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Universal Data Management through Web Base Configurable System

Authors

Vrishali Patil[1] , Biradar M.S[2]

[1]Department of E&TC, Siddhant college of engineering, sudumbre, Pune.
Email: *vrishalikadam@yahoo.co.in*
[2]Department of E&TC, Siddhant college of engineering, sudumbre, Pune.
Email: *MsBiradar2002@rediffmail.com*

Abstract
This paper presents universal data management through web base configurable system. Universal data stands for most of analog signal which are useful for mankind and industrial system. 24bit ADC provides high resolution data. We have tried data acquisition for multiple applications. Data frequency and channels can be customized through web base configurable system. Data can be logged with set frequency with real time stamp and this data is available on web. Remote access of the data, makes the system very useful and low cost solution. data can be collected from remote locations. HTML/.NET script is used to develops web pages and their GUI application. Embedded hardware contains Ethernet [10/100 base-T, RJ45 connector] base microprocessor RCM3700 having 512KB memory for storing the web pages. By using a low cost network communication module (RCM 3700) as a web server, one can achieve better network security, lower power consumption, compact size, and easier to use at remote places. Results show the remote monitoring and control system [RMACS] with data log. Low cost web server for collecting high resolution data with multiple channels provides best solution for many applications.
Keywords – Data Acquisition, Ethernet, HTML/.NET script GUI, RMACS.

INTRODUCTION

Data acquisition plays an important role in the field of modern industry control and social structure. In many cases, remote data should be transferred to monitor center or system which is traditionally located far from the manufacturing place or concern unit. Importance of the data availability remotely shows such type of system saves money and time. There are two different areas in which this system is useful. In industry sector and the human safety areas this technology is useful. As per as industry concern we can connect long distance plants and offices with live processes of the machinery and their data. Which will provide number of benefits depends on implementation. Our area of focus is to show the flexibility of data acquisition and logging with different condition. There is always worry about safety issues about human and its resources. According to our proposed design we can cover number of issues with good solutions. For example we can secure the complete home and which will display current status on the web, in such cases people can monitor there home or concerned system from any part of the world. Also can operate some outputs depending on the situations.

There are two important points we are covering in this experiment. In hardware area we are capturing data with best resolution 24 bit ADC with high precision measurement application with 8 channels which will give more options for sensing the different parameters. Signal processing circuit provides the different data in proper format which can be read by ADC. Most of the analog signal can be read through this circuitry. There are digital ouputs and digital inputs provision

on application board which can control the desired system. We are using Microprocessor module having networking facility with very good capacity of flash memory access. Through Ethernet [10/100base-T] all hardware features can available on network and with the help of good memory web pages storage can be achieved. Microprocessor can operate up to 22 MHz which will make hardware speed up application compatible. Microprocessor can handle many protocols which gives the platform for various devices connectivity with making small changes in application board. 1mb flash gives very good platform for developing application code. After connecting the hardware in the network and with the proper system from where we want the data upload on web. Web pages which are stored into flash memory are developed on the HTML platform. Web pages have a very good feature where with help of it we can configure the complete system. We can set how many digital or analog data should be recorded plus with which frequency data should save i.e.data log with desirable frequency. Also we can operate the digital output of the hardware through web application. Data which is displayed on the web pages through the network and coming from the hardware system is stored in to the sql data base with the help of .NET script. .NET script gives the platform to handle the data logging from HTML to SQL data base. After this there are good chances of data presentation from SQL data base. With the help above structure industrial data as well as home appliance data we can manage remotely through networking. System proposed with configurable features give the choice for data which will be helpful for data handling and storage. Also data can store with date and time stamp.
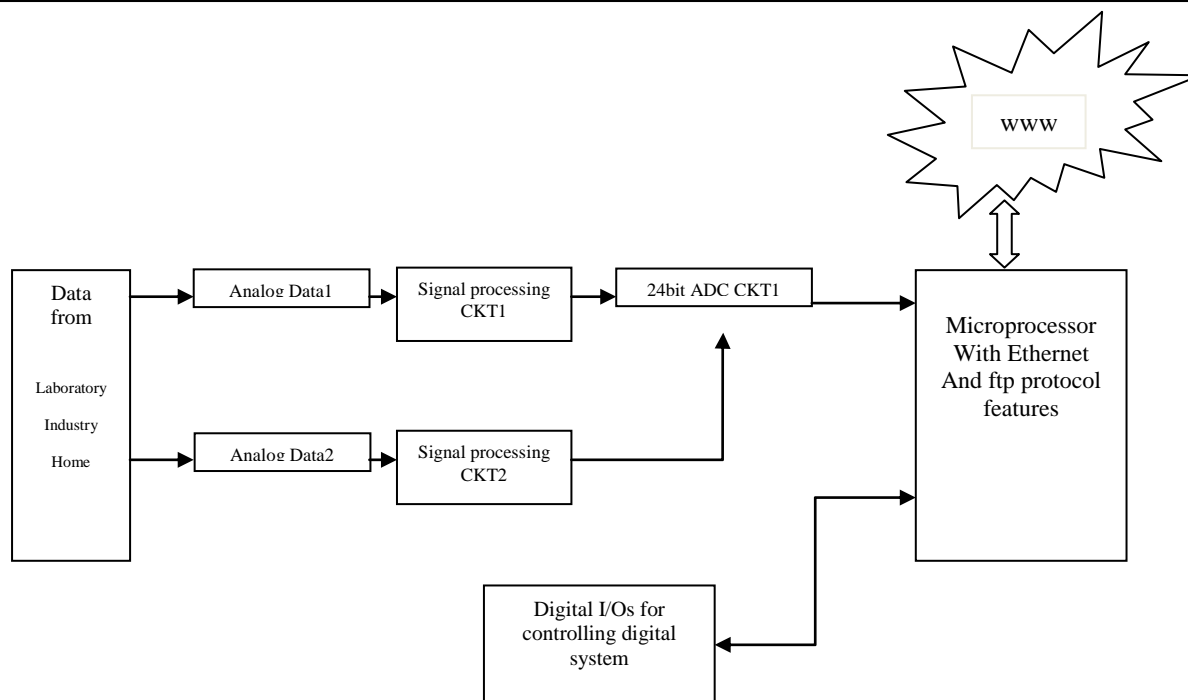
Fig1. Data acquisition hardware block diagram

