application files include the datasheet for the Hurst PMSM motor, MPHID.dll, PIC18, dsPIC33 and VB.Net Projects and code.

Hardware

- CAN Node A MCHP MCP2515 Demo
- http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en537141&part=MCP2515DM-BM
-
- CAN Node B dsPIC33 MCLV Board with dsPIC33FJ128MC804 PIM and Hurst Motor
- http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en537020
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All User manuals and schematics for the Hardware boards can be down loaded from the links above the boards are available from MCHP.

CAN Node A Board Picture

CAN Node B Picture

Hurst PMSM Motor

Format of the Motor Control Command byte in Message ID 0x211 byte[0]

Bit	7	6	5	4	3	2	1	0
Function		L5	L4	L3	L2	L1	DIR	Motor ON/OFF

Bit 0	0	Motor OFF
	1	Motor ON
Bit 1	0	Motor Run Forward Direction
	1	Motor Run Reverse Direction
Bit 2- 6	0	Led or DO OFF
	1	Led or DO ON

ID 0x211 DATA byte [1]

Low nibble Actual Motor Speed

ID 0x211 DATA byte [2]

High nibble Actual Motor Speed

ID 0x211 DATA byte [3]

Motor Temperature

How to run the Example

Connect the Board CAN bus connectors together Program each board with it hex files generated by the mikroElectronika compilers and power up the boards

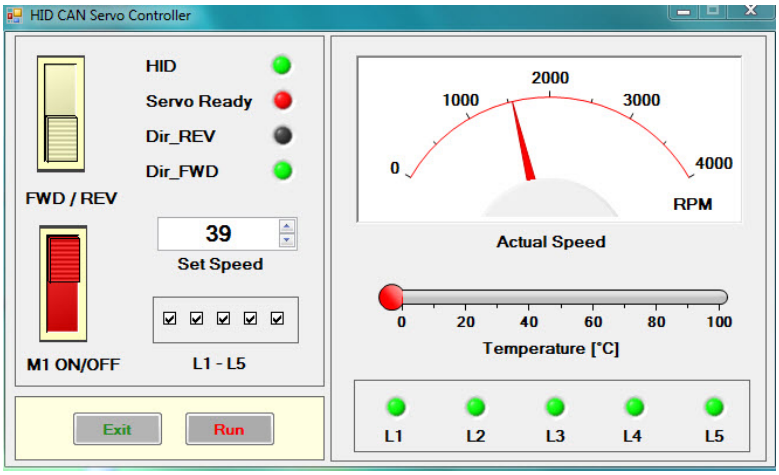
Run the GUI on the PC and enter the commands as shown in GUI, Your Motor should now be running and you should see the Speed in the GUI

The images below show the GUI that I use for my application however as not many people has National Instruments Measurement studio (which has all the nice user controls) I just show you what can be done with an GUI.I also include a Visual Studio VB.Net Template that is functional and can be used by the user to create his own GUI to communicate to his application or implement the Data bytes as described above to use the example code directly.
Please note that the MCHP dll is the property of Microchip and are intended for use solely with MCHP products

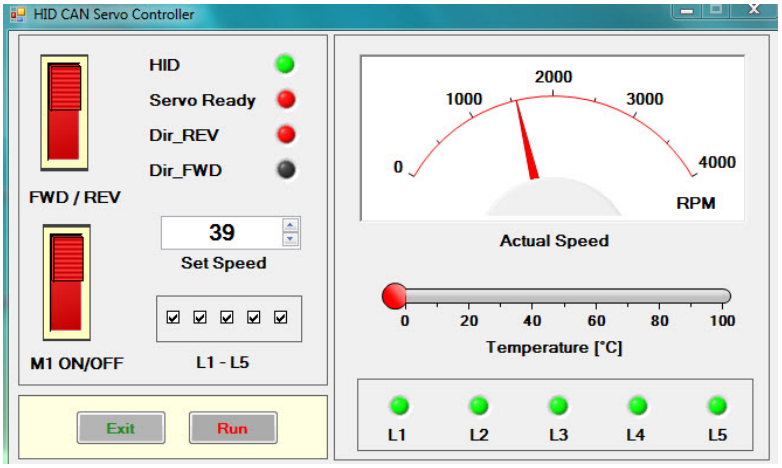
Note See the PIC18F Project code in which buffer positions the data is placed

Pictures of the GUI Screen

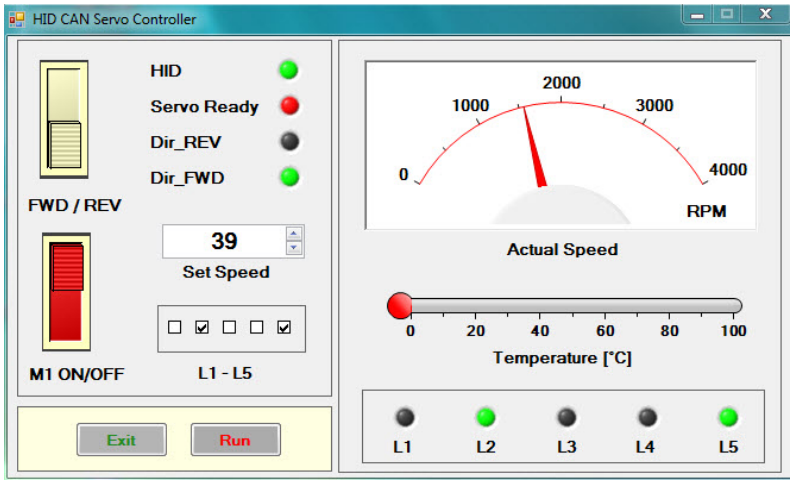
Motor Running Forward Direction



Motor Running Reverse



Digital Outputs Switched ON



Motor Temperature