



FUNDAMENTALS OF DATA ACQUISITION SYSTEM

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ABSTRACT: To move further in any project or experiment, we need data because that data tells us the result of your analysis. Likewise, Data Acquisition System (DAS) or sometimes referred as DAQ has been a crucial part of every monitoring system. DAS converts physical conditions into the digital form and then stores it for analysis. Mostly, the signals from sensors are converted to digital form for further analysis. Data Acquisition System helps to measure or control physical characteristics of something in the real world. DAS provides faster response over failed organizations processes that may occur anytime in the system. The DAS procedures are optimized to the maximum to obtain maximum efficiency and better efficiency. Through this paper we will be discussing the Data Acquisition System which is often termed as DAS, its concept, its components, its importance and its purpose.

Keywords : DAS, Sensors, Analysis, Efficiency

I. INTRODUCTION

As discussed earlier, to move further in any of your projects or experiments the most important asset that one should possess is data. Without any data it is practically very difficult to understand how a system actually functions. In essence, Data Acquisition is a process that consists of collecting information to understand the physical process using sensors, computers or by using any measurement device[1]. This method is very distinct from the methods used in the older days of recording tapes, using paper charts. Unusual like those methods, the signal from the sensors are converted from analog to the digital domain and hence recorded to some digital medium like ROM, hard drives or flash media etc.[2]

DAQ is described as a general process by which the real world is captured and then printed out in a digital format. The basic schema of a Digital Acquisition system is described in figure 1.1. Most of the process equipment like sensors, transducers are analog devices and all of them require analog signals to operate. It is the hardware of the DAQ system that performs

analog - to - digital conversion and vice-versa. The computer in the DAQ software runs processes and records the data.

So, you can see it is the data that tells how the system is operating and can tell priorly what errors can we get into a system. Acknowledging the problems soon can lead to greater efficiency and optimization of the whole process.

II. COMPONENTS OF DATA ACQUISITION SYSTEM

DAS plays a crucial role in the power monitoring system and collects data from different sensors of PV systems[3]. From here, the data gets digitalized and then stored and further sent to the control system for storage and presentation. The data acquisition system consists of four different components.

1. Sensors
2. Analog to digital Converter
3. Computer with DAQ Software
4. Signal Conditioning

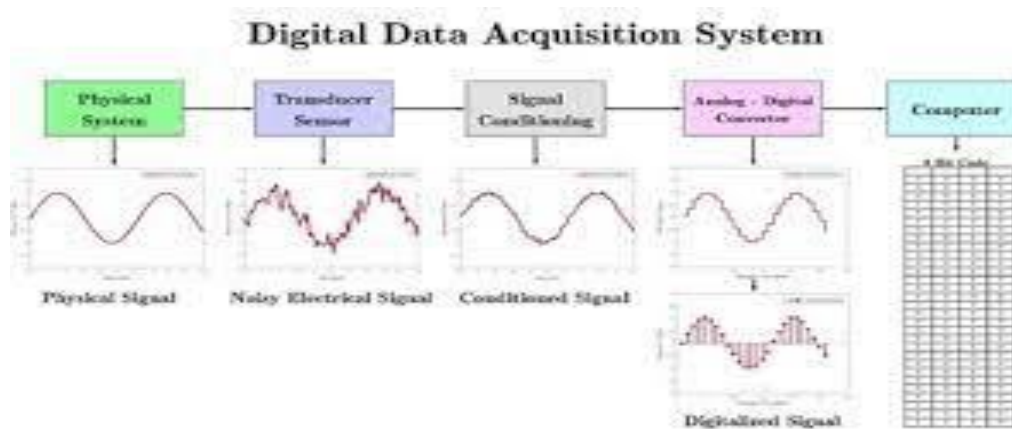


Fig. 1.1

Sensors The sensor is usually the first element in the data acquisition system. Sensors detect some change and send output on some other system. A sensor converts the physical process into a digital signal converted into a human readable display for reading and understanding. [4]

We come across various sensors in our everyday life such as: thermometer, camera sensor, digital sensor etc.

Signal Conditioning Analog signals are not practically prepared before they are converted into digital form for further processing. Signal Processing is a phenomenon

that manipulates the signal for further processing. Many DAS applications require signal conditioning to accurately measure the result.

Analog-to-Digital Converter (ADC) The main purpose of the ADC is to convert conditioned analog data into a stream of digital signal which can be set up for display, analysis or storage. ADC plays a crucial role in the DAS system.

Computer with DAQ software And in the end there is a computer which has DAQ software installed in it. It is the last part of the chain of data Acquisition Method. This computer is used for signal logging and analysis.

DAQ Hardware interfaces the signal and a PC. Here are some names of the hardware. CAMAC (Computer Automated Measurement and Control), Industrial Ethernet, Industrial USB, LAN Extensions, NIM, Power Lab, VME Bus, VXI.

DAQ software is needed for DAQ hardware to work with a PC. It involves the use of a programming language such as : C++, Visual C++, Pascal, Ladder logic, Fortran, Lab View. [5]

III. PURPOSE OF DATA ACQUISITION SYSTEM

The sole purpose of the DAS is to store data. But, they also provide real time and post recording visualization and analysis of the intended data. Engineers use the DAS system quite a lot because of the key capabilities of it.

1. Used for recording and storing the data
2. Used for real-time data visualization
3. For reviewing the post recording data
4. For generation if the report

It is not the end, they are used in monitoring applications as well.

1. Used for monitoring machineries like fans, generators etc.
2. Monitoring bridges, industries.
3. Monitoring the energy consumption and energy efficiency in the production process
4. And in many other monitoring scenarios.



IV. IMPORTANCE OF DAS

DAS is important for testing of the products in every aspect of life. They are used in automobile industries for checking the performance of the vehicles. They are used in medical services for checking the compatibility and effectiveness of the drug or any device. So, they are used in basically any electromechanical device we use,

Before the invention of the Data Acquisition System, all products were tested in an unorganised manner with chances of high error and low efficiency. This is because at that time we had ways of only subjective measurement.[6]

But now, with the invention of the Data Acquisition System, these sorts of subjective measurement techniques were replaced with practical objective measurements which save time as well. Now, the procedures can be repeated, compared and have opened chances for various analysis techniques.

In today's era, no one would consider designing any product be it large, small vehicles, machinery without applying a Data Acquisition System to test it's safety, durability, performance and reliability.

V. CONCLUSION

The Data Acquisition System has played an important role in every aspect of life. It throws light on why data is a very important asset. Each and every parameter can be judged by making variations in data. Analysing the data through DAS can not only save time but loads of money and human efforts, The new modern Data Acquisition System has proved efficient and has optimized the efficiency of the product it has been used on. So, here through this paper we have clearly discussed on the fundamentals and throwed light on importance of DAS,

VI. REFERENCES

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