SEVER ROOM TEMPERATURE DETECTING AND ALERTING SYSTEM

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ABSTRACT

Temperature controlling or Temperature detecting systems were used in many technical environments. Designing a system which include temperature detecting and also an alerting system with extended features in a single design was identified as a new approach of interconnecting several systems. In some special working environments it requires to maintain a constant amount of temperature, pressure or humidity inside particular working environment regardless of geographical area or whether conditions for the safety of the equipment and tools used in particular work. This type of a developed system not only can applicable with an alerting system but also with a controlling system which will guide the environment turn back to the required state. The knowledge of micro controller based systems serial communication systems, Thermo sensors, data transmitting techniques were used in this system. Mobile communication strategies were used for data transmission. The system consists of several electronic and programming applications and strategies which were merged together in the purpose of proving a perfect solution for the research. The system consists of 16X2 LCD display as the Interface, Alarm light notification facility via Global System for Mobile Communications (GSM) module. Additionally this system can be developed by adding a controlling unit which can control the temperature itself. The knowledge of fuzzy logic in Artificial intelligence can be adopted as extended development theory for this kind of fully automated system. This system was identified as an approachable low cost device which is also the most suitable practical solution for the sever room at Sri Lanka Customs Information and Communication Directorate.

Keywords: *Temperature detecting, Data acquisition system, Thermo Sensor*

1.0 INTRODUCTION

Most working environments in technical world require maintaining the quality of the workshop or office according to the international standards and also some system tools and

equipment requires to be used in the specific environment. This design was identified as a major requirement of Sri Lanka Customs Information and communication directorate. Although this design was developed according to their requirements, it can also be applied in any other environment which requires the same functionality in different ranges. The temperature range which can be measured by the sensors changes from sensor to sensor. Therefore referring to the temperature range the sensor was selected. The required temperature range for the sever room was identified as 17-19^{0}C but any value below 17^{0}C were also allowed because with heat generated by severs practically never allows the environment to drop temperature less than 17^{0}C and also lower temperature causes no harm to servers. During cooling system failure sever room temperature increases rapidly therefore the alarming system was designed to be fast and accurate. Temperature measuring system are more common in the office and residential environments but this system was designed to not only to measure the temperature but also to display the temperature itself, alarm and send a notification to the responsible person to reset the system.

1.1 Literature

The existing related studies and experiments were studied not only to identify the most suitable method but also to gain knowledge for identifying the best practical solution for the research problem. The study of LM35[1] temperature sensor with PIC16f877A[2], PIC 16F876A based Temperature (DS1620) / Humidity (HS15p) Display (Hitachi LCD)[3]were done to identify the applicability of thermo sensor. Inapplicability of the sensors was the major drawback of existing concepts.

The concept of Mobile communication strategies were also referred along with several implementations. AT commands in serial communication systems were used along with GSM modules or without GSM modules. Most of those applications were designed to work with and communicate with the computer HyperTerminal.

The study of fuzzy logic in Artificial Intelligence[4] was also referred in some research basic projects. Though it was only suggested as a further development, several systems were identified as applicable with this system concepts which can be used with few modifications.

2.0 METHODOLOGY

The device is a microprocessor based system. The microcontroller was used for all the data manipulations such as identifying the temperature, controlling the data transmission module and displaying purposes. Relevant components were used to stabilize the system power at the required input value. Thermo sensor DS18B20[5] was used to detect the temperature in the environment. For the programming, a requirement of the microcontroller 16F877A; mikroC[6] was used while AT commands were used for configuring the GSM module. A LCD display was used for displaying purposes while a GSM module was used to transmit data to the alerting station. Following block diagram expands the content of the above mention system.
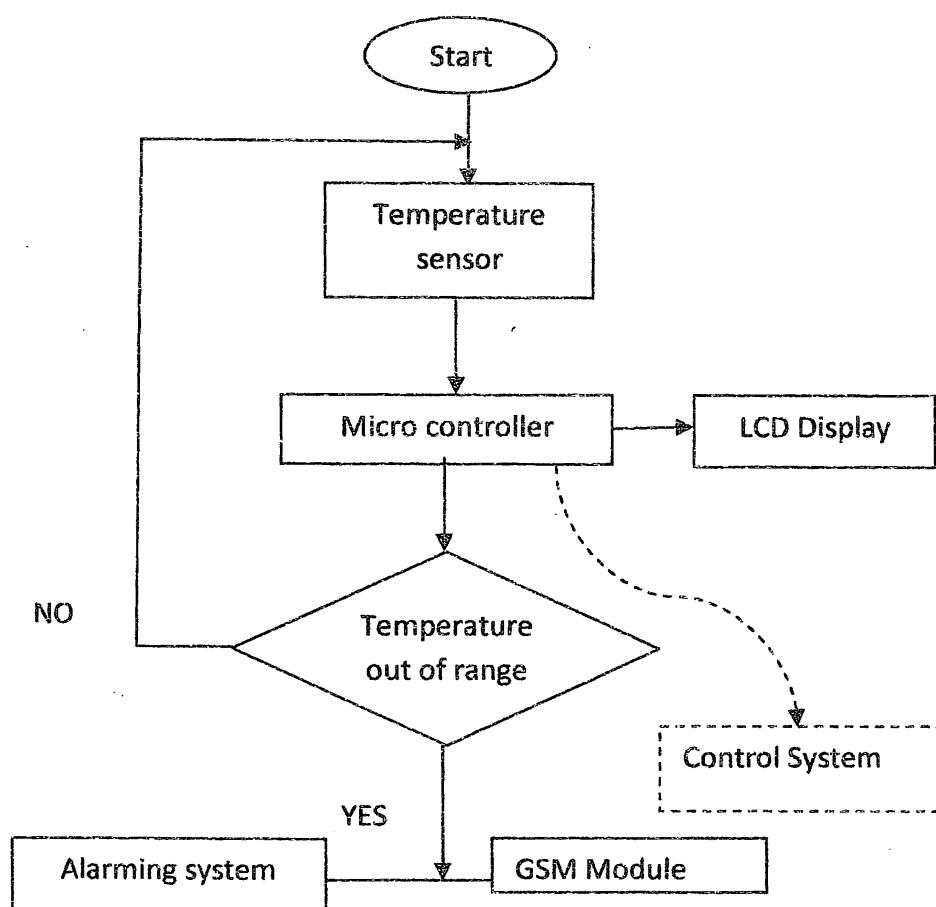

