REAL TIME EMBEDDED APPLICATION FOR ONLINE INTERACTIVE DATA ACQUISITION AND MANAGEMENT SYSTEM

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Abstract: Design of on-line embedded web server is a challenging part of many embedded and real time data acquisition and control system applications. The World Wide Web is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billion of users worldwide and allows the user to interface many real time embedded applications like data acquisition, Industrial automations and safety measures etc.It approached towards the design and development of on-line Interactive Data Acquisition and Control System (IDACS) using ARM based embedded web server. It can be a network, intelligent and digital distributed control system. Single chip IDACS method improves the processing capability of a system and overcomes the problem of poor real time and reliability. This system uses ARM7 Processor portability with Real Time operating system (RTOS) it makes the system more real time and handling various processes based on multi tasking and reliable scheduling mechanisms. Web server application is ported into an ARM processor using embedded `C' language. Web pages will be implemented by Hyper text markup language (HTML); it is beneficial for real time IDACS, Mission critical applications, ATM networks and more.

Keywords-Embedded ARM7 Processor, Embedded web server, Interactive data acquisition and control system (IDACS).

I. Introduction

Online Interactive Data Acquisition and Control system plays the major role in the rapid development of the fast popularization and control in the field of measurement and control systems. It has been designed with the help of many electrical, electronic and high voltage equipments; it makes the system more complicated and not reliable. This project approaches a new system that contains inbuilt Data Acquisition and Control system (DACS) with on-line interaction. It makes the system more reliable and avoids more complication. It is the great demand in consumer applications and many industries.

The design of very fast data acquisition in plasma discharge application. This system replaces various complex cables which are used for acquisition and ARM processor for data acquisition and digital diagnosis. There are various digital DAC systems are available for the substitution of multisite job operation. A single worker can interact with the machine and collect various data from ongoing work in a single work station. The simplest design of data acquisition system is the popular choice for many embedded real time applications and PC systems. The design of flexible and networked data acquisition architecture was approached, where the software resources are stored in local memory to avoid the level of resource usage and increases system's efficiency. This system process the client based on dynamic manner by server response and it maintains separate data base with DAC controller. In advanced traffic survey mechanism uses data collection process for post processing of vehicle's position.

Signal conditioning is the major part of any data acquisition unit. High level integration architecture it allows signals to be conditioned, simultaneously acquired according to the external clock and triggers processed and transferred data to real time servers. Signal measurement from astrophysical sources -where the shared memory and internet protocols are used for data handling and process from remote users. It was developed with Global Positioning System (GPS) and Environmental monitoring system. Similarly depends on industry and its location General Packet Radio Service (GPRS) also used for data transmission through on-line. But this project doesn't use GPRS and GPS systems for data uploading into internet. It reduces the system complexity and effective for all kind of real time applications. Every real time embedded system should be run by real time operating systems.The embedded web server application is developed and ported into ARM7. This single ARM board has been act as data acquisition unit, control unit, embedded web server and self diagnosis.

All processes are allocated with essential resources and associated with reliable scheduling algorithms and internet protocols followed by ARM processor. This miniaturized setup reduces the complexity & size of system. Every client can access the industry directly without any interaction with additional server and modules. IDACS shows Intelligent Data Acquisition and Control System. This system contains single ARM7 processor

ARM processor is the heart of this work. It handles two modes at same time, DAC and Web server. During DAC mode Processor can measure signals which are coming from various external sources and applications. And it can control the industry machineries by the control

instruction sent by client via embedded web server. During signal measurements Analog to digital converter is very important, because almost every external source is giving analog signal only. While converting these analog to digital processor has to handle asynchronous interrupts. Similarly during web server mode processor will handle client request and response to the particular client by sending web pages, client can interact the industry by giving instruction in web page on its own web browser. This setup can be suitable for inter communication with other nodes via Ethernet and higher end ports. Ethernet programming and execution is very easy and adaptable with various applications. Embedded web pages are designed by JAVA language.
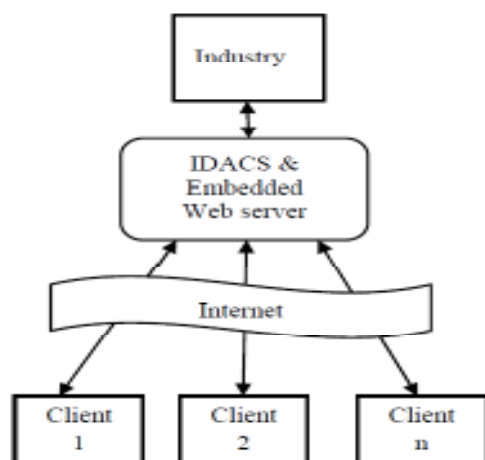

