GUI Software User's Guide

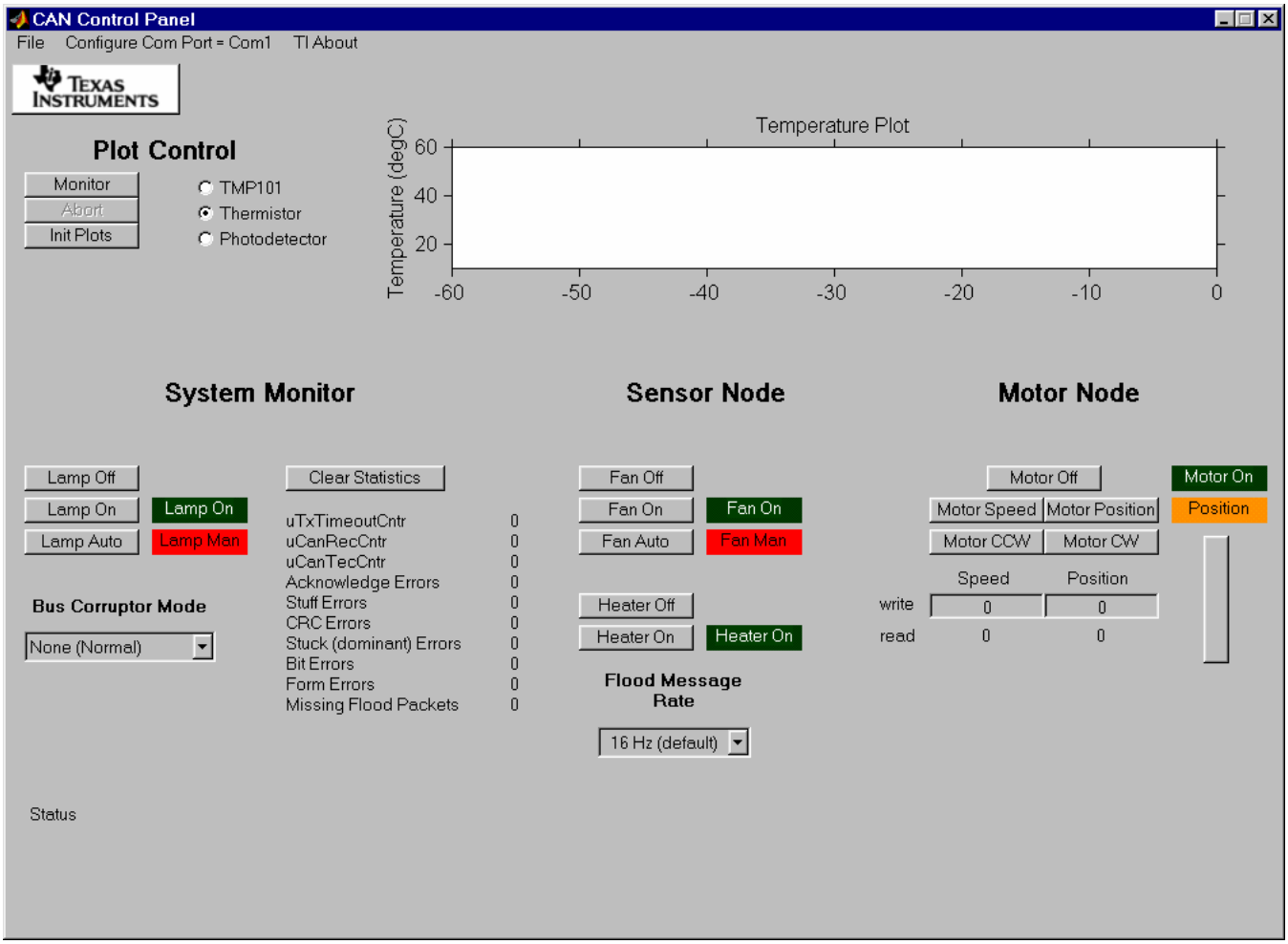
OVERVIEW

The Industrial Automation platform consists of several subsystems spread across three electronics boards. For this demonstration, three processors have been chosen that span the low-end control (TMS320LF2406A), high-end control (TMS320F2810), and general microprocessor (TMS470R1VF338 – an ARM7 processor) markets.

This document describes the features of the Graphical User Interface (GUI) program used to monitor the Industrial Automation platform. The System Monitor node (TMS320F2810) connects to the PC using an RS232 interface.

Control Panel Overview

Below is a screen image of the GUI software. The top portion of the CAN Control Panel contains a plot axis and a number of controls to determine what is plotted. The bottom portion of the panel has a number of pushbuttons, list boxes and input boxes used to control the various functions on the three electronics boards. Finally, there are a number of colored textboxes used to display status as well as a message area at the bottom of the window.



