Remote Process Monitoring & 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 Wi-Fi 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. Wi-Fi 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

A. Overview

A conventional method for monitoring and controlling various industrial/automobile processes parameters such as temperature, water level, etc is on site. This type of system requires a person is to be there to monitor the parameters continuously. A person has to then control the parameters if any changes happen. There is no provision for monitoring and controlling such a parameter centralized from a remote location.

In last few decades' remote management of industrial processes has gained the popularity as increasing demands in effective utilization of time, cost and human labor. This creates platform for smart remote monitoring and controlling the processes in industry. Ethernet/internet-based data monitoring brings new capabilities and unprecedented access to process measurement and control. Using standard process sensors, such as thermocouples or RTDs (temperature), pressure transducers, flow meters or other sensors that produce a standard analog or pulse output, you can monitor, control or log data in almost any location - across the hall, on the other side of the street, across town, on opposite ends of the country, or anywhere around the world. Using the power of the internet, remote monitoring takes on new meaning. With Ethernet-based, internet-enabled instrumentation, remote access can be anywhere a Smartphone has a signal. From the simplest application, viewing data through the web-browser on your iPhone, Blackberry device or laptop, to more sophisticated uses, such as sending a text or e-mail message when an alarm occurs, or transmitting a data log file over the internet from a remote location to a central office. A user can access this data anytime, anywhere, 24 hours a day, 365 days a year, wherever you have internet access. Remote monitoring and control (M&C) systems are designed to control large or complex facilities such as factories, power plants , network operations centers, airports, and spacecraft, with some degree of automation. M&C systems may receive data from sensors, telemetry streams, user inputs, and pre-programmed procedures. The software may send telecommands to actuators, computer systems, or other devices. Remote Monitoring and Control System is an easy to use and highly reliable facility, enabling the efficient monitoring and management of a wide range of equipment. The system features an advanced in station, which allows operators to appreciate the status of all monitored equipment at a glance, using a display. Adoption of smart remote management helps to provide flexible and good quality of service and also reduces loss in production due to the delay which occurs in handling the faults conventionally.

B. Proposed System

The proposed project aims at overcoming limitation of onsite process parameters monitoring and control. 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 module 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

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II. PROCESS UNIT (1, 2)

For process unit (1, 2), microcontroller 8051 is used. LCD display is used for both the process units to display current status of sensors. Temperature sensor LM35 is interfaced to process unit 1 with ADC0804, as microcontroller is not having inbuilt ADC and sensors output is analog.in the same way water level sensor is connected to process unit 2. Relay is connected to both the process units to demonstrate the controlling action ON/OFF. For controlling temperature fan is connected to relay of process unit 1 and dc motor for relay of process unit 2. When the temperature value exceeds above threshold value the fan will ON and vice versa. Same is for water level. When level exceeds above threshold motor will ON otherwise will turn OFF.

Assembly language is used for programming of controller. For that Keil u-vision2 software is used.

