Real Time Industry Automation Using GSM Arm7 Lpc2148

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Abstract

Automation is the current desideratum of industries. There are number of technologies that are growing to achieve the good automation in the plant. One of the recently popular technologies is the automation utilizing sensors and actuators. Here in this paper development of ARM7 and uC/OS-II RTOS predicated authentic-time industry automation system utilizing GSM communication is presented. The proposed system is having centralized controller, sensors and relays. Centralized module is the main unit that accumulates the information from plant sensors and gives this information to the cessation utilizer utilizing GSM communication. Withal whenever needed it control the engenderment automatically by switching the relays and actuators? The ARM7 LPC2148 is utilized as monitoring and controlling unit for different parameters. Some time more than processes need to be monitor and control in authentic-time. To control the process in authentic-time uC/OS-II Authentic- Time Operating System and needful files are dumped in to ARM controller.ARM7 LPC2148 controller is programmed utilizing Embedded C language. Results obtained show the usefulness and efficacy of the system as orchestrated.

Key Words: Automation, Sensors, Relays, ARM-7

1. INTRODUCTION

In industries, systems are becoming very involute. Interactive Data Acquisition and Control system plays the major role to control in the field of quantification and control systems. It has been designed with the avail of many automation instruments and high voltage equipments. This paper approaches an incipient system that contains inbuilt Data Acquisition and Control system (IDACS) with on-line interaction. To test the site equipments and environmental so it can track state of system in authentic time .For that microcontroller predicated systems can be utilized, to design flexible and adaptable system. This is more reliable, evades more complication and provides high performance to the system. The ARM for

ARM processor for data acquisition and digital diagnosis. The ARM architecture is predicated on Reduced Ordinant dictation Set Computer (RISC) principles, and the ordinant dictation set and cognate decode mechanism are much simpler than those of micro programmed Intricate Injuctive Authorization Set Computers. This simplicity results in a high injuctive authorization throughput and impressive authentic-time interrupt replication from a minuscule and cost-efficacious processor core. Pipeline techniques are employed so that all components of the processing and recollection systems can operate perpetually. Typically, while one injuctive authorization is being executed, its processor is being decoded, and a third injuctive authorization is being fetched from recollection. ARM predicated embedded system will be more functional, reliable, cost efficacious, less in size and low power consumption. Microcontroller has low speed and poor recollection, so it can only execute simple control tasks. A 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 setup

reduces the intricacy & size of system. A minute 8-bit microcontroller has the portability with RTOS. Generally all ARM7 processors have the portability with any kind of higher end RTOS. RTOS comprises of two components, namely, "Real Time" and "Operating System". Authentic-Time betokens an expectant replication or reaction to an event on the instant of its evolution. Operating System (OS) is a system program that provides an interface between hardware and application programs. OS is commonly equipped with features like: Multitasking, Synchronization, Interrupt and Event Handling, Input/ Output, Inter-task Communication, Timers and Clocks and Recollection Management to consummate its primary role of managing the hardware resources to meet the authoritative ordinances of application programs Authentic time kernel is simple and stable. RTOS can divide an involute application into several mutually independent tasks predicated on task priority and it withal has its own circumscription. RTOS, include the task management, task scheduling, interrupt handling etc. Industrial application requires multiple tasks to be executed. Controlling the industrial system, processing of data, storing of the data and transmission of the data with polling technique require more

time so utilization of multi tasking is involved. When ARM processor amalgamated with RTOS with timing constraint can be realized for the data acquisition and transmission of data. For e.g. transmission of data utilizing Ethernet or RS-485 which requires industries standards like mod bus protocol and it will have timing constraint shows the overview of IDAC system. Every client can access the industry directly without any interaction with adscititious server and modules. IDACS shows keenly intellective data Acquisition and Control System. This system contains single ARM7 processor which is portable with RTOS. ARM processor is the heart of this work. It handles two modes at same time, DAC and Web server. During DAC mode Processor can quantify signals which are emanating from sundry external sources and applications.
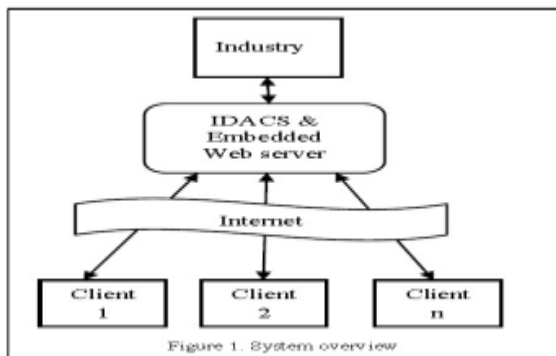

Fig:-1 **System Overview**

2. RELATED WORK

Subsisting Method

Different researchers have worked and many methods have been suggested on the industrial automation and control utilizing different communication technologies, out of them some are still working to amend more and more. Vehbi C.Gungor et.al proposed that different communications technologies fortified by two main communications media, i.e., wired and wireless, can be utilized for data transmission between keenly intellective meters and electric utilities. G.M. Sultan Mahmud Rana et.al designed and implemented a cost efficacious home security system utilizing the GSM technology. The system is designed to detect burglary, leaking of inimical gas. A. Ajith Kumar et.al suggested an article An Industrial Perspective on Wireless Sensor Networks-A Survey of Requisites, Protocols, and Challenges, fixated on the utilization of WSN in industrial applications .The better and efficacious industrial communication is characterized by the fact that interaction and control must take place in authentic time, with arduous time requisites. By considering the above work and desideratum of industries an industrial application oriented automation system is developed and implemented for sponsoring industry i.e