Plot Control

Three radio buttons are used to determine what data will be plotted when the MONITOR button is pushed. The choices are the TMP101 temperature sensor, a thermistor connected to an INA330 operational amplifier and a photo-detector connected to a LOG102 logarithmic amplifier. There will be a slight difference in temperature measured by the TMP101 and the thermistor due to physical placement on the board. All of these devices are on the Sensor Node. The MONITOR button will enable a polling loop that will read the selected data and update the strip chart. The update rate for the polling loop is approximately 0.5 seconds. The strip chart will automatically adjust the scaling of the plot every 50 samples or if any sample point exceeds the current range. The INIT PLOTS button can be used to provide a clean strip chart. Once the MONITOR button has been pushed the ABORT button can be used to stop the polling. Pushing the MONITOR button will also enable monitoring of status for all connected nodes. (See below)

System Monitor

The System Monitor node has a white LED lamp that can be turned on or off using the LAMP ON and LAMP OFF pushbuttons. The LED lamp output will be Pulse Width Modulated (PWM) based on data from the photo-detector on the Sensor node when the LAMP AUTO button is pushed. The two colored text boxes will indicate the current status of the lamp. The BUS CORRUPTER MODE button is used to simulate some common error conditions on the CAN Bus. Many of these error conditions will stop the proper reception of data on the CAN bus, but none of these will damage the CAN Transceivers. The System Monitor also collects some error statistics. Most of these are error counters from the CAN Controller inside the TMS320F2810 DSP (CAN REC Counter, CAN TEC Counter, Acknowledge Errors, Stuff Errors, CRC Errors, Stuck at Dominant Errors, Bit Errors, and Form Errors). Refer to the *ECAN Peripherals Reference Guide* (SPRU074) for more information about internal error counters. The remaining two are counters inside the DSP code. The TX Timeout counter increments whenever a transmitted System Monitor message is delayed more than one control loop period. The Missing Flood Packet counter is incremented whenever Flood Data messages from the Sensor node do not have consecutive sample numbers. This occurs if the Sensor Node was forced to abort a Flood Data message because it was delayed more than one control loop period. Flood Data messages we designed to have the lowest priority on the bus and will be delayed due to CAN bus arbitration.

Sensor Node

The Sensor node has a fan that can be turned on or off using the FAN ON and FAN OFF pushbuttons. Pushing the FAN AUTO button will cause the fan to be controlled based on the temperature measured by the thermistor and will turn the heater on. The fan will turn on if the temperature exceeds a set threshold and at the same time the heater is turned off. Once the temperature has dropped below a set threshold the fan will turn off and the heater will be turned on again. When the fan is not in AUTO mode, you can turn on the heater by pressing the HEATER ON button. If temperature is being monitored, the strip chart will be updated accordingly. If the lamp is in AUTO mode, the lamp output will be Pulse Width Modulated based on the data from the photo-detector. The Sensor node can be used to increase the amount of traffic on the CAN bus through the FLOOD MESSAGE RATE list box. This list box controls the number of Flood Data messages that are sent by the Sensor node each second. Increasing this rate will eventually cause Flood Data messages to be aborted by the Sensor node because delivery of that message was delayed more than one control loop period. This is intentional. It is used to demonstrate bus arbitration and how higher priority messages can delay lower priority messages.

Motor Node

The Motor node has a stepper motor that can be controlled using the MOTOR SPEED, MOTOR POSITION, MOTOR OFF, MOTOR CW and MOTOR CCW pushbuttons. The MOTOR CW and MOTOR CCW pushbuttons will cause the motor to move clockwise or counter-clockwise respectively. In position mode the motor will rotate 1/16 of a revolution each time a button is pushed. Pushing the MOTOR CW or MOTOR CCW buttons when in speed mode will increase or decrease the speed at which the motor rotates depending on the motor's current speed and direction. There are two text boxes that can be used to enter a specific speed or position. Entering a number in the speed box will cause the motor to change into speed mode and spin at the specified rate (up to the maximum speed of +/- 147 RPM).

Message box

The area at the very bottom left of the CAN_CONTROL window is used to display messages to the user. Most messages occur when the monitoring loop is running. Messages include error code descriptions and confirmation of button actions (monitor enabled or aborted).

File Menu Items

Init Trace Vars

This menu item will initialize some internal variables by issuing a number of memory reads to the DSP. These variables need to be initialized before the MONITOR loop can be run. Pressing the MONITOR button will check to see that the variables have been initialized as needed. Therefore the user does not need to run this option prior to running the monitor. It is supported as a quick means to verify that serial port connection is working.

Close

This will close the CAN_CONTROL window. Using the "X" button in the upper right-hand corner will close the window also.

Configure Com Port Menu Item

This menu item is used to configure which COM port to use to talk to the Industrial Automation platform. The choices include COM1 through COM4. The default is COM1 and should would for most user's.

NOTE: Some programs may interfere with the proper operation of the CAN_CONTROL GUI because they tie up the serial port. The Palm Pilot Hot Sync Manager is an example of one program that can tie up the serial port. Disabling the Palm Pilot Hot Sync Manager should free up the serial port and allow normal operation of the CAN_CONTROL GUI.

TI_About Menu Item

This menu item will open up a window with the version number of the software GUI. Also on this window is a button to read the version numbers of the DSP code. NOTE: The demonstration platform must be plugged in and connected via the serial port for this button to work properly. Clicking on the OK button will close the window.

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