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Performance Evaluation and Representation of a System Generating Power

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Abstract — *This paper provides the info regarding the way to acquire the real-time information of parameters and monitoring by means of the board. At this point the parameters considered for observation are temperature, vibrations and liquid level. Arduino Uno is one of the user-friendly microcontroller that has user outlined I/O pins and conjointly input analog pins. Hence this paper considers a system in which the pc with Java has been interfaced to temperature sensing element LM35 by means of arduino board. Using this system we are able to monitor time period temperature and additionally acquire vibrations and liquid level knowledge using the coded-software. By making use of this thought-about system, the distinct appliances such as fans, high temperature alarms accustomed to avoid dangerous events by taking proper actions may be machine-driven. In this proposed methodology the temperature sensing element ceaselessly provides the temperature in voltage terms that is connected on to arduino board inorder to observe the periodic temperature and conjointly it's been plotted on the graph. Also along with the temperature, the data of vibrations and liquid level is recorded in the database. Based on the threshold values that has been set within the projected system it control the temperature and conjointly the cooling system and LED is turned.*

Keywords- *Temperature ,Vibration, Liquid level, Arduino board, Computer, Data-Acquisition.*

I. INTRODUCTION

In our day-to-day life we tend to need monitoring of several physical parameters like temperature, vibrations, liquid level, pressure, humidity, flow rate et al. in several fields. According to distribution, quantities and detected frequency of monitored objects, we have such a lot of completely different monitoring ways to capture the measurements. The user must decide whether or not to have a manual monitoring or the machine-driven monitoring.

In the implemented system, the temperature sensor fetches the perceived temperature that is connected to pc through arduino board. Considering the sensed temperature, computer display shows the variations in it on the graph. If the temperature raises above the set threshold value then the pc sends commands to arduino and turns the cooling system on in conjunction with the indication of LED glow. Similarly if the temperature reaches below the set threshold value then the cooling system and the LED turned off. Along with temperature the projected system additionally fetches the information of vibrations and liquid level through arduino and displays it.

Mainly, this proposed systems deals with data-acquisition conception. Data-acquisition is also named as data-logging which is the method of collecting and organizing the information which means it measures an electrical or the physical phenomenon like temperature, pressure voltage et al. and processes it to convert the resulting samples into digital values that will be manipulated by a pc.

II. RELATED WORK

The system was developed to produce a prototype product of a Web Based Temperature Monitoring system that allows the user to monitor continuously the condition of room temperature**[2]**. Here the software part of the system involves written programming and the coding is constructed using the C language platform. Then they are uploaded to microcontroller which in turn creates VB6.0 application inorder to display the temperature. The data is saved in the database. In paper**[3]** author make use of a remote wireless temperature monitoring system that can be applied in real-time and with multi-regional access to information. The wireless sensor nodes are used to collect real-time data and using ZigBee it is transmitted to base station**[1]**. In order to achieve soil temperature, soil moisture and humidity monitoring, the data is received, saved and finally displayed at base station[4]. In the present study the ARM controller is used to implement a real-time field monitoring and controlling system to sense temperature, nature of land and pressure. All these parameters will be uploaded to server and field information can be monitored**[5]**.

III. SYSTEM IMPLEMENTATION

The proposed system can be explained in terms of block diagram that is as shown in below figure 1.

