Serial Multiplexed Based Data Acquisition and Control System

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Abstract

Data acquisition and control system consists of analog to digital converter (ADC), digital to analog converter (DAC), timer, counter, pulse generator, digital input / output (DIO) depending upon requirement. All the system components must communicate with personal computer (PC) for data and control signal transmission via one of the communication protocol like Serial, Parallel, USB, GPIB. Serial communication is advantageous over other protocol due to several reasons, like long distance data transmission, less number of physical connection, ease of implementation etc. The developed Serial Multiplexed based Data Acquisition and Control System (SMDAC), which can control different modules like ADC, DAC, DIO, Timer card using single serial port. A LabVIEW based program is developed for the individual communication of each module.
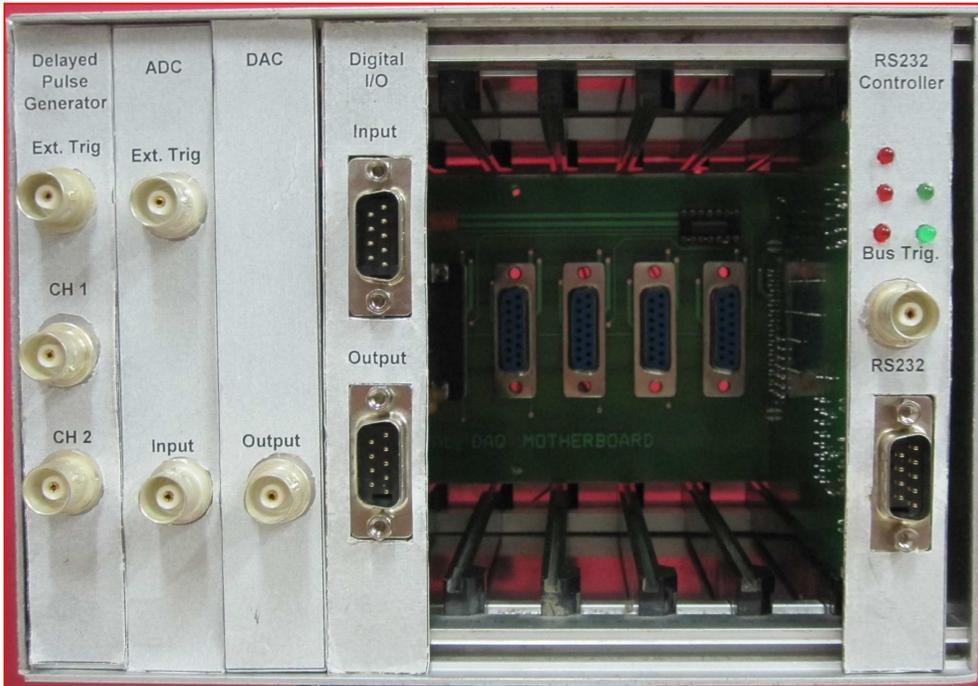
System Assembly of SMDACS
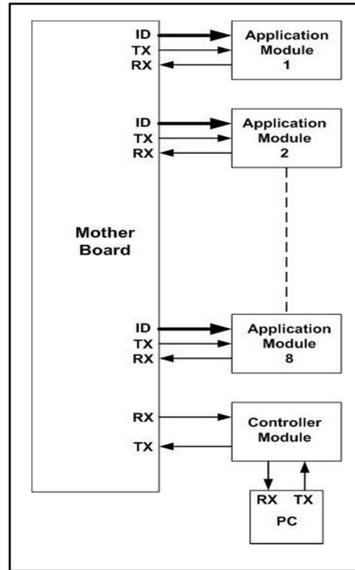
System Block Diagram
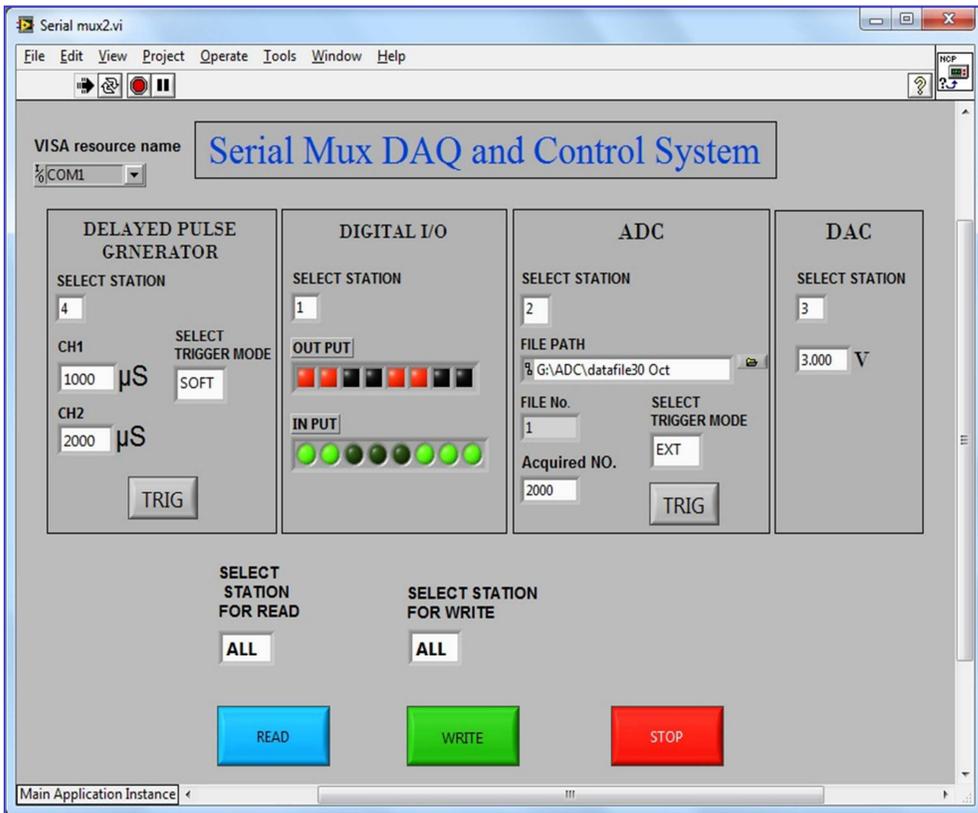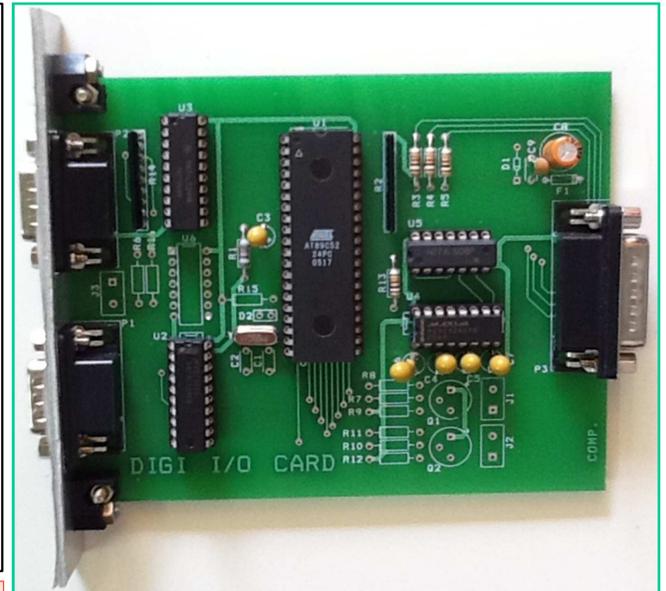
GUI Control Panel for SMDACS