Figure 1:System overview

II.Related Works

A. Title:"Secured Wireless Communication For Industrial Automation And Control**".** Author:S. Palanisamy, S. Senthil Kumar, J. Lakshmi Narayanan @ 2011

Description: Wireless based industrial automation is a prime concern in our day-to-day life. The approach to Zigbee Based Wireless Network for Industrial Applications standardized nowadays. In this paper, they have tried to increase these standards by combining new design techniques to wireless industrial automation. The personal computer based wireless network for industrial application using Zigbee can be adopted at micro and macro industries, it has various types of Processors and Microcontrollers. Here Microcontrollers, Temperature Sensors, Zero crossing detector, Voltage regulators are used. The system is fully controlled by the Personal Computer through Visual Basics GUI (Graphical User Interface). The GUI is developed based on application by the user. All the processor and controllers are interconnected to personal computer through Zigbee. The Personal Computer will continuously monitor all the Data from remote processing unit and compare with value preloaded process structure. If any error is found the

personal computer takes necessary action. Here star topology four node Zigbee network is tried. The first Zigbee is connected to the personal computer it acts as full function devices and is used to send and receive data from other nodes. The second, third and fourth Zigbee are reduced function devices and they are used to control the speed of DC motor, temperature control and lamp illumination control respectively. All the Zigbee's are interconnected with processing unit through RS232 protocol.

B. Title:" Implementation of GPS for Location Tracking". Author: Ahmad Ashraff Bin Ariffin, Noor Hafizah Abdul Aziz and Kama Azura Othman @ 2011

Description: Stand alone global positioning system receivers are widely used nowadays to accurately locating one's position. By using stand alone GPS receivers the distance between two

locations on earth can also be measured. This research paper present the design and implement a low cost Global Positioning System suitable to be used for hiking, climbing and sailing activities. The function of the GPS is to locate the position of user. The effects of line of sights in relation to different experimented locations are also studied. In this project, the hardware used is PIC18F4520 integrated with GPS receiver typed FV-M8. The GPS modules will generate the coordinates of latitude and longitude as well as the bearing angles between two positions. The algorithm to calculate the distance between two positions was developed by using PIC C Compiler. The written algorithm extracted the data from the GPS receiver via the RS232 communication. Microcontroller is used to parse the NMEA data sentences and execute the algorithm. Finally, the output is displayed to a LCD display unit. System testing conducted showed that for a few chosen different locations, geographical view and weather conditions, overall results give an average of 10 % different compared with ideal theoretical calculated results.

C. Title:" Evidence Collection from Car Black Boxes using Smartphones**"**Author:Chulhwa Hong, Truong Le, Kangsuk Chae, and Souhwan Jung @ 2011

Description: The evidence collecting system, which uses smart phone not only to transmit critical videos to the police station server, but also to manage information obtained from car black box, was proposed. In fact, it is very hard to fully deploy VANET infrastructure. As a result, even though the communication between car black box and police station server which use VANET infrastructure could be possible, it is not easy to apply in practice. In addition, our demonstration also shows how to apply security functions in evidence collecting system. In this proposed scheme, therefore, security services are guaranteed.

D. Title:"Embedded Web Server & Gprs Based Advanced Industrial Automation Using Linux Rtos".Author:Manivannan M

@ 2011

Description: With the rapid development of the field of industrial process control and the fast popularization of embedded ARM processor it has been a trend that ARM processor can substitute the single chip to realize data acquisition and control. Embedded ARM system can adapt the necessary requirements of the data acquisition system, such as the function, cost, size, power consumption and so on. In this research work a new kind of embedded ARM platform has been introduced to implement efficient & high performance remote I/O data acquisition and control system (DACS) and embedded web server. This system can measure and store any kind of electrical and non-electrical signals in embedded web server. And it can able to control the devices remotely. A web server is a system which hosts websites and provides services for any requesting clients. A Client can access the industry's web server through internet and LAN router. Digitally acquired data are stored in web server's data base. Whenever the client wants to access data, it sends the request to server; this request is taken by the router, which is connected to the internet.

III Conclusion

This system has advantages in terms of allowing direct bidirectional communication and reducing overhead, which can be vitally important for some real-time applications. The operational costs have been reduced by relinquishing the storage of large data to an FTP server on the Internet. The system is designed to support both static and dynamic IPs.A method to distribute the IP information has been developed. This cost-minimization effort is a big concern for mobile systems using wireless communication methods and has not been discussed before. The overall cost advantage of the system in terms of the components used makes it an attractive choice for data-acquisition applications.

References

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