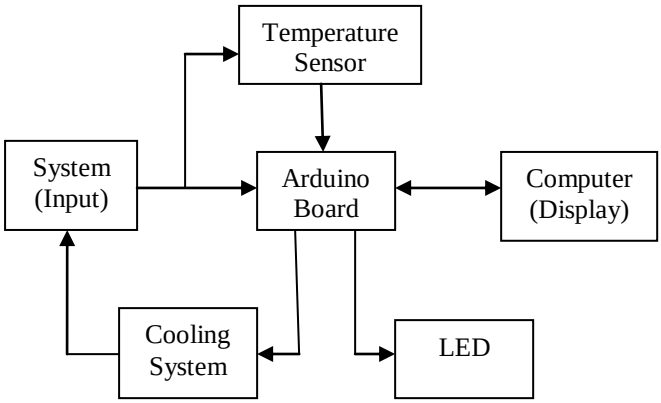


Figure 1. Block diagram of proposed prototype system

Figure 1 explains the method of data-acquisition and observance of the parameters to be within the desired range. Here the temperature is sensed in terms of voltage using temperature sensing element LM35 that is interfaced to arduino board. The code is designed in such a way that it displays the temperature as well as vibrations and also the liquid level data acquired by arduino. Also the code is designed to monitor and correct the temperature range inorder to get the desired range that is set. Suppose if the temperature range reaches larger, once compared to desired range then the computer sends the information back to arduino to control. Then arduino turn on the cooling system thereby the LED conjointly glows to indicate the temperature range is high. If the temperature reaches lower then both LED and cooling system goes to off condition.

3.1. Hardware Implementation

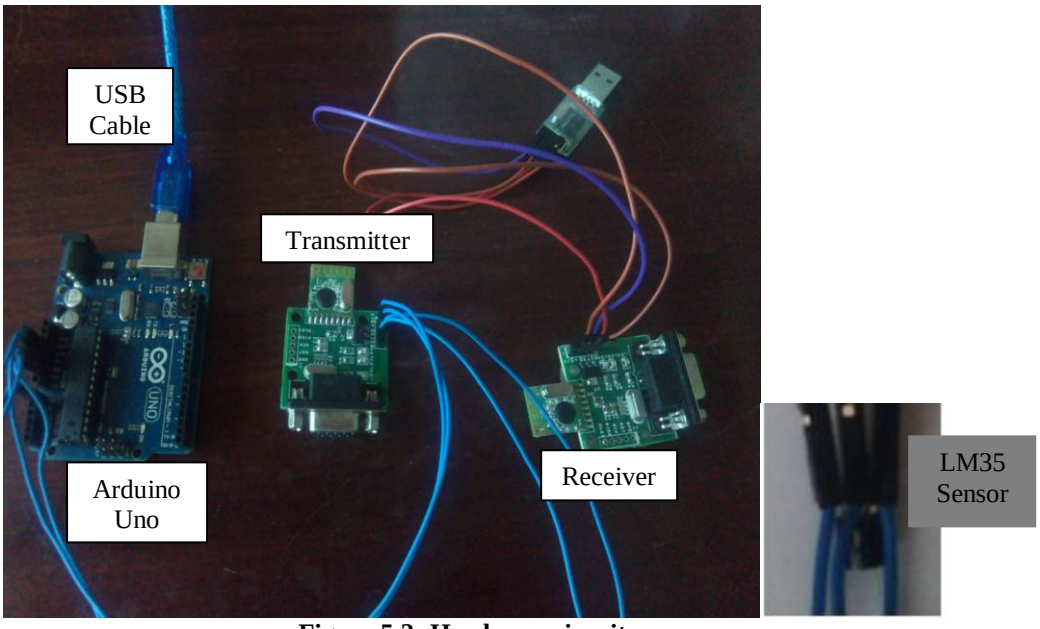


Figure 5.2: Hardware circuitry

3.1.1. Temperature Sensor LM35

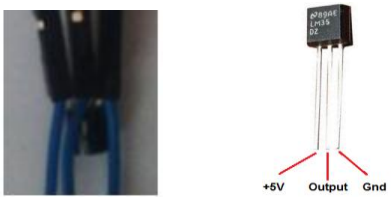


Figure 2. LM35

LM35 is one of the temperature sensor which is accuracy incorporated circuit. This current sensor's yields the output voltage fluctuations linearly with centigrade temperature and it is one of the point of interest when temperature sensors with Kelvin-scale alignments are considered. It is having the low yield impedance furthermore it can work with single supply of power. The self-heating limit of LM35 is low.

