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WEB based Weather Data Acquiasition System

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***Abstract*— With rapid development of science and technology the environment monitoring and analysis is having its own significance at present polluted zones. The temperature levels are increasing with the improper utilization of the resources. The carbon dioxide levels are also increasing owing to deforest at all zones of the world. The humidity levels are also influenced by temperature changes. The state of the atmosphere of the particular location is to be monitored and analyzed to safe guard the OZONE layer. This paper considered ambient temperature , Co2 levels, Humidity levels, and rain detection . The signal logged from the sensor assembly is interfaced to the ARM 7 micro controller to compare with the predefined threshold values. The processed signal is communicated serially to the personal computer using IEEE 802.4.15(ZIGBEE). The processed data is also linked to the web server with the support of internet of things application. The signal graphical analysis is done by applying the high level programming Python language. The developed methodology is adapted to Sai Spurthi institute of technology campus to enable the visitors to know the status of the present environment. Favorable results are obtained to meet the challenges of environment monitoring and to increase the alarming signals to improve the green house mechanism.**

Keywords*— *Temperature, Co2, Humidity, ARM7, IEEE 802.4.15, Web link

I. INTRODUCTION

With the advancement of technology and science the rate of weather pollution is increasing proportionally. The human life is influencing by the rapid changes in atmospheric pollution. The sun radiation and CO_2 and humidity levels are influenced by the green house mechanism. Deforestation is the major component to be considered to stabilize the environmental conditions. Deforestation leads to depletion of OZONE layer causes to raise the temperature levels on the surface of the earth. CO_2 levels due to motor pollution and industrial pollutions can be normalized with plantation only. So the green house mechanism is directly influencing on the changes of the environmental parameters. If the temperature levels are greater than 40 degrees then an alarming signs will be circulated to the society to increase the plantation.

Weather parameters monitoring and transmission to several locations to keep track on the green house mechanism will boost the survivability to the next generation. This paper focused the weather conditions at sai spurthi campus only. Due to greenhouse mechanism only the temperatures and pollutions levels are nominal within the campus premises compared to the outside campus.

II. LITERATURE SURVEY

This paper considered two physical parameters for monitoring one is temperature and the second one is humidity. ARM 9 microcontrollers is used to process the data .And the LABVIEW software is used for simulation and analysis purpose [1].

This paper considered two parameters one is temperature and the other is light detection. This paper aims to acquire the data from the sensors for monitoring purpose. The author focused only on data acquisition [2].

This paper considered humidity and temperature for logging the data. The logged data is transferred to the personal computer for analysis. The measured signals are compared with primary standard devices for calibration purpose [3][6].

This paper focused to provide the weather information for formers. The temperature, humidity and wind speed parameters are transmitted using IEEE 802.4.15 [4].

This paper aims to regulate the soil mechanism using PIC16F877A microcontroller. The paper considered the temperature, humidity. The measured values are compared with the preset levels. Based on the error signal the water pumping motor is on and off by using relay [5].

III. HARD WARE IMPLEMENTATION

A. Temperature sensor

LM 34 Thermister type sensor. The output is voltage signal an order of mV. The scale normalization and conditioning the signal is done using the ARM 8 Microcontroller. 0-10 V sensor output signal is equated to 0 to +148 degree Centigrade. '1'Volt output signal of the sensor is scale normalized to 14.8 degrees. This signal is given as one input to the ARM 8 Micro controller for further processing.

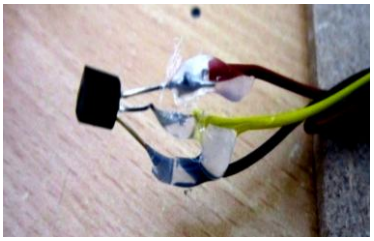

Fig. 3.1 Temperature sensor

B. Humidity sensor

The change of resistance w.r.t to the amount of vapor deposited with the sensor is considered to measure the relative humidity. The change of resistance is proportional to the voltage signal in an order of mv. This signal is conditioned using ARM 8 microcontroller for further processing.

