

Web based Process Monitoring and Control

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Abstract: A conventional method for monitoring and controlling various industrial/automobile processes parameters such as temperature, water level, etc is on site. There is no provision for monitoring and controlling such a parameter centralized from a remote location..The proposed work aims at overcoming this limitation of the existing system. In this project these parameters will be monitored and controlled remotely. There will be GUI provision on server PC. The most Crucial and Vital part of this project will be MOD and WiFi module interface. In industries/automobile the MOD communication protocol is preferred over all other communication protocols. The reason behind this is the various features and efficiency provided by MOD which is very much suitable for industrial/automobile working environment..In the proposed project, there are two process units whose parameters are to be monitored and controlled. The control will be ON/OFF control. The desired values of all the parameters are stored in processor. The process unit will monitor the process and observe the parameter values. These observed values are compared with predefined set values which are stored in the processor. The observed and set values both are displayed on LCD simultaneously. The information is send to the master unit using MOD interface. This communication is wired communication and bidirectional one. WiFi interface is used to send information to the server unit. This communication is wireless and bidirectional. The control will be done by process unit. In this project 8051 microcontroller for process unit and controller based on ARM7 core for master unit is used.

Key words: Remote process monitoring and control.

I. INTRODUCTION

Network is one of the basic information instruments in the society, and it is an important channel of information communication. Remote monitor has become an important maintenance method that is based on the network. Industrial measurement and control system has changed from the traditional centralized monitoring control system to network-based distributed control system. MOD bus enables the configuration of inexpensive local networks and multidrop communication link. It offers data transmission speeds of 35 Mbit/s up to 10 m and 100 kbit/s at 1200 m. It has its own unique advantage with its reliability, flexibility and real-time performance, which adopts to the interconnection between two units.

The systems consist of two process units, master unit and the server. The desired values of all the parameters such as temperature, water level are set in the processor. The process unit will monitor the process; observe the parameters value. These observed values will be compared with the values set in processor. The observed and set values both are displayed on LCD simultaneously. The predefined values can be changed in

PC. The information is send to master unit with the help of MODBUS. At the same time information is send to server unit by WiFi module. The controlling action will be done by process units.

II. METHODOLOGY

The overall all project will be containing following units

- 1) Two Process units
- 2) Master Unit.
- 3) Server Unit.

1) Process unit(1,2):

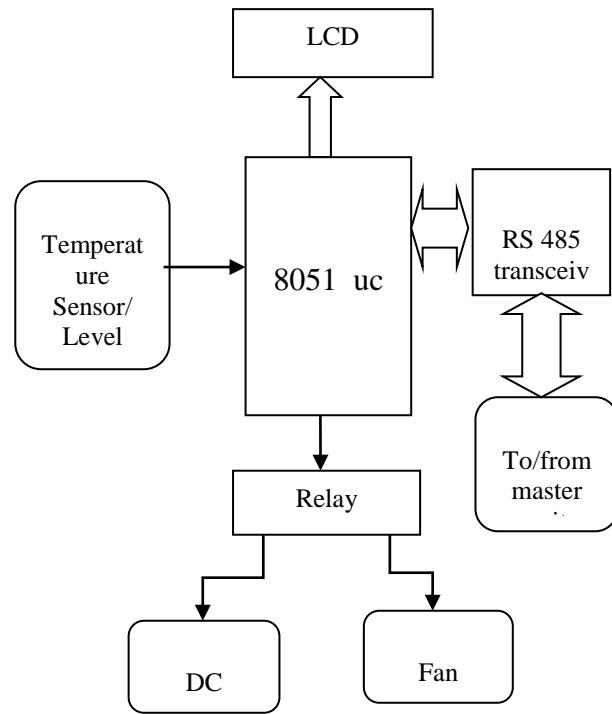


Fig.1, Block diagram of process unit(1,2)

The analog output of the parameter sensor such as temp, level etc. are converted into digital signal by the externally interfaced ADC to the microcontroller. The current values of parameters are compared with the predefined set point stored in microcontroller. If its value exceeds or decreases about the set points then accordingly the relay will be turned ON/Off to demonstrate the controlling action. The set point and the current value of parameter both will be simultaneously displayed on LCD and the same data will be send to master unit via MOD bus. RS484 will act as MOD bus. The LCD display is 16x2. To the relay DC motor and fan is

connected to demonstrate the controlling action of water level and temperature respectively. Microcontroller 8051 may be called computer on chip since it has basic features of microprocessor with internal ROM, RAM, Parallel and serial ports within single chip. Or we can say microprocessor with memory and ports is called as microcontroller.