The figure 2, shows the pin configuration of the temperature sensor LM35. The pins of LM35 describes that one pin is connected directly to ground point. Inorder to activate LM35, it is supplied with +5V of power supply. The centre pin of LM35 is to get the output that means to get the sensed temperature using this sensing element.The LM35 does not require any outer alignment or trimming to give average exactnesses of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

3.1.2 Arduino Uno Board

Here we are using one of the microcontroller which is based on Atmega328 is the Arduino Uno board. The figure 3, shows the hardware of Arduino Uno Board. At a reasonable level, when utilizing the Arduino incorporated advancement environment, all boards are customized over a serial connection. Its execution differs with the hardware form. Some serial Arduino boards contain a level shifter circuit to change over between RS-232 logical levels and transistor–transistor logical (TTL) level signals.Boards of current Arduino are coded through Universal Serial Bus (USB), actualized utilizing USB-to-serial connector chips, for example, the FTDI FT232.

It has 14 digital I/O pins (of which 6 can be utilized as PWM yields), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button**[1]**. It contains everything expected to support the microcontroller. Basically connect it to a PC with a USB cable or power it with an AC-to-DC connector or battery to begin.. "Uno" implies one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0**[1]**. The Uno board and version 1.0 of Arduino Software (IDE) were the reference renditions of Arduino. Now developed to more current releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform & for a broad rundown of present, past or obsolete boards see the Arduino list of boards**[1]**.

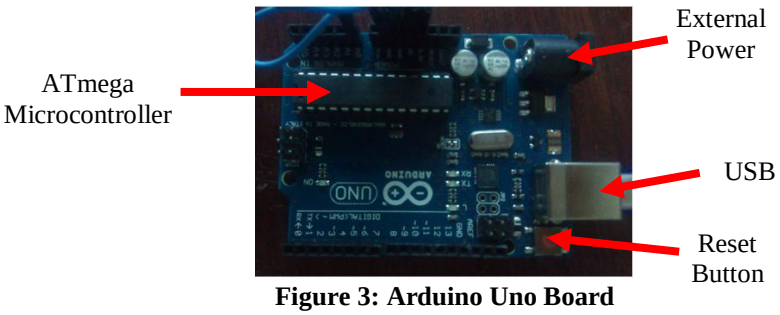


Figure 3: Arduino Uno Board

The power pins of arduino are as per the following:

- Vin- The input voltage to the Uno board when it's utilizing an outside power source (rather than 5 volts from the USB association or other managed power source). We can supply voltage through this pin, or, if supplying voltage by means of the power jack, access it through this pin.
- 5V- This pin yields a directed 5V from the controller on the board. The board can be supplied with power either from the DC power jack (7 - 12V), USB connector (5V), or VIN pin of the board (7-12V). Supplying voltage by means of the 5V or 3.3V pins sidesteps the controller, and can harm the board. We don't exhort it.
- 3V3- A 3.3 volt supply created by the on-board controller. Greatest current draw is 50 mA.
- GND. Ground pins.
- IOREF- This pin on the Uno board furnishes the voltage reference with which the microcontroller works. A legitimately designed shield can read the IOREF pin voltage and select the perfect power source or empower voltage interpreters on the yields of output to work with the 5V or 3.3V.

Additionally, some pins have particular capacities:

- Serial: 0 (RX) and 1 (TX). Used to get (RX) and transmit (TX) TTL serial information. These pins are associated with the relating pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: 2 and 3. These pins can be designed to trigger the interrupt on a low esteem, a rising or falling edge, or an adjustment in worth.
- PWM: 3, 5, 6, 9, 10, and 11. Give 8-bit PWM yield with the analogWrite() capacity.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins bolster SPI correspondence utilizing the SPI library.
- LED: 13. There is an implicit LED driven by advanced pin 13. At the point when the pin is HIGH esteem, the LED is on, when the pin is LOW, it's off.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI correspondence utilizing the Wire library.

There are couple of different pins on the board:

- AREF- Reference voltage for the simple inputs. Utilized with analogReference().
- Reset- Convey this line LOW to reset the microcontroller. Ordinarily used to add a reset catch to shields which obstruct the one on the board.

3.2 Software Implementation

In the implemented system, the programming is done in the form of block schematic which means it is a graphical coding which is easy to monitor the real-time temperature, vibrations and the liquid level along with the hardware system.