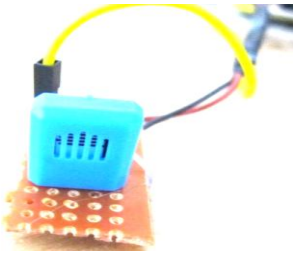

Fig. 3.2 Humidity sensor

C. CO2 Sensor

Coal belt regions and heavy traffic density are polluted with Co2 levels. Deforest is one reason to increase the levels of Co2. The sensor sensing resistance is measured between 30KΏ to 200 KΏ. This signal is normalized to 10 to 300 PPM using ARM 8 micro controller.

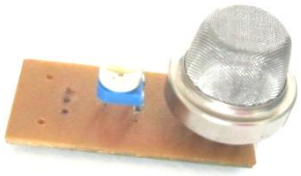

Fig. 3.3 CO2 Sensor

D. Micro Controller

ARM 8 Micro (LPC 2148) controllers is used for improving the processing speed, to acquire the input signal and to process the logged data using the developed algorithm. The processed data is outputted for serial data transmission. The processed data is concerted into serially using the line driver MAX 232. This data is transmitted serially using IEEE 802.4.14 wireless communication device. This device is interfaced to ARM 8 through MAX 232 line driver. The acquisition mechanism is simulated using Proteus software.

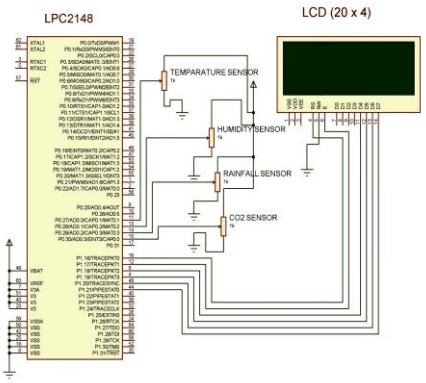

Fig. 3.4 Hardware simulation using Proteus software

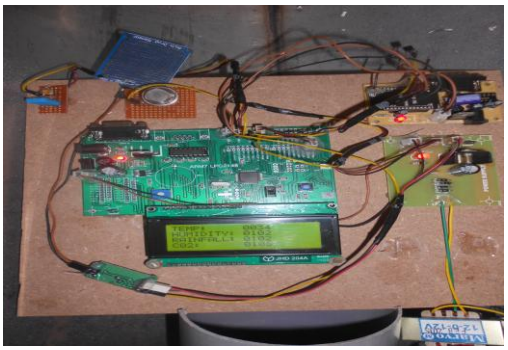

Fig. 3.5 Hardware circuit of weather data acquisition

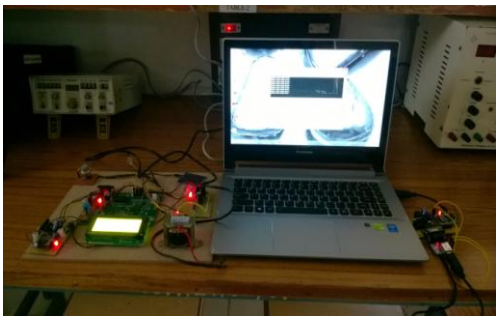

Fig. 3.6 Experimental setup of weather data acquisition

E. Communication

Low power short range communication is established between the processing unit (micro controller) and the data presentation unit (web server) using IEEE 802.15.4. For transmitting the acquired temperature, humidity, Co2 information, offset Quadrature phase shift keyed modulation stream (OQPSK) is used at 2.4 G Hz frequency. Fig 3.3 represents the receiver section interfaced to the personal computer using USB port.

