INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 4, Issue 3)
Available online at: www.ijariit.com

Temperature monitoring and controlling through GSM

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ABSTRACT

The scope of the paper is basically to set aside the traditional methods of monitoring physical parameters such as humidity, temperature, light. This can be accomplished by utilizing SMS/GSM technology. This will facilitate easy monitoring of the required parameters, thus saving cost, effort, and time. Our scope is designing and testing of physical parameters and to implement this system everywhere either in small scale or agricultural sectors or wherever required.

Keywords: *GSM, SMS, Temperature sensors, ADC, Micro Controller, LM35, LCD, GSM modem.*

1. INTRODUCTION

This paper basically aims at monitoring of physical parameters using Microcontroller via GSM interface using different sensors. The sensors can be used to sense the temperature, light, humidity, water-level etc and those can be sensed at a far distance using SMS technology without any electronic circuitry for data transfer. The temperature observing framework utilizing GSM experiences three phases flag molding circuit, analog to digital converter and sending messages to portable devices. The project consists of two modules-one is the temperature observing and the other is the temperature control.

For this reason, we utilized the LM35 sensor which characterizes the parameters of the temperature sensor. The Simple yield of LM35 is opened up through a procedure of signal molding. Opened up signal is bolstered into an ADC for advanced information. This computerized information is exchanged to an LCD for showing the result. ATMega328 microcontroller is utilized for this strategy. A Modem is likewise associated with this controller for the remote correspondence of the information through GSM innovation by getting an alarm through SMS.

The target of this paper is to outline and build up a wireless communication link to monitor and control equipment that is far away from the user and also to build up a high-security framework to keep a beware of them. As we know it's very difficult to monitor and control the parameters through wires and simple gadgets. Through utilization of microcontroller, Observing and controlling of physical parameters are especially viable in enterprises. Therefore, Embedded System plays an important role. The fundamental favorable position of this idea is the real-time direct estimation of the parameter through GSM strategy. GSM is responsible for transmitting and receiving the data from the user. Here, the temperature is checked specifically which is at the same time shown in the LCD and can be sent as a message by GSM strategy. The framework is additionally outfitted with fundamental equipment to start control activity for temperature when it achieves esteem higher than the specific edge temperature [2]. For controlling the temperature, relays are used which are connected to a heater and cooler.

2. PROPOSED SYSTEM

The proposed system is designed to sense the parameter at any instant using SMS and to automatically control if it crosses the critical level. At the point when the framework will begin, all gadgets are initialized. Initially, the heater is OFF and the underlying temperature is shown on the LCD Screen. When we send the SMS the heater will be turned on. On the off chance that the temperature ascends past the basic level (in our case is 40 deg) the radiator will naturally be killed and in the meantime, it will alert to the client through SMS.

3. PRINCIPLE

As GSM is the principal objective, the temperature which is consistently checked by utilizing temperature sensor surpasses a specific level the SMS is sent to specific versatile as a sign of staying away from harm or mischance. This task is handled by ATmega328 microcontroller. It is along these lines eluded as a safeguard for keeping away from harm and ready given to people by sending a message to mobiles.

4. BLOCK DIAGRAM

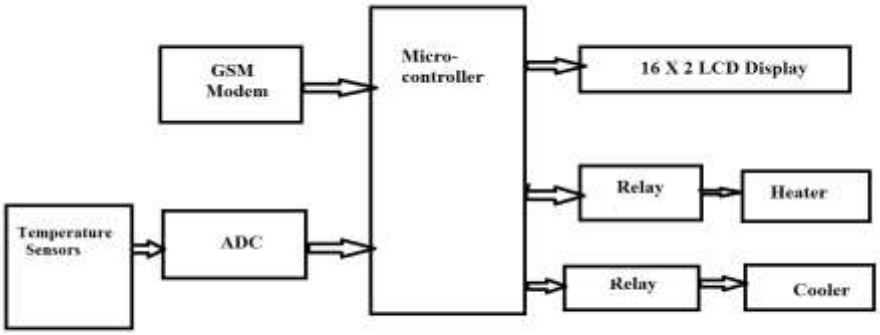


Fig 1: Block diagram of our system

5. SYSTEM DESIGN

5.1. Hardware Implementation

In this system, a power supply of +5V DC for the microcontroller and operation of the relays is used. ATMega328 Microcontroller, LM35 Temperature Sensors, LCD, Relays, GSM are the important components of the system.

5.2. Hardware Components integrated into System

5.2.1. ATmega328 Microcontroller

ATmega-328 is basically an Advanced Virtual RISC (AVR) micro-controller. **ATmega328** is an eight (8) bit Microcontroller. It can handle the data sized of up to eight (8) bits. It operates ranging from 3.3V to 5V. It's normally used in Embedded Systems Application [6]. It has 32kB flash memory; 2kB RAM 1kB EEPROM. It can be viewed as a stage up from the ATmega8. It has 32 broadly useful working registers, three adaptable clock/counters with analyze modes, inside and outer interferes with, serial programmable USART, a byte-situated 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter, programmable guard dog clock with inside oscillator, and five programming selectable power sparing modes. ATmega328 microcontroller act as the CPU (Central Processing Unit) in our System. The microcontroller ATMega328 is in charge of observing and controlling the temperature.