BRIEF REVIEW

A] Data Sources and Acquisition

We can implement this project to different type of the systems. For example we can collect data from the research lab where there are many important areas which need to observed carefully. There are number of different corrosive gases and very sensitive systems, those data must be available to concern higher authority person. So we can connect above system with laboratory and make data available on network. There are sources of data which need to make available to higher authority which are always connected with network. These become easy to provide correct information about actual plant/machinery without consuming time. Data acquisition is depending on the type of data and respective sensors. For analog data provide proper voltage levels with signal processing a head. In the signal processing unit sensor range and ADC range need to match which have been handled by signal processing unit. We are going to use high resolution ADC which provides smallest change in the recoding parameter. Depending on the change in data rate we can use high Speed ADC. There are few digital inputs required to be observed according to application, so there is a provision of the 20 and more no.of digital inputs which can be increased by using sampling technique.

B]   Microprocessor and coding

ADC is interconnecting with Microprocessor through SPI protocol. This is a three wire protocol, one is for data input [SDI], second is for data out put [SDO] and third one is for synchronizing clock pulse with the help of it data propagate. There is control line called as chip select which make enable ADC. Microprocessor is clocked with up to 20 MHz with reset circuitry. 1 MB flash is available for programming code also we can store the HTML web pages into it. Rj45 Ethernet connector is available on the board for network connection. JTAG connector is available to program the processor. We can program it several times. There are different type of equations need to implement into code to scale the analog data.

C] Power supply and Digital I/Os

3.3 vdc, 200mA is required while Ethernet transmission. We have design the 700ma power supply with +/- 5vdc level. If required depend on the analog input type we can add the things. All the input and outputs are TTL level. Outputs are open collector type. There are different color LED are available to indicate the digital level of the output.

GUI Software Algorithm and Features

We have used HTML language for building the web pages structures. Activate only require logic is used. For that purpose software configuration technique is used. We can activate or deactivate the digital always analog inputs as well as digital outputs. We can set data logging frequency also from the web pages; because of this data storage can keep controllable. Special algorithm is implemented using .NET code which helps the data capture from web pages and export into the SQL data base. This gives permanent storage with date and time stamp. From there we can plot the data with dynamic scales and can generate the crystal report.

There is a facility for multipoint data access means we can see the pages simultaneously from different computer. By using .NET we can develop the attractive and secure GUI structure.

Experiments

With respect to Fig[1] temperature and pollution level of the atmosphere around the residence area is captured with very high resolution of ADC and their standard sensors. Also some security level digital input captured through hardware which made available on the network. Travelling people can monitor there home security status and also respond to by digital output by showing there presence. Pollution can be usable for government data record as per human life importance is concerned. Through SPI protocol ADC communicated with the microprocessor, then data is properly scaled according to outer valve parameter and ADC count conversion. Converted data then linked with the HTML WEB pages variables which have been declared with maximum capacity. These variable can updated with current value from the ADC as outer side value get changed sequentially it updated with concern variable. With the help of Ethernet protocol all these information updated on the network. All these changes at hardware side parameter can be observed on the network. Then after displaying current values on the web pages these data store into the SQL data base with date and time stamp.

CONCLUSION

Remote accessing data is very useful technique for industrial as well as home security purpose. With our above experiment we made availability of the high resolution data on network. High resolution data gives the chance to detect very fine changes in extremely important data. Also with the help of digital I/Os we can control the system remotely. With different system we can configure the number of analog and digital signals recording decision with their frequencies of recording. We have also concluded that with different system we can implement this system with minute changes which proves the utility of this project.

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