

CANBus Data Acquisition Module

Introduction

This project involves implementing FreeRTOS on the Atmel AVR microprocessor platform and writing a data acquisition control module. Since the timing of CAN bus packets are not guaranteed on the network, this control module can accept a request from a device on the CAN bus with details on what data to acquire and what timing that data is to be acquired and sent. This module can then setup and schedule a process to do the appropriate acquisition on the appropriate timing as well as stop the acquisition when the stop request has been sent. This allows for a central datalogger that can communicate with multiple embedded systems, requesting each to acquire different signals at different frequencies and passing them on to the data logger via the CAN bus. The logger then does not have to worry about timing issues due to delays on the CAN bus.

Implementation

In this implementation, I will be using an Atmel ATMEGA644P to install the FreeRTOS on. I will write a module that can receive instructions via packets sent on the CAN Bus. Based on the instruction, the module will schedule a process to acquire data from the 12 infrared thermopile sensors connected to it via the SMBus or from the 4 linear position sensors connected to its analog inputs. The higher frequency process will have higher priority than the lower priority process. Each acquisition process will write the acquired data to a fifo, pipe or appropriate buffer and then call a lower priority, non scheduled process to read that data and send it to the datalogger via the CAN bus. While I will be using the thermopile and linear position sensors in this configuration, the system is very modular in that any acquisition type could be configured and the scheduler could then schedule that acquisition.