Flow Diagram of Application card
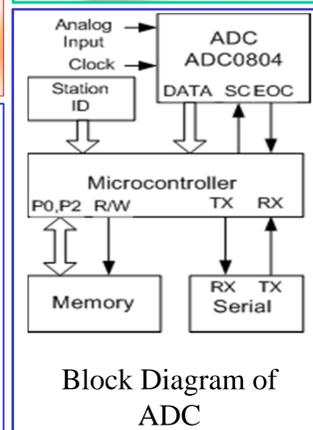
Block Diagram of ADC
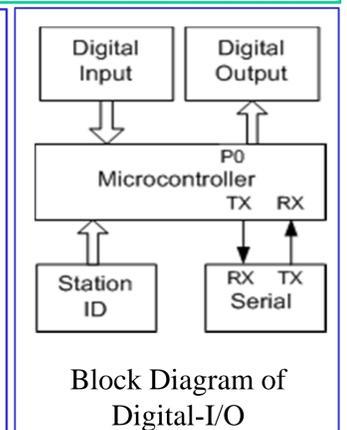
Block Diagram of Digital-I/O
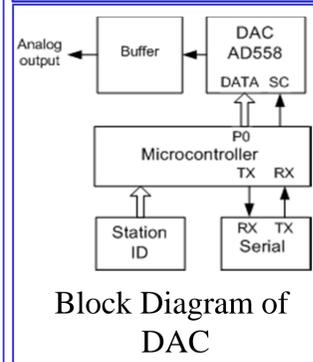
Block Diagram of DAC
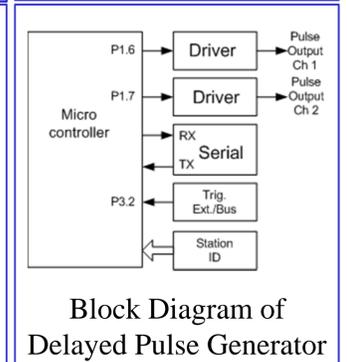
Block Diagram of Delayed Pulse Generator