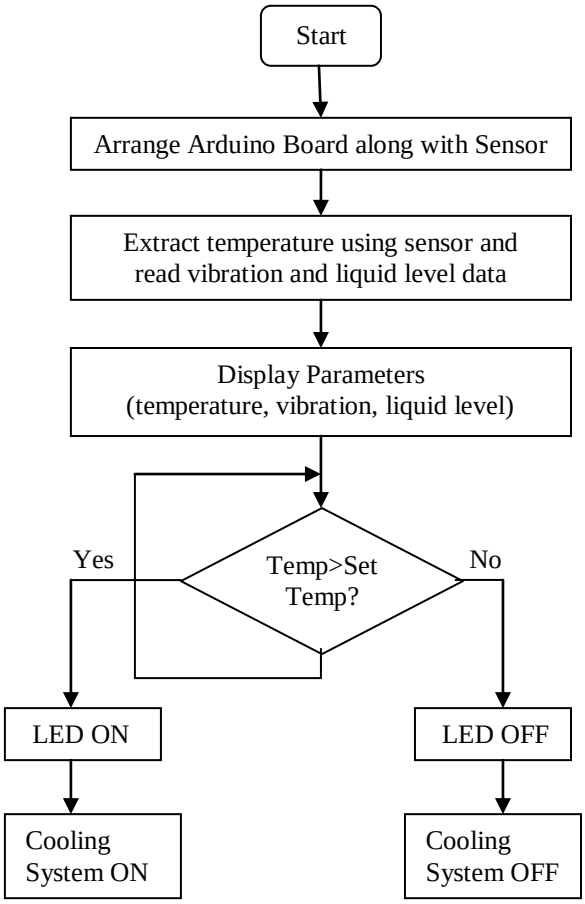


Figure 4. Flow Chart of Implemented System

The figure 4, portrays the stream outline used to perform the activities of the anticipated framework. Firstly, assemble every one of the parts required for this anticipate. Setting up of the equipment segments. Accordingly organize Arduino Uno board alongside Temperature sensorLM35. After every one of the courses of action of the equipment got over, begin the framework by giving power supply to input source that is warming loop. When it begins working that implies when it begins getting warmed, extract the temperature utilizing the temperature detecting device furthermore utilizing the Arduino board extricate the data of vibration and conjointly fluid level information which are then put away in the database.

This procedure keeps on observing the temperature evenly. Here based on the range of temperature the LED and the Cooling framework turned. At the point when the present temperature is more prominent than the desired temperature esteem which has been set, the LED gleams showing the temperature reach is intersection the farthest point. Correspondingly if the present temperature worth is beneath the coveted range then both LED and the chilling framework goes. Along these lines the framework what is proposed will work. These procedure of the framework relies on upon the Java programming. Utilizing this we can program the Arduino board to work as indicated by the requirements of the client to get the soughted output effectively.

IV. SIMULATION RESULTS

The figure 5, demonstrates the consequences of the framework before observing. For this situation the LED and the cooling system are both in off condition. This tells the present temperature is underneath the limit level of temperature that has been set. This is the outcome got following 10 minutes of the anticipated framework began.