2) Master Unit:

Master unit will receive data from process unit using MOD bus. Also it will send data to server unit by WiFi module. The LCD 16x2 is used to display current and predefined parameter values of temperature and water level sensor. MODBUS is a commonly used industrial communications protocol. It allows the exchange of data between PLCs and computers. MODBUS is a common means of gathering data from many different sources for viewing operations, archiving and troubleshooting from a central remote location. It is widely used and a fairly simple protocol. RS-485 can address up to 32 slaves using either a two wire (half duplex) or four wire system (full duplex) and has a distance capacity of 4000 meters. The LPC2131/2132/2134/2136/2138 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. The LPC2131/2132/2134/2136/2138 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. Following is the block diagram of master unit.

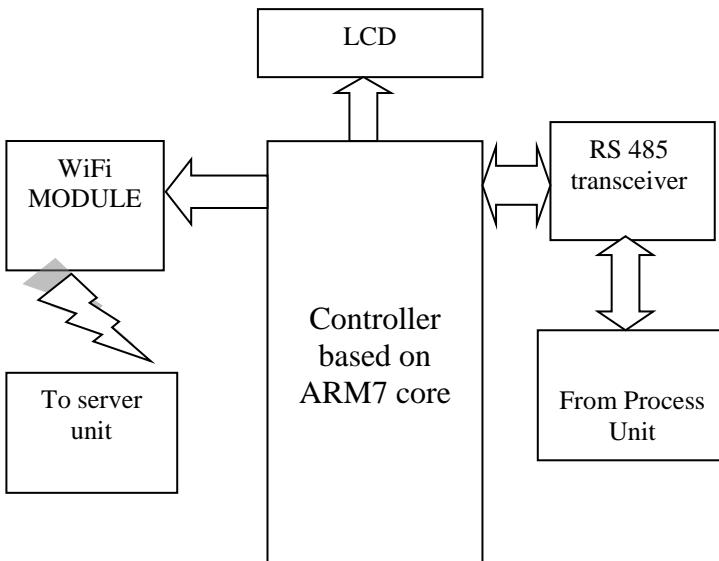


Fig.2, Block diagram of master unit

ESP8266 is an impressive, low cost WiFi module suitable for adding WiFi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone WiFi connected device—just add power. This module includes 802.11 b/g/n protocol, WiFi Direct (P2P), soft-AP, Integrated TCP/IP protocol stack.

3) server unit:

The server unit will send controlling information to the master unit with the help of internet connection which will communicate with the process unit. The process unit will control the parameters according to parameters values. Following is the block diagram of server unit

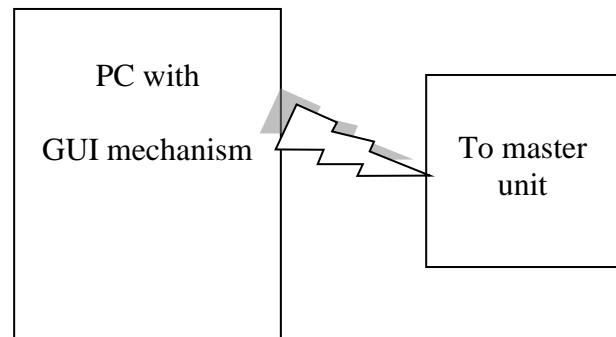


Fig.3, Block diagram of server unit

III. OBJECTIVE

The main objective of this project is to explore applications of remote monitor and control of process parameters such as temperature, water level etc. The project has process unit, master unit, server unit. All the predefined values are set in PC. The information related to parameters which are going to be changed or monitored is provided by process unit to the master unit with the help of MODBUS. The same information is send to server unit by master unit with the help of WiFi module. The server has GUI mechanism. The set value and current value both are displayed on the LCD simultaneously. The controlling action will be done by process unit.

IV. SCOPE

The proposed project consists of two process units, one master unit which will act as gateway and server unit. The temperature sensor and the water level sensor are connected to the process unit. The process unit observed the parameters value and compared it with predefined set values which are stored in process unit. The microcontroller 8051 is used for process unit. The information related to the values of parameters is send to the master unit with the help of MOD bus. The maximum length of MOD bus is maximum 40000ft. The same information is send to the server unit by WiFi module. Controller based on ARM7 is used in master unit. The server is with GUI mechanism.

V. CONCLUSION

The proposed technology provides remote monitoring and control of industrial processes. Due to this the time required will be reduced. The efficiency and reliability will increase. As the process is monitored and controlled remotely, the man power is reduced. The crucial part of the proposed system is MOD and WiFi module interface. MOD bus interface is required for communication between process unit and master unit. WiFi module is for communication between master and server unit.

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