Figure Error! No text of specified style in document..1:Block diagram of the system

Selecti.. a .u.....v. ....p........ ..... was .... .g.......... p... .f this process the active range of the sensor and accuracy were considered to select the sensor.DS18B20 was identified as the suitable sensor which has measuring temperature range of -55^{0}C to +125^{0}C and also has an a accuracy of ±0.5°C from -10°C to +85°C which also has a unique one port pin for communication which converts temperature to 12-Bit Digital word

750ms (Max)[1].When it comes to the programming LM35 consumes less memory than DS18B20 but LM35 requires to touch the surface to read the correct temperature while DS18B20 can read the environment temperature.

The microcontroller was selected after considering the following major functional capabilities. Should support,

- serial communication
- several I/O ports

And also, wider the opportunities for further developments. The system was divided in to several units in the development process. Each and every unit was designed to have their own troubleshooting and recovering methods.

2.1   Circuits Designing

The following circuit design was developed in order to implement the circuit according to the figure 2.1

Main circuit board was designed including power, sensor, data controlling and handling units. Display unit PCB (Printed Circuit Board) was designed only for the LCD (Liquid Crystal Display).
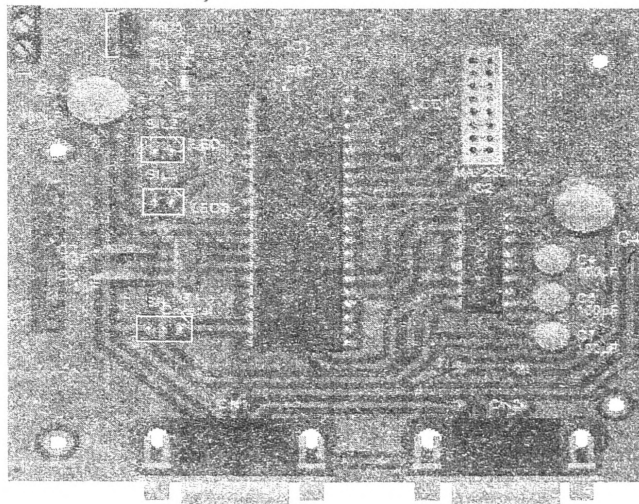

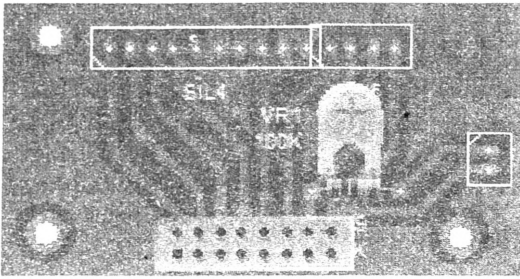Figure Error! No text of specified style in document..2:Main circuit design

Figure Error! No text of specified style in document..3:Display unit

3.0   RESULTS AND DISCUSSION

The above mentioned system was designed as a solution to overcome the identified problem inside the sever room with an effective and efficient manner within a limited time period and also with a low budget.

Though above mention system seems like it has a basic concept, merge of several concepts has added it a unique way to approach the goal. Further suggested control system adds additional value to the system because it was suggested as a backup system which automatically adjusts according to the requirements. This Artificial Intelligence sections adds upgraded standard to the system.

This research paper also proves that not only the electronic industry requires electronic related knowledge but also other streams interconnect with electronic industry somehow. Therefore the knowledge can be merged and can be used with any field of study.

Though this research was based on a requirement inside Information and Communication Directorate at Sri Lanka Customs author identified that this solution is also applicable with any Industry which requires maintaining a stable temperature in order to have a suitable working environment. As an example Workshops at Sri Lankan Airlines Engineering Division also requires maintaining stable temperature level inside workshops most of these workshops uses a central AC system which makes this case very much similar to the first case.

Also the same concept can be applied for humidity, pressure or any other environmental change with an appropriate sensor.

3.1 Future Developments

A subsystem control system was introduced as shown in fig 2.1as further development concept in this research problem. This system was suggested to work as an auto control unit which works independently in case of increase the temperature inside the server room. It was also suggested to be fully automated and function itself.

Concept of Artificial Intelligence comes along with this suggestion and it requires a study of fuzzy logic[6] to develop controlling unit.Real time clock was also suggested to apply into the system which will conform the time at each temperature regardless of time taken to deliver the message.

4.0 CONCLUSION

The study and the implantation which was included in this paper was an attempt to fulfill one of many real time system requirements exists in the electronic related industry and it also proves that the knowledge of computer studies also can be merge along with many electronics products as well as electronics can be used in any type of an industry as long those industries adopt and moves along with latest technologies.

ACKNOWLEDGEMENT

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