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Remote Lab Circuit Temperature and Intensity Measurement and Control

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Abstract*—*Data acquisition systems are primarily systems which receive the analog data, perform and process the predefined response. Data acquisition (DAQ) is to obtain the data that can be manipulated by a PC, data acquisition, mainly involves getting analog signals, waveforms and processing them to obtain required information. The main electronic device of DAQ systems includes sensors which converts any parameter to an electrical in nature, then processing the signal and send to the by a DAQ hardware.These papers discuss two real signals, particularly light intensity and temperature and transmit this information through wireless to a facility that has better human processing and accessibility capability. The application of this paper is in places where analog values of the surroundings have to be remotely received, monitored and controlled.

Keywords: DAQ, hyper terminal, wireless technology, sensor and Real time display

I. INTRODUCTION

Information procurement is that the examining of the genuine information that can be changed from a PC. Information procurement normally includes getting of simple flags and preparing the signs to get obliged data. The segments of DAQ frameworks incorporate vital sensors that change over any physical parameter to an electrical sign, then sign molding happens, which can then send by information obtaining fittings. A DAQ is an electronic system designed to measure required parameters. The purpose of the data acquisition system is used for analysis of the logged data and the object of measurements. The data acquisition system is normally made of hardware and software. The hardware part is designed with the help of sensors, components. The software for the DAQ system, is the logic and the analysis software. An example: Data logging carried out by a DAQ system is used to measure content such as light, temperature, fire and humidity in the nuclear power storage plant. The measurement data are then stored for analysis purposes. Data acquisition systems consist of following elements. (1). Measuring output (sensors around the room), (2). Recording output signals (logger unit), (3).Uploading/accessing recorded data (telemetry) and (4).Analysis of recorded data. (DAQ software). Acquired information is displayed, analyzed, and stored in PC, the whole system is controlled can be developed using languages BASIC, C and Pascal. We can also develop a programing language used for data acquire include EPICS and VB, which offer a graphical user interface environment optimized for data receive.

II. IMPLEMENTATION

The main aim of this paper is to screen the light intensity and temperature of an individual circuit in a Remote laboratory range in a utilizing remote innovation and an also wired correspondence. The figure 1 demonstrates the general block diagram of the system.

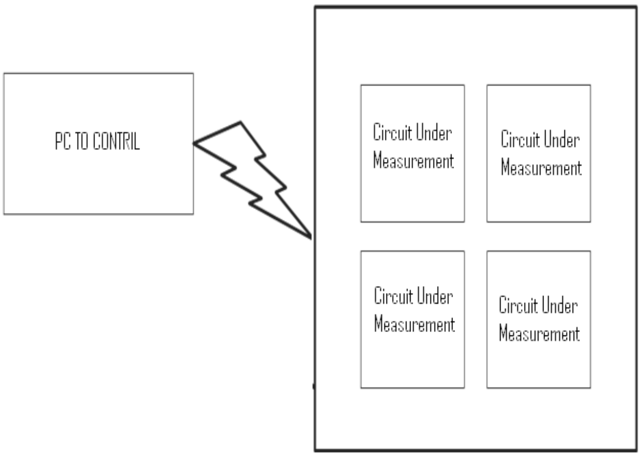

Figure 1. General Block Diagram

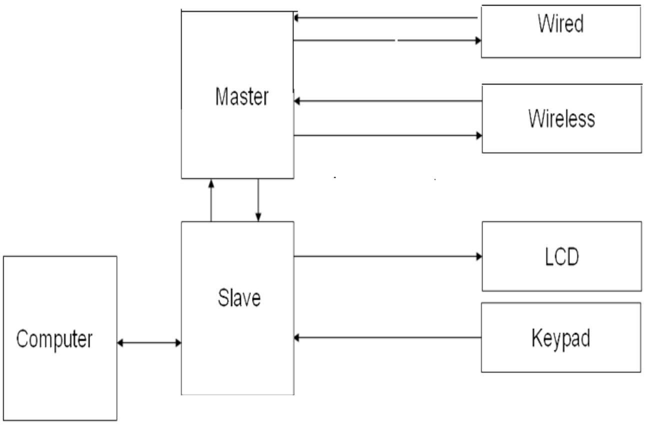

Figure 2. Control module

DAS acquire data around the room using sensors and it sends to control module, where we can view on the LCD or hyper terminal on the computer. Communication designed is meant for wireless as our system is used in confined places in case of failure in wireless it can communicate also by means of wired communication using RS 485 protocol.

A. Control Module

The control module is the heart of our framework. We can get to all the DAQ frameworks set in the bound room by simply selecting a specific DAQ and we can view values.

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The figure 2 demonstrates the general diagram of the control module. Control module has 2 controllers one is master and another one is a slave, and these will interface known as SPI interface. The Slave is associated with the LCD, keypad and hyper terminal of the machine. The Master gets the DAS, by interfacing with SPI, it is sent to the slave and displayed on the LCD and hyper terminal of the machine. When the framework is exchanged on, it requests the password, we can get into the framework. Later it starts showing the values of the temperature and light intensity on the LCD and hyper terminal of the machine too. If there is any temperature or light cross the predetermined values it gives an an alert to switched off under allowable farthest point. On the off chance that there is any disappointment in remote correspondence, qualities can be seen by joining wired correspondence physically.