5.2.2. LM35 Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (centigrade) temperature. The output of LM35 does not need any external calibration or any other functions and also it draws only 60 microamps from its supply. The operating temperature range is from -55°C to 150°C. The yield voltage fluctuates by 10mV in response of each °C rise/fall in encompassing temperature, i.e., its scale factor is 0.01V/degree C. It accuracy is 0.5^0 C.

5.2.3. LCD Display

LCD is a liquid crystal display. An LCD is a flat-panel display that make use of light-modulating properties of liquid crystals. LCD is having 8-bit data line and 3 control signal. It runs on a 5V DC power supply and only needs about 1mA of current. To display the temperature in our system we make use of 16 × 2 LCD. 16 × 2 means 16 characters for each line and there is 2 such line.

5.2.4. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch. When we want to control or operate load whose operating voltage or current is higher than the output of microcontroller we have to use a relay which is an electromechanical switch. It basically operates in two modes Normally Closed (NC) and Normally Opened (NO). Various devices can be controlled i.e. whether to ON or OFF through relays. In our system, we have utilized two 5V relays for controlling the temperature i.e. one for the heater and other for the cooler.

5.2.5. GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network which sends and receives data through radio waves. Like GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier for its functioning. GSM modems support a set of AT commands. In addition to the standard AT commands GSM modem also supports an extended set of AT commands. The quantity of SMS messages that can be handled by a GSM modem for every moment is low just around six to ten SMS for each moment. A GSM modem is used to overcome Remote machine problems.

5.2.6. Power Supply

Our System requires unregulated power supply of 12V for relays and regulated 5V supply for electronic circuit. The power supply is designed with step down transformer, rectifier, filter and regulator. Our system requires maximum of 12V/1.5A so the power consumption is approximately 20W.

A. Transformer

This is used to step down the voltage level of the A.C. input from 230V to 12V A.C. the current rating of the transformer is 500 mA. This is more than enough to supply the current to the relay unit and to all other circuitry.

B. Rectifier

The rectifier used here is the bridge rectifier. Here the A.C. signal coming from the transformer is rectified and converted into pulsating D.C.

C. Filter

This unit is nothing but a capacitor of high value which can charge and supply its charge to the circuitry in the falling edge of the input signal. This way it continuously maintains the direct cycle voltage across the circuit.

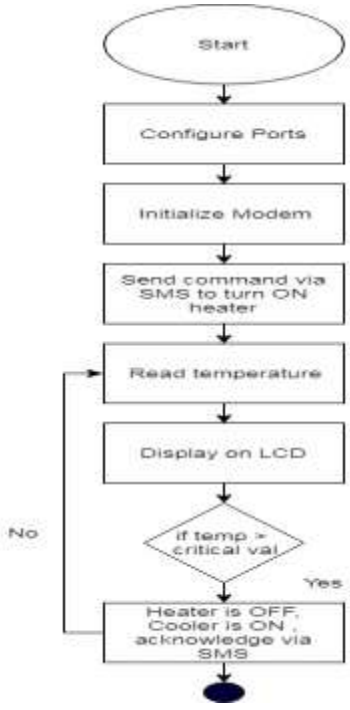
D. Regulator

The regulator is used to give constant output whatever is its input voltage. The input to this unit is nearly 15V D.C. and its output voltage is constant to 5V/12V.

5.3. Software Implementation

The assembly level programming is done on Arduino IDE software, the developed program is installed in the ATMega328 microcontroller. The Arduino IDE combines project management, make facilities, source code editing, program debugging, and complete simulation in one powerful environment. The Arduino platform is easy-to-use and helps one to quickly create embedded programs that work. The Arduino editor and debugger are integrated into a single application that provides a seamlessly embedded project development environment. The circuit diagram has been drawn using Eagle-4.11.

5.3.1. Flowchart



6. VIEW OF COMPLETE SYSTEM

Fig 2: Picture of the whole system

7. CONCLUSION

Temperature checking and controlling is finished with the assistance of a microcontroller and LM35DZ is the temperature sensor. The temperature is shown on the LCD screen and the coveted estimation of temperature is additionally set. The whole basic leadership is finished with the assistance of a microcontroller ATMega328. This sort of framework can be introduced in any put where we have to keep up temperature roughly consistent. This System can be utilized as a part of enterprises to gauge the temperature furthermore, control the temperature according to prerequisite. It can be utilized in tea processing plants to persistently screen and control the temperature required for preparing the tea clears out.

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