Proposed Methodology

The proposed work includes the accumulation of data from different sensors like temperature sensor, inductive sensor, IR sensor etc are placed in the engenderment working environment. Out of all some sensors gives the analog data and some gives digital pulses, analog signals undergo signal conditioning to convert it to digital. The controller used is ARM7 LPC2148 which belongs from ARM family. Relays are utilized for controlling and switching purport. Controller takes the sensor values and exhibits it on LCD and as withal at the same time send it at remote location to alert utilizer through GSM in the form of SMS .If sensor value exceeds than predefined then utilizer can control the process by passing the commands the through SMS and action can be controlled utilizing relay switching. For execution of operation in Authentic-Time uC/OS-II RTOS is ported and dumped into LPC2148.

3. IMPLEMENTATION

ARM7 LPC2148 Microcontroller

ARM7 LPC21487 is one of the widely used microcontroller predicated on a 16-bit/32-bit ARM7TDMI-S CPU with authentic-time emulation and embedded support. LPC2148 is RISC predicated processor that utilizes fewer transistors than other typical processors. Hence it leads to low cost and low power consumption. In this work some sensors such as LM35 temperature sensor gives the analog data that need to be convert in to digital. Its 10-bit A/D converter provide digital output with deference to the voltage given by LM35 with conversion times as low as 2.44 us per channel. The potency supply operating voltage range emanates from 3.0 V to 3.6 V. The main reason behind cull of ARM7 is its support for uC/OS-II RTOS for authentic-time execution of tasks. Programming of is done utilizing embedded C-Language with the avail of Keil IDE software implement.

uC/OS-II RTOS

uC/OS-II RTOS is an authentic-time operating system which is utilized to perform a task within particular time interval. Compared to OS and RTOS, RTOS fortifies only multitasking and time scheduling tasks. uC/OS-II sanctions multiple tasks to run at the same priority level[7].If we implement without uC/OS-II it is less precise and time delay will be more, and it cab possible to perform one task at a time. In mundane operation system performs a task piecemeal. So to surmount this quandary I am implementing uC/OS-II for number of tasks as displaying temperature on LCD exhibit, object detection by IR

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sensor, metallic Object detection by inductive sensor, switching relays etc. Priorities are assigned to tasks to get access of resource. Inter-task or inter process communication in C/OS takes place utilizing Semaphores, Message mailbox and Message queues. Tasks and Interrupt accommodation routines (ISR) can interact with each other through an ECB (event control block)

2*16 LCD Exhibit

Matrix LCD exhibit [2*16] is employed in this work to exhibit the compulsory parameters. Once the minimum required voltage is applied to the electrodes, the liquid molecules will be aligned on culled directions. Here exhibit is utilized as resources for different tasks. uC/OS-II gives the access of LCD to highest priority task at a time according to the priority assigned to the tasks.

GSM SIM900A Modem

In this work i have culled GSM SIM900A because of its baud rate and low power consumption. ARM controller within very short duration read the sensor values and engenders SMS AT (Attention) commands. This commands will be send to GSM modem connected to controller. Modem executes the commands to send/receive SMS alert to utilizer at remote location. Some sample commands used to GSM are

"AT+CMGL" List message, "AT+CMGR" Read message, "AT+CMGS" Send Message

Inductive Sensor

A proximity (inductive) sensor is an electronic proximity sensor, which detects metallic objects without physically contacting them. Hence it can be categorically utilizable for applications where access presents challenges or where dirt, oil and dihydrogen monoxide etc are prevalent. Inductive proximity sensors emit an alternating electro-magnetic sensing field. When a metal target enters the sensing field, eddy currents are induced in the target, reducing the signal amplitude and triggering a transmutation of state at the sensor output. As the output of inductive sensor is in the form of pulses it does not require any digitization.

IR Sensor I

R detectors are specially filtered for Infrared light; they are not proficiently adept at detecting visible light. IR detectors are digital out - either they detect 38KHz IR signal and output low (0V) or they do not detect any and output high (5V). When an object is proximate to the sensor, the light from the LED reflects off the object and into the light sensor. This results in an immensely colossal jump in the intensity, and considered as object detected. When the

object is far away from the sensor there is no reflection of back light hence it give high output.

4. EXPERIMENTAL RESULTS

Fig:-2 Kit over view

Fig:-3 Result on LCD

5. CONCLUSION

The sensor predicated automation system can amass sensor data astutely. It was designed predicated on ARM LPC2148 and uC/OS-II RTOS and the application of wireless communication. It is very felicitous for authentic-time and efficacious requisites in data acquisition system in industrial environment. Variants of sensors can be utilized as long as they are connected to the system. We can monitor the plant environment through GSM. As the number of input to the ARM controller is circumscribed, for industry purport we can utilize the PLC controller for higher inputs/outputs. It is possible to develop android application for automation systems with the avail of Internet communication

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