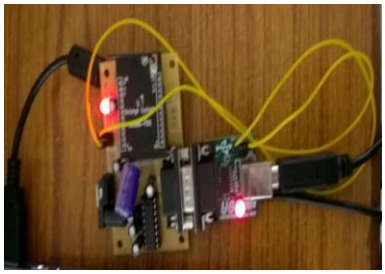

Fig. 3.7 Wireless receiver communicating with Personal Computer.

IV. SOFT WARE IMPLEMENTATION

The Signals transmitted from the ARM 8 received serially to personal computer using IEEE 802.4.15 receiver. The received signals are interfaced to the Personal computer for graphical analysis using Python programming language.
Internet of things application is used to retrieve the data using HTTP protocol through local area network. Thing speak is providing the facility of data logging from field instrumentation. The logged data is plotted (graphical representation) using the python software. This process is linked to the internet server with a separate I.P Address (192.168.1.49). The authorized person can access the process station at any location to observe the weather at Sai Spurthi Institute of Technology campus. Flash magic software is used to represent the actual data of the weather. The hyper terminal is used to receive the data to and from computer to the receiving circuit. Hyper terminal works for the device connected via serial port. The hyper terminal is configured at 9600 baud rate.

V. ALGORITHAM-1

Step1: initialize the ports
Step2: Initialize the serial port
Step 3: call the algorithm 2
Step 4: enable the hyper link
Step5: Display the received data
Step5: Plot the data using python
Step 6: link the data to the web server
Step 7: Reset the process
Step 8: Go to step 3

VI. ALGORITHAM-2

Step1: initialize the ports
Step2: Initialize the sensor assembly
Step3: Initialize the sampling time
Step4: Initialize the iteration count with '4'
Step5: Read the data from temperature sensor and decrement the count by one
Step6: if
The count is not 'ZERO'
Then repeat step5
Else
Average the data
Display the averaged data and transmit it
Step7: Read the data from humidity sensor
Step 8: Repeat step 6
Step 13: Read the data from Co2 sensor
Step14: repeat step 6
Step 15: Read the data from Rain fall Sensor
Step 16: Repeat step 6
Step 17: Go to step 5

VII. RESULT AND ANALYSIS

The experiments were conducted to acquire the data from various sensor Assembly and transmit for web application was successfully executed with the proposed methodology. The extracted information is averaged to obtain the precise values at the output stage of the controller. The communication between the controller and the personal computer has been established using IEEE 802.15.4. The received signals at the personal computer are plotted for graphical representation using python language. A separate I.P. Address provided for login the web page. This developed work is linked to the campus website www.Saispurthi.ac.in/ weather.

Fig. 7.1 Graphical representation of weather information in campus website.

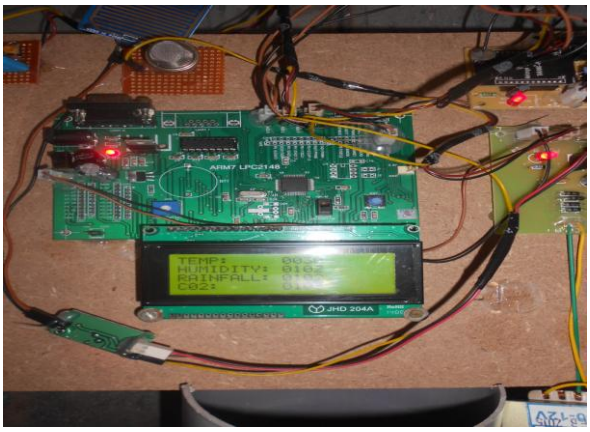

Fig. 7.2 Weather display at the control and transmitter unit

Fig. 7.3 Weather module mounted in a model rocket

This work was developed to monitor the state of the weather condition at sai spurthi campus only. The visitors can have the weather information at sai spurthi before them arriving to the campus. The dry state and wet state of the campus can be monitored by considering the rain fall graph. The state of the temperature and CO2 levels alarm the campus management to improve the greenhouse concept by planting the trees.

ACKNOWLEDGMENT

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