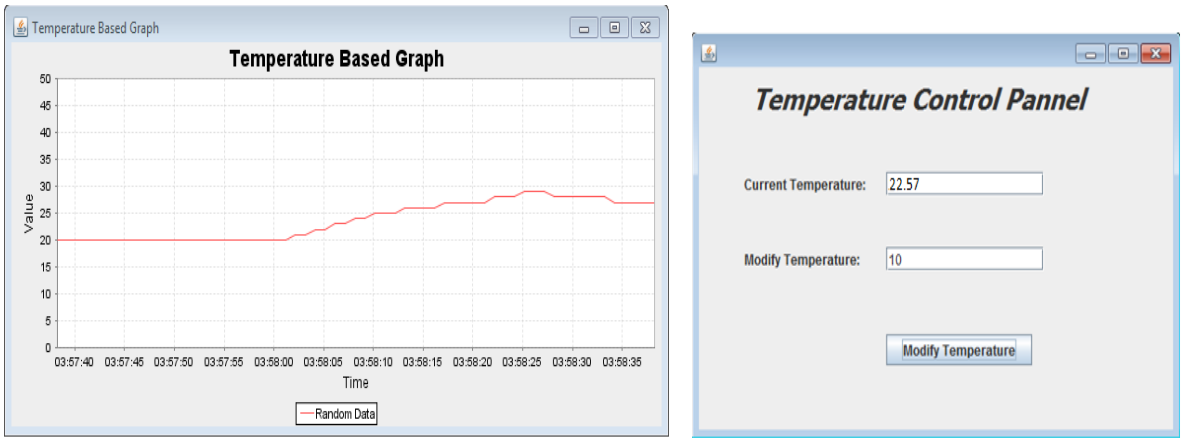
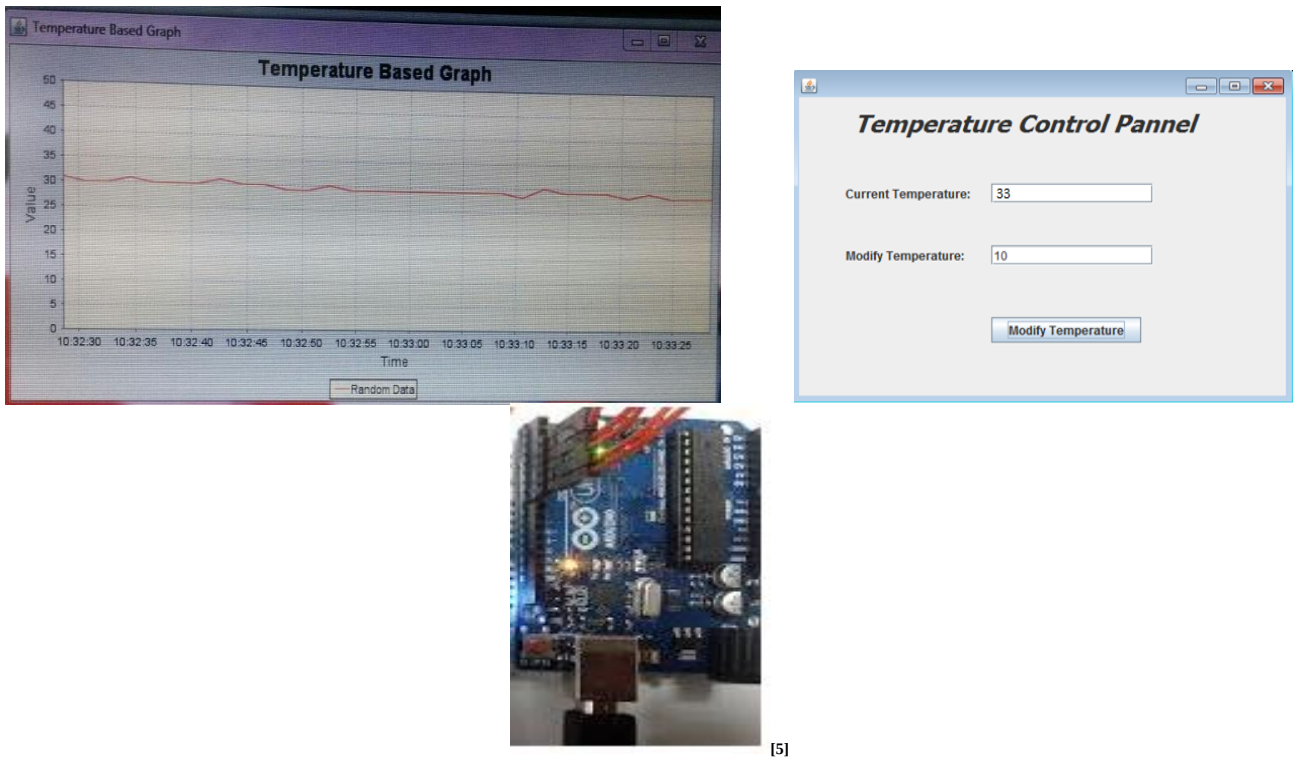


Figure 5: Plot showing the data acquisition before monitoring

The figure 6, demonstrates the consequences of the framework when the temperature is high. Here the LED and cooling framework gets swung on to demonstrate that the present temperature is over the limit temperature that has been set. This is the chart demonstrating when the temperature is beyond the desired range. Glowing of LED is shown.



