Cloud Based Monitoring and Controlling of Industrial Processes Through Wireless Sensor Networks

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Abstract: In current modern field, the necessity for observing, controlling and alerting framework is a standout amongst the most imperative criteria for limiting the power utilization and other load conditions. In this paper, an effort is made to monitor and control the Industrial processes through Renesas and alert users through cloud. With the development of infrastructure such as smart cities, more and more safety infrastructure needs to be monitored. For sake of safety measure this paper proposes an idea of predicting the industrial processes through Renesas R5F100LE and alerted using cloud. This paper makes use of a controller R5F100LE and Amazon web service (AWS) cloud, where they act like two important devices for monitoring of temperature, over heat, over voltage and over load conditions are checked by RL78 controller always, whereas AWS stores the message in its cloud storage and forwards them to respective systems at respective conditions.

Keywords: Renesas, RL78, AWS, WSN

I. INTRODUCTION

The fundamental goal for the development of this paper is to provide a technique for monitoring, controlling and alerting the industrial processes going on in the environment.Industrial processes in the environment involve temperature, heat, voltage, coolant level and load conditions. In current scenario the system monitors the industrial processes and alerting is done through the voice output such as fire alarms, speakers, etc.Measures to control variations in these processes have not been implemented in existing systems. As a measure of control and alert this paper processes a technique which is implemented with the help of small credit sized board Known as Renesas (R5F100LE) and with help of Amazon Web Server(AWS cloud).Figure 1 depicts the outline of proposed system.

Here we are using Renesas microcontroller, to monitor temperature, over heat, over voltage and over load conditions and transfer the data to the server via GSM/GPRS. The R5F100LE is a 64pin board designed with the double layer surface mount device based embedded board with different sensors mounted on it [7]. This board design includes interfacing of different sensors in order to monitor the variations in the surrounding and alerting to the human through a server notification which involves a framework regarding the variations. Alerting of variations in these industrial processes taking place at different places is done with the help of wireless communication and stored on cloud for future use.

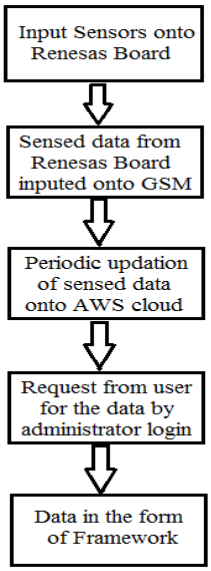

Fig.1.1 Outline of proposed system

The entire paper is designed as follows: section II explains about the literature review, existing and proposed systems. Section III describes how the idea is implemented and the methodologies used behind the implementation. Conclusion and Future Enhancement are outlined in section IV and V respectively.

II. LITERATURE SURVEY

A. EXISTING SYSTEM

Alheraish implemented home security system by means of GSM cellular communication network using microcontroller 89X52 and Sony Ericsson GM-47 GSM module. This system enables far end user through SMS facility to monitor the state of home door, provide password facility for key based door lock and control home lighting system [1].

Chen Peijiang and Jiang Xuehua portray a remote checking framework in view of SMS of GSM. The framework incorporates two sections which are the checking focus and the remote observing station. The observing focus comprises of a PC and a TC35 GSM correspondence module [8]. The PC and TC35 are associated by RS232. The remote checking station incorporates a TC35 GSM correspondence module, a MSP430F149 MCU, a show unit, different sensors, information assembling and preparing unit[2].

Scanaill et al built up a tele-checking framework, in light of short message benefit (SMS), to remotely screen the long haul versatility levels of elderly individuals in their indigenous habitat. Two coordinated accelerometers are associated with the convenient unit through the simple contributions of the microcontroller [9]. Portability level outlines are transmitted hourly, as a SMS message, straightforwardly from the versatile unit to a remote server for long haul examination. Each subject's versatility levels are observed utilizing specially crafted portability ready programming and the suitable medicinal work force are cautioned by SMS if the subject's versatility levels diminish [3].

B. PROPOSED SYSTEM

The system design is divided into 2 different parts as hardware and software part. The hardware part is designed to monitor and control the variations in the industrial processes and software part acts as an alerting tool for the system users. Under normal conditions the Renesas senses the variations in voltage, temperature, coolant level, and current and sends it on to the cloud user as a framework output through wireless communication making use of GPRS/GSM [6]. When there are variations in these processes system alerts the users and a control measure is taken for reducing the current and voltage to normal working condition. These data sent on to the user are stored on cloud database for future use.

III. METHODOLOGY

Many inserted frameworks have considerably unique plans as indicated by their functions and utilities. In this paper, structured modular design concept is adopted and the system is mainly composed of a Microcontroller rl78 [4], LCD, Buzzer, Relay, Bulb, Temp lm35, Transformer,Mp3, SD card, and speaker.

Figure 2 shows the system architecture of the proposed system.The microcontroller located at the centre of the block diagram forms the control unit of the entire project. Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided.

By using the Renesas microcontroller we can monitor the temperature andtransformer in order to check the overaload condition at different locations. To resemble heavy machinery a bulb is used. The output of bulb is given to voltage circuit to detect overload condition. These results are displayed on LCD. MP3 player is used to provide voice output as well.

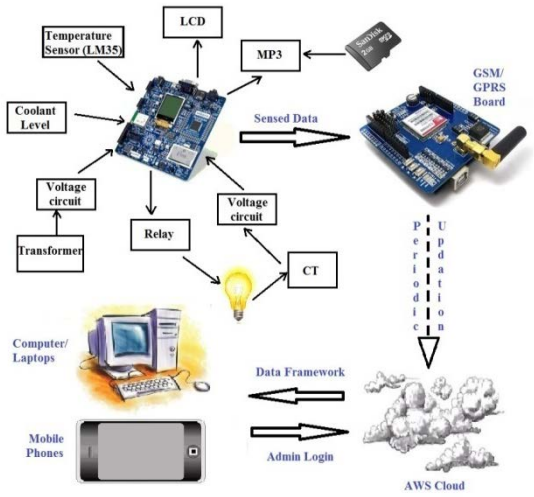

Fig. 2.1 System Architecture

GSM/GPRS module is provided in the system. Through this the microcontroller can upload the data to a cloud server. Here AT commands are utilized as part of the coding. Data is uploaded on timely basis over the server.

Using a computer and internet connection concerned authorized person can view the data on the server. Here the server being used is Amazon Web Server. A virtual machine will be created through which the authorized person can login to the server and view the data.

Renesas (RL78) is 16 bit architecture, it has 64 I/O pin (R5F100LE)[5]. It has 11 I/O ports, 64kB ROM, 4kB RAM,1 watch dog timer,I2C protocol, 3 UART's, 10 bit ADC, 8 Timers, on chip debug function, high speed on-chip oscillator.

IV. CONCLUSION

Each existing paper was analyzed and its limitations were noted. As a solution for the problems faced in existing system this paper gave a solution by implementing a wireless communication between the hardware and the front-end user. Here the sensing of variations in temperature at two different locations were sensed and when the maximum temperature is reached it is sent to the cloud server with an alerting from the speaker. Similarly when the current voltage gets overloaded it is cut-off with the help of relay connected to it. The main advantage of this implementation is that sensing is done for two different locations and the usage of cloud makes this project cost-effective and easier for the users to access the system just by authenticating themselves.

V. FUTURE ENHANCEMENT

Although precautionary measures to monitor control and alert the variation in industrial processes have been implemented by usage of cloud few limitations do exist in this paper. This paper is initial step for future work; in future,steps can be taken to alert the offline users through wireless communication.

VI. REFERENCES

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