B. Data acquisition system Module

The data access system is the sensor in which sensors are arranged around. This module is kept in the characterized room and this is the module which collects the data. The figure 3 exhibits the general diagram.

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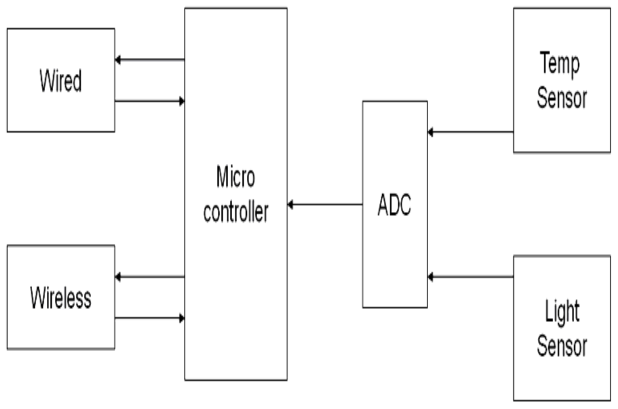


Figure 3. Data acquisition system Module

DAQ contains a combination of microcontroller, sensors, and ADC. Sensors used delicately and react to the progressions within the nature's turf. Transducers, provide current, voltage quality compared to the present continuous. The Analog to digital converters signals at a high rate and sustains it to the controller. The ADC may be a 8-channel, 8-bit IC with the channel selection controlled by 3 choose lines from the controller. 2 of the 8-channels are used, one every for the temperature and light measurement. The controller structures containing the DAS address, temperature, light, path, computer memory unit and sends it through its interface and through RF module.

III. TEST RESULTS

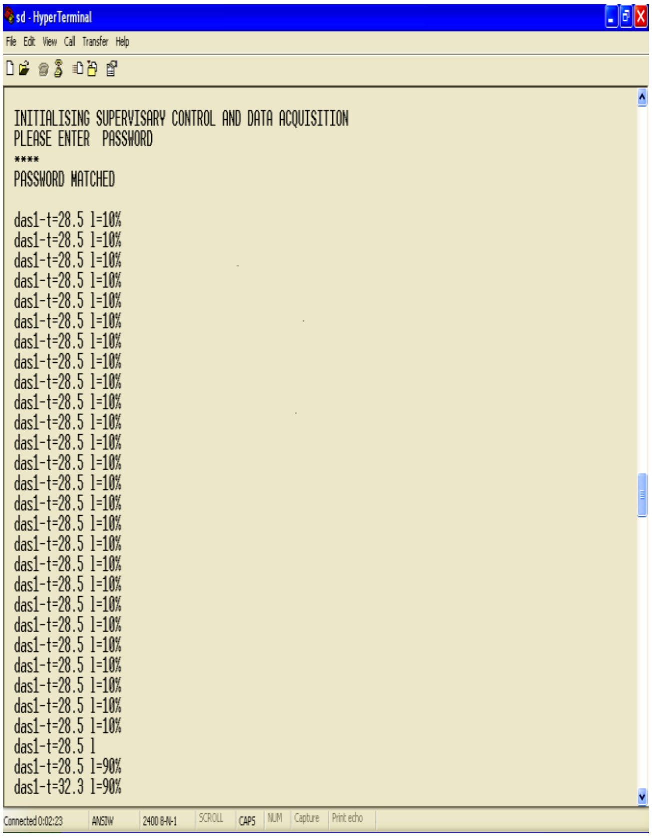
The both transmitter and receiver modules can be kept at a distance of 10 feet for accurate reception. The above figure 4 screenshot has been obtained when the system is first switched on. After displaying the name it will demand for the password. By entering the correct password one can access into the system. After entering the correct password it starts displaying the real time values continuously.

For daylight room light intensity, the system is programmed to show 20% – 30% .

For absolute darkness, it shows as 0%-10%

For a high intensity torch, light it is 90%.

For intensities above 90%, the software is programmed to show a constant value of 90%.



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INITIALISING SUPERVISARY CONTROL AND DATA ACQUISITION
PLEASE ENTER  PASSWORD
****
PASSWORD MATCHED

