

Review Paper: Real Time Based Data Acquisition System

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Abstract:-The aim of this thesis is to implement and design a data acquisition system (DAQ) by using MATLAB. Early persons look at a scientific instrument and writes down observations. This became unchanged until the paper-based chart recorder became available. The digital computer acquired data, stored automatically and also analyses and reports it. DAQ is a group of interconnected hardware or electronic instruments to the measurement of analogue and digital signals. This paper introduces DAQ (Data Acquisition) process based on MATLAB by bringing a real-world signal we are trying to measure or capture the data from LED panels, digital read out type instruments, deflection needle type instruments and other physically observed like number of objects persons, observable weather conditions, entering a room or lighting conditions, into computer, for processing, storage or analysis. Generally for processing purpose, transmission and display analogue data is first collected and then transformed into the digital form.

Keywords: DAQ (data acquisition system), A/D (Analogue to digital converter)

1. INTRODUCTION

Main process in DAQ is to take analogue signal and convert it into digital form and send to computer for real time monitoring. Process control and factory automation are the most common applications for industrial data acquisition systems. In process control systems we can detect or measure multiple physical quantities (temperature, pressure etc.) within one system. Factory automation is a system which measures one physical quantity across multiple systems. Basically data acquisition is a process which takes data from different devices and analyse, store and display that data accurately with the use of various interconnected equipment. The analogue data input is the backbone of the data acquisition system.

2. BASIC DATA ACQUISITION SYSTEM

Data acquisition system is the combination of much equipment connected with each other. It takes analogue as input signal and digital signal as output which are recorded for future prospects.

Data acquisition starts with physical phenomenon which are being measured. This physical phenomenon could

be the temperature of a room, flow, the intensity of a light source, strain, the pressure inside a chamber, the force applied to an object, or many others. It is a device which converts a physical quantity into desired electrical signal like voltage or current. Before digitization (converting analog signal into digital signal) it is must to ready the analogue signals for conversion it is called signal conditioning. It is the step to prepare the signals for next step. Signal conditioning is used before data acquisition because of accurate and effective measurement it. Signal conditioning consists of many equipments. Like logarithmic amplification, peak detection, linear amplification, filtering or sample and hold. By Signal conditioning achieving good performance and quality of system. A/D converter convert analog signal into digital format and than binary values (either 0 or 1) given to the computer for further calculation because computer can only read binary values and after that binary number converted into digital number. Computers systems were used for collecting multiple channels of data. They were not used in small projects because of cost. All PC-based data acquisition systems will record accurate and reliable data

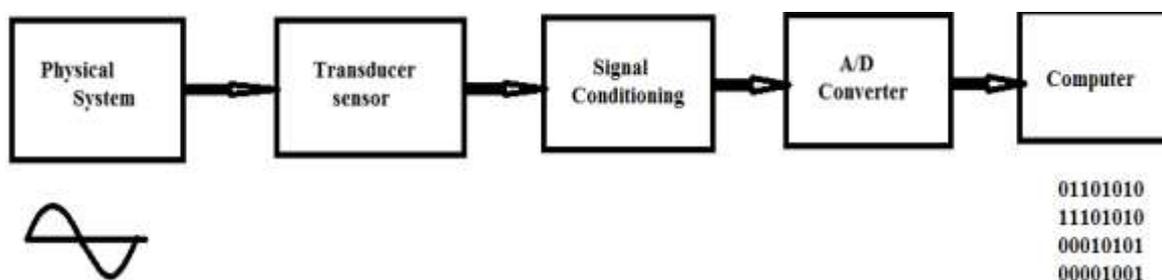


Figure 1 - Basic instrument of DAQ

3. LITERATURE REVIEW

On automobile data acquisition and processing system based on dual CPU architecture

DAQ based on dual CPU architecture was presented by Khanna et al [3]. According to him with un-deterministic

input in one CPU architecture everything is not served at time this is the limitation of this architecture. To overcome this problem he used dual CPU architecture. This technique gives high processing without expensive processor. This

architecture is free for expansion for future application .They have not use FPGA completely .

On Data acquisition system based on FPGA and DSP

According to Baofeng et al [4]. Speed of system increased by FPGA. He uses EP2C5Q203 FPGA of cyclone II. They use advance data processing data is capture by AD and send to FPGA. DSP process on data PCI send the signal to PC for record and display. This concept is used in medical imaging and 3 G mobile communication.

Xingguang et al [5] also given his article on FPGA based DAQ .He stated that this system is light weight, small size and consume low power. He used USB 2.0 for data accuracy and fast uploads.

Swamy et al [6] also published his article on DAQ system based on FPGA .He used serial RS 232 and SPI communication protocol. He used two phased in his article .one phase is designing of SPI and second phase is designing of RS 232. His system achieved high speed 1.5 Msps and 99% accuracy. This system designed reliable and stable clock generator and baud generator.

According to fan et al [7] his system divided into three modules 1) front to end signal processing module, 2) FPGA data acquisition module and 3) data storage module. FPGA module was designed by VHDL and simulated by ISE software. His system consumed low power and collected data from different sensors.

On distributed DAQ based on field bus for large space fire test

According to Shi et al [8]. Field bus technology capture signal from full scale burning equipment in the poly U/USTC atrium are more flexible network architecture and they provide reliable signal. Field bus techniques with distributed DAS achieve high speed, large capacity and expandability.

On wireless data acquisition system based on STM32 ad virtual instruments

According to article of JinLin Hu et al [9] .Wired DAQ system has many disadvantages such that duplication of work, complexity of cable connection etc. To overcome those limitations they have designed wireless data acquisition system based on STM32 and virtual instruments. To accomplished DAQ of close environment. They have used Cortex M3 core ARM processor .For data transmission they used Bluetooth module and virtual instrument to handle the receiver.

Their system can be used in wireless data collection, wireless handheld meter reading and information collection .STM32 has 16 ADC and multiple 12C because of that entire system easily connected. Meter readings calculated and updated by Lab view software.

On High Speed Real-Time Data Acquisition System Based on Solid-state Storage Technique

According to the article of Nan et al [10] his project can be used in real time application and gives high speed. In ADC section 3Gsps ultra high speed is applied. Distributed section is a part of hardware which distributes original data stream into four streams. He used four solid state storage

card made by NAND flash array for each data stream .This system consists three sections -acquisition section, distribution section and storage section. He used DDR3 based FIFO and NAND flash. Controller software implementation method. According to him his system gives good SNR low BER and high speed.

4. SUMMARY

This paper review on automobile data acquisition and processing system based on dual CPU architecture, Data acquisition system based on FPGA and DSP, distributed DAQ based on field bus for large space fire test, wireless data acquisition system based on STM32 ad virtual instruments and High Speed Real-Time Data Acquisition System Based on Solid-state Storage Technique. The aim of this paper is to define the introduction about Data Acquisition System and Real time based high speed DAQ. Our purpose of doing this is to reduce cost, time and space involvement.This project shows that instead of replacing old analogue instruments, use of webcam and transferring the captured data to system to convert the same in digital form. Basically it is digitization of signals or data without using digital instruments.

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