Aquisiting Data Using Microcontroller

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Abstract : The developed Data Acquisition and Control System acquire data from analog channels and display it on the TouchScreen Display for monitoring. The system also monitors the data received on different digital pins and indicates the status of these pins by turning the corresponding indicators present on the TouchScreen, RED or GREEN. For providing the graphical interface, the TFT is programmed to display different screens each performing a specific function. The reason for developing different screens is, to keep the data acquired from different analog and digital pins as well as the controlling part of the system separate from each other, so that no two data overlap each other.

Keywords: **Microcontroller based data acquisition, TFT (Thin Film Transistor) graphic display.**

1.   INTRODUCTION

The very basic operation of the system is to acquire data, process it and then act accordingly. The block diagram below shows this basic operation.
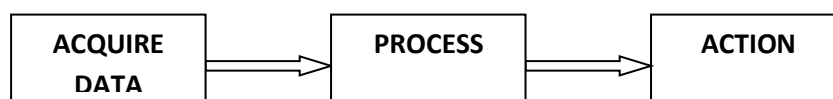
The system should have an analog interface, digital interface, analog output and digital output.

2. EXISTING SYSTEM

Most of the data acquisition systems can be divided in to two broad categories namely "**external box**" or "**internal plug-in board**". The USB and Ethernet based systems are considered as external systems while systems on PCI and PCI Express are considered as internal systems.

The major advantage of the external box data acquisition system is that it can be placed close to the sensors and actuators with which it communicates. This minimizes the wire requirements for connecting the I/O to the data acquisition system which in turn also minimizes the time and expenditure for field wiring. It also reduces the noise experienced in the field wiring.

On the other hand, the advantage of using internal plug-in boards is that, such systems are closer to the controlling CPU which allows them to run faster and also collect data at higher rates. Another advantage is the simplicity, as everything is present in one box.

As the technology is advancing, the external box data acquisition systems are becoming more and more intelligent removing the gap between the external and internal plug-in systems. Thus the choice of which system is better is left to the user, as it is the decision based on the particular application.

The external box (embedded) data acquisition systems can be developed on different platforms such as:

- ARM based data acquisition system.

- 8051 based Data acquisition system.

- AVR based data acquisition system.

It was observed that external box data acquisition system (such as temperature data logger, weather data logger, data acquisition for industrial automation, etc) have been developed using the microcontroller , ARM microcontroller and AVR microcontrollers. Some of them also included an LCD display for monitoring the data.

The microcontroller based (embedded) data acquisition systems have some important feature such as:

- They are single stand alone systems.

- Provide analog as well as digital interface.

- Data acquisition occurs at a higher speed.

- Flexible and expandable.

- Real time data analysis capabilities.

- Data storage for months.

Nowadays microcontrollers are being used in most of the industrial and household applications. Some of the applications are as stated below:

- For measurement of physical quantities such as temperature, pressure, force, stress, strain, etc.

- They are being used in laboratories for performing different measurements such as voltage, current, frequency, power, energy, etc.

- DC motor and stepper motor control.

- Automobile applications.

- Household applications such as door lock, washing machine, camera, etc.

The microcontroller can be employed in most of the above applications but for the applications where high speed processing is required an ARM based processors are mostly preferred. The ARM processors are specifically used in portable devices such as mobile phones, digital cameras, etc. because of its features like low power consumption, efficient performance, speed, etc.

3.   DESIGNED SYSTEM

This paper is to discuss a general purpose data acquisition and control system that can be used for most of the applications. Based on the various survey and the requirements of this project we decided to use the Arduino platform for developing the data acquisition system. The Arduino platform was selected because it was found efficient and cost effective for this project. Some of its features are listed as under:

- Flexible and easily expandable.

- They are easily available in the local market.

- It is an open source platform.

- Small in size, compact and handy.

- The Arduino boards are less expensive than other microcontrollers.

- The Arduino software can run on different operating systems such as windows, Linux, and Mac OS X.

- The programming environment is also easy to learn and use for beginners, yet flexible enough for advanced users to take the advantage of as well.

- The Arduino software is published as an open source tool that can be extended by experienced programmers.

- An aid for system development is provided, through different number of libraries and example codes present on the Arduino website.

4. CONCLUSION

The developed data acquisition and control system provides the processed output that can be used to monitor various system. It is also able to control different devices such as electrical appliances by giving commands through the touchscreen.

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