[5]

Figure 6: Plot showing the results when temperature goes high along with LED indication

The figure 7, is demonstrating the outcomes after the observing procedure has been completed. By performing the methods what we executed through the Java programming we are getting the checked output result as beneath.

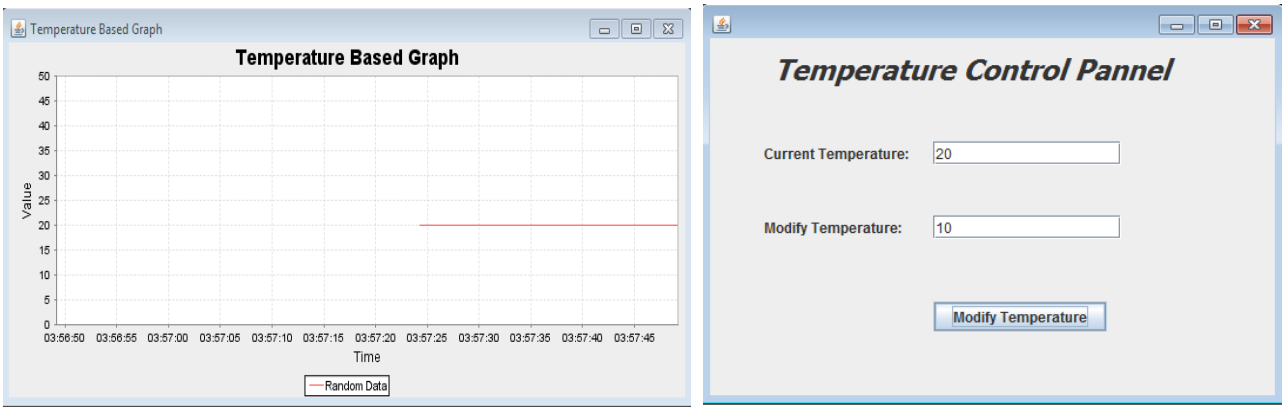


Figure 7: Plot shows the results after the monitoring process

The figure 8, demonstrates the plot of the gained information of the parameter-vibration. The vibration parameter is signed in the database after the procedure, that is as appeared in that figure.

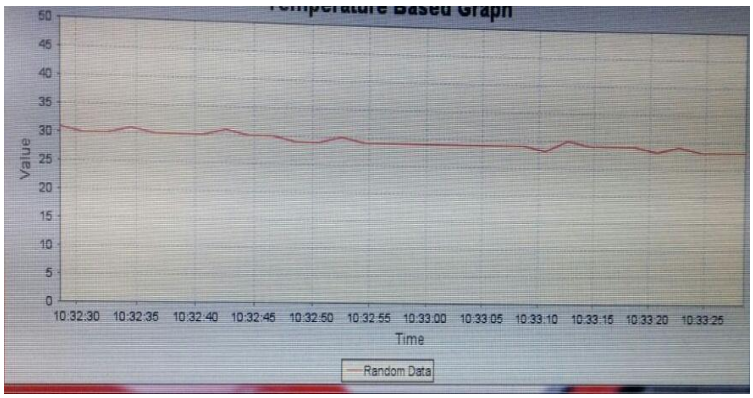


Figure 8: Plot of data-acquisition of vibration

The figure 9, demonstrates the database record of one estimation of the fluid level information when the proposed framework keeps running with the customized Java programming.

Figure 9: Data-acquisition of liquid level

IV. CONCLUSION

The belief of this prototype structures is experimented for actual-time temperature tracking the usage of arduino is as follows:

- The code has been interfaced to an Arduino board for diverse tracking of actual-time sports.
- The layout that is proposed can be changed to show the parameters studying on lcd display. it is also feasible to ship SMS to tracking authority through GSM modem.
- This gadget can do data logging in excel report also.

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