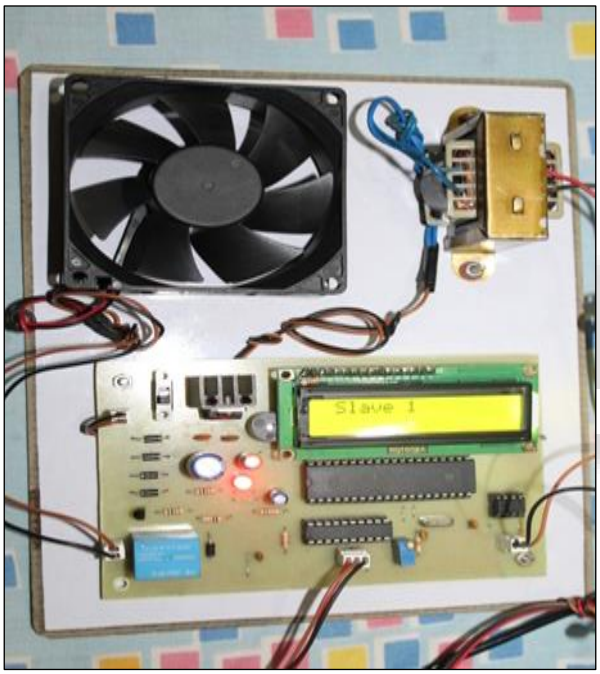


Fig. 1: snapshot of process unit 1

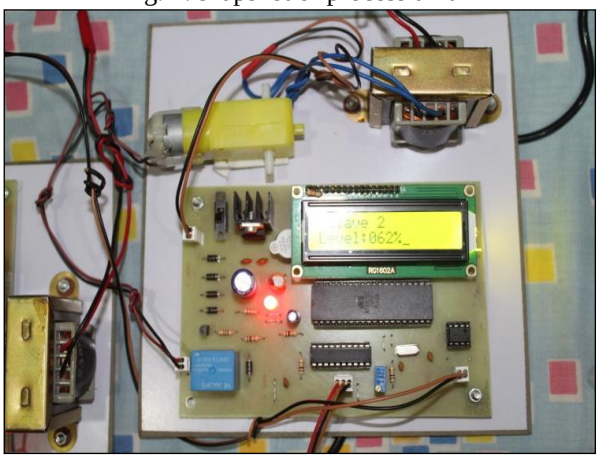
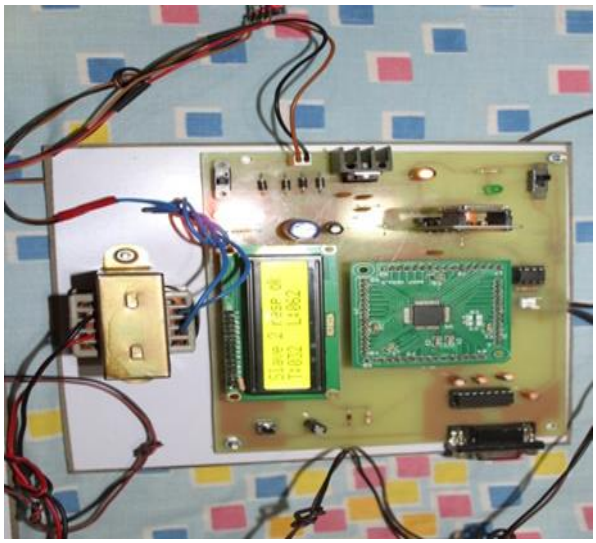


Fig. 2: snapshot of process unit 2

III. MASTER UNIT

For master unit controller based on ARM7 is used. LCD display is connected to master unit to display the status of both the sensors. For communication between process unit and master unit MOD bus is used. For communication between master and sever WiFi module ESP8266 is used. Embedded C is used for programming of LPC2138. For that Keil u-vision4 software is used.



IV. SERVER

The web page is created at the server with the help of Java and HTML code. Server will first check the status of both sensors if any cange takes place then accordingly it will send the command to master unit via internet then master unit will send same to corresponding process unit.

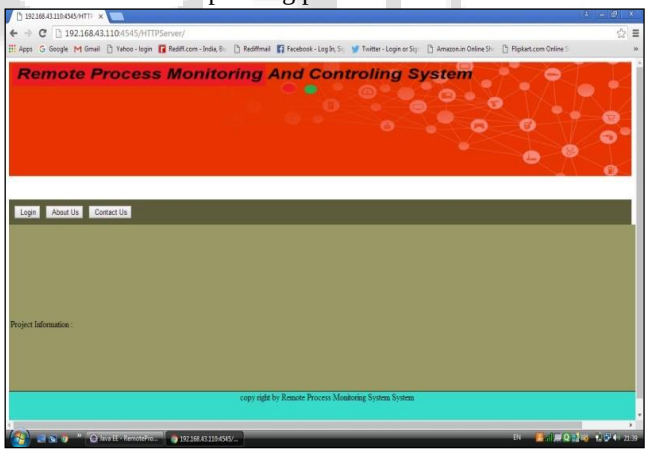


Fig. 3: snapshot of web page at server

V. WORKING OF PROPOSED SYSTEM

After running the program the server will first check the WiFi module is ok or not. If it ia ok it will check whether process unit 1 is ok then whether process unit 2 is ok. If all are ok it will check temperature value, water level value. If the values are exceeding above or below the threshold value it will send the controlling commands to the master unit through internet. Then master unit will send same controlling commands to corresponding process units with the help of MOD bus.

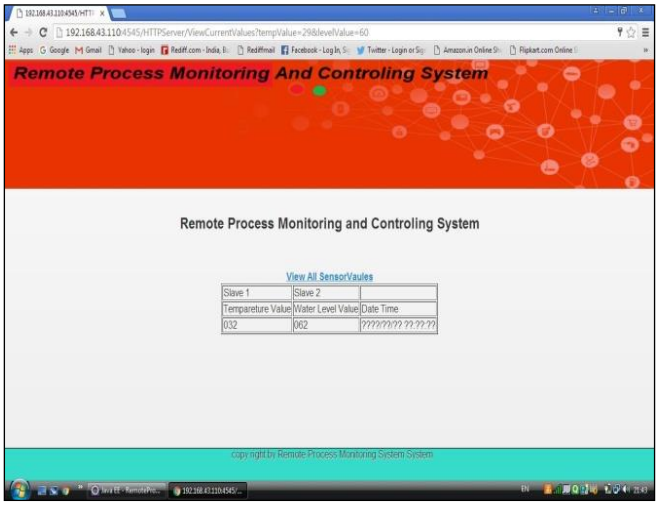
VI. RESULT

A. Checking of WiFi module and process units

B. Current values of temperature and water level

C. If values exceeds above or below the threshold

D. Web page at sever



VII. 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.

VIII. 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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