Steps of LabVIEW GUI

1. Configure serial port by VISA resource name.
2. Select Station ID (logical address) and other related parameters which are to be passed to the different application modules.
3. Activate required Station ID for passing the parameters (All or specific station).
4. Select appropriate command (Write or Read).
5. The program can stop forcefully by Stop command.
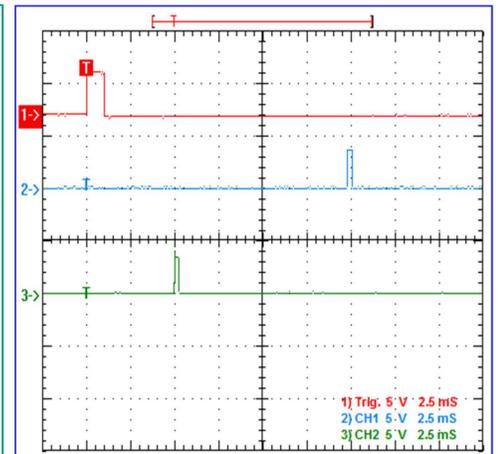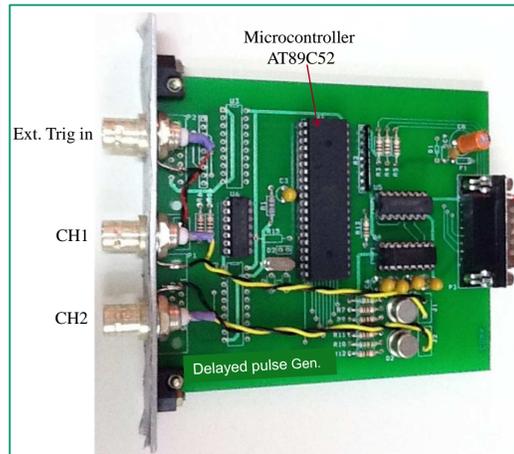

Timing diagram for TTL Delayed Pulse Generator module (CH-1 External Trigger Pulse, CH-2 output pulse of channel-1 and CH-3 output pulse of channel-2)

CONCLUSION

The developed SMDACS is stand alone and useful for small experiment. The system can be used for acquiring slower sampling data for longer duration using digitizer module. The system can be used to generate different timing pulses using TTL delay generator to synchronize with other system. Digital I /O module can used to generate digital pattern or to acquire system status. The signals generated using digital to analog converter is used for analog pattern generation and to control programmable high voltage power supply.