das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
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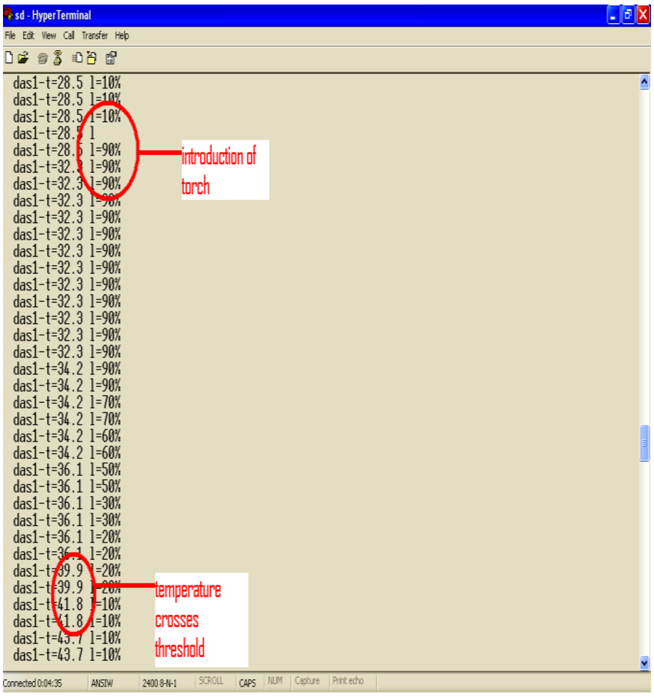
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l
das1-t=28.5 l=90%
das1-t=32.3 l=90%
```

Figure 4. Screenshot when the system is switched on

This screenshot fig 4 shows the real time display of data on the computer screen. The top circled portion shows the sudden increase of light intensity when a torch is switched on. At this very instant an indicator LED is switched on the DAS board, indicating the crossing of the threshold value. The temperature values can be seen to vary gradually from the room temperature of 28 deg, when a heated solder gun is kept in the vicinity of the temperature sensor.



```
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l=10%
das1-t=28.5 l
das1-t=28.5 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
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das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=32.3 l=90%
das1-t=34.2 l=90%
das1-t=34.2 l=90%
das1-t=34.2 l=70%
das1-t=34.2 l=70%
das1-t=34.2 l=60%
das1-t=34.2 l=60%
das1-t=36.1 l=50%
das1-t=36.1 l=50%
das1-t=36.1 l=30%
das1-t=36.1 l=30%
das1-t=36.1 l=20%
das1-t=36.1 l=20%
das1-t=39.9 l=20%
das1-t=39.9 l=20%
das1-t=41.8 l=10%
das1-t=41.8 l=10%
das1-t=43.7 l=10%
das1-t=43.7 l=10%
```

Figure 5. Screenshot of real time display of data

The bottom circled portion shows the crossing of the temperature limit. At this moment a different LED on the DAS board is switched on which remains on till the value comes below threshold. Also a buzzer is on the control module is switched on.

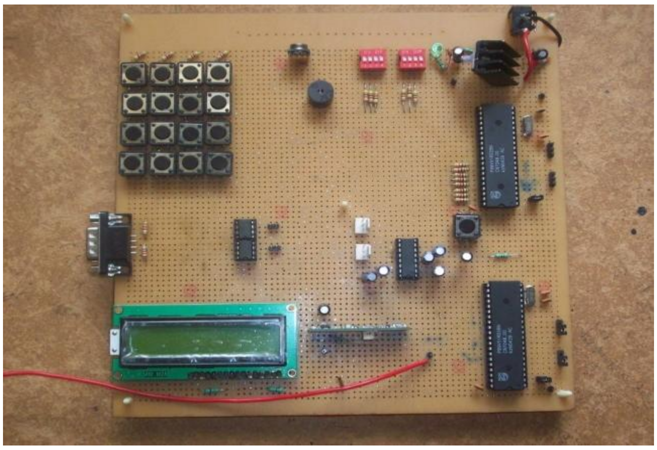

Figure 6. Photograph of control module

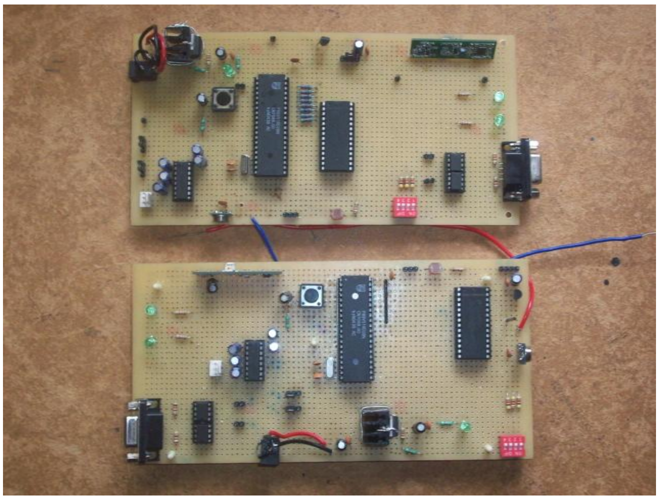

Figure 7. Photograph of data acquisition system

IV. CONCLUSION AND FUTURE ENHANCEMENT.

The DAS module and efficient the temperature range can be measured from 2 degrees to 150 degrees for the given configurations.Variation in light intensity can be detected from absolute darkness to a high intensity torch light.Stand by wired communication is used in case of RF link failure. Hence the communication is reliable.This paper finds application in not only in the Remote laboratory also in missile storage and nuclear reactor where analog sensory inputs from confined compartments are required. More controlling options can be given at the operators end and hence make the data transfer more bidirectional. The processing capabilities of the controller can be utilized to the maximum so that all work can run parallel. Also interrupt mechanisms can be used. This project can be upgraded to handle more DAS modules and higher number of analog inputs. Also the wireless technology can be upgraded to support higher data rates.

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