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Weather Data Acquisition System

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Abstract— The aim of our project is to design & develop a Weather Data Acquisition System. In these project we are measuring the various weather parameter like temperature, humidity, pressure and along with these we are displaying the concentration of CO gas. By using micro controller ATMEGA 16. We are going to display data on LCD and save data so that we can access the previous record. These weather monitoring will provide a temperature and other parameter of very short region, so we are able to get the actual weather parameter present in that region. Wireless acquisition of the data can be obtained using module CC2500. Module CC2500 is use to transmit and receive data wireless. The data can be received on USB port of PC and parameter can be displayed on monitor.

Keywords— Data Acquisition, RF module, ATMEGA16

I. INTRODUCTION

With the rapid development in the field of embedded technology there is also an increasing thrust for a data acquisition system which is fast in processing speed, small in size, low in cost and monitors the data in real time The use of a microcontroller as a processor has become popular because of its speed, energy efficiency, low cost and low weight which leads to the broad use of it in Data Acquisition System. Data Acquisition System is a system which is used for acquisition of signals of physical parameters continuously for a certain period of time and keeps a record of those acquired values for future use. In weather data acquisition system the parameters like temperature, humidity, pressure are measured by respective sensors. The parameters are in physical in nature so it has to be converted into digital data. For analysis, display and recording, the processor is further connected with computer or Laptops. The complexity of a system tends to increase with the increase in the number of physical properties to be measured, resolution of ADC and accuracy and speed of the measurement required. ATMEGA 16 microcontroller is ideal for low power application.

II. DATA ACQUISITION

Data acquisition is the process of sampling signals that measure real world physical conditions and converting the resulting samples into digital numeric values that can be manipulated by a computer. Data acquisition systems (abbreviated with the acronym DAS or DAQ) typically convert analog waveforms into digital values for processing. The components of data acquisition systems include:

A. Sensors that convert physical parameters to electrical signals
B. Signal conditioning circuitry to convert sensor signals into a form that can be converted to digital values.
C. Analog-to-digital converters, which convert conditioned sensor signals to digital values.

Data acquisition applications are controlled by software programs developed using various general purpose programming languages such as LabVIEW, BASIC, C, FORTRAN, Java, Lisp, Pascal. Stand-alone data acquisition systems are often called data loggers.

III. WORKING

The design of system is shown in block dig.1. At first the parameter which has to be measured is interface by respective module or sensor to microcontroller. The DHT 11 sensor is use to measure the temperature and humidity. MPX4115 is use to measure the pressure present in environment. Then all these data will be displayed on LCD which is interfaced with controller. To access data by RF module the RF module TX pin is connected to RX pin of microcontroller and vice versa. The module CC2500 can be used for RF transmission of data. The output can be seen on laptop or pc by coding in visual basic and obtained an acquisition of parameter on it. The baud rate is set to 9600 bytes for proper transmission and display of data. The same module can be interfaced to another microcontroller kit to see the output. For multichannel data acquisition, number of receiver and respective interface will increase. The cost and complexity is directly proportional to the number of receiver and the parameter which has to be measured. Number of receiver can be implemented to see the output. Following figure shows the simplified block diagram of data acquisition.

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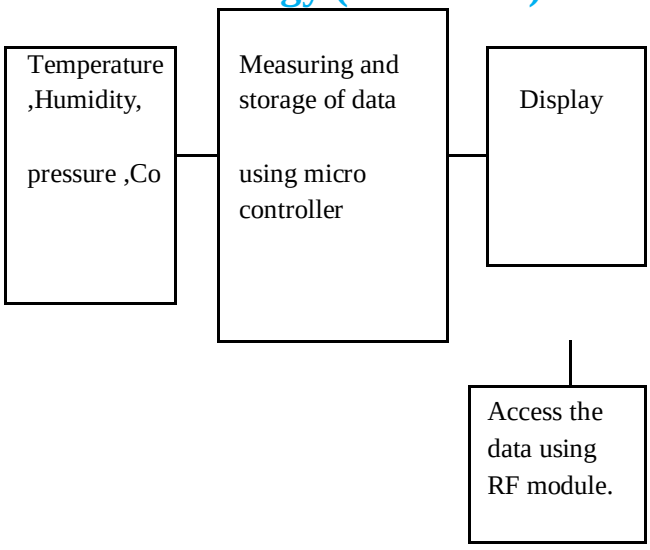

Fig 1- Block diagram of Data Acquisition system

IV. HARDWARE

DHT 11- It is a 3 pin sensor which is used to measure the temperature and humidity present in air. It is widely used sensor because of its accuracy to measure data accurately for data acquisition. The no.2 pin is use for interfacing with micro controller. Others are VCC and GND respectively. The temperature can be converted into kelvin.
MPX4115- This is an pressure sensor used to measure the atmospheric pressure. It provides the data accurately. The ADC is required to convert analog data into digital as parameters are analog in nature.
CC2500 MODULE- These is a wireless RF module used for transmits and receives data wirelessly. The baud rate is set be 9600 bytes at both end and front side for proper transmission of data. The range of module is depend on the frequency on which it is operating. Average range is up to 60m.
MQ-7 SENSOR- This sensor measures the amount of carbon monoxide present in air. It is measured in ppm. (parts per million)

V. RESULT

Data measured by sensors, which is analog in nature, will first convert into the digital form for proper measurement. The output can be seen on the PC or laptop using the software design in Visual basic. The output can also be seen on the other micro controller having LCD display with cc2500 module interfaced to receive data. The parameter can be saved on PC as a data logger. The complexity and cost depend on the number of parameters have to be measured and the number of receiver.

VI. CONCLUSION

This system can be used in the areas like inertial navigation, vibration monitoring, appliance control, and robotics application where measurement, monitoring, and storing are necessary. The designed system is low cost, compact system with 12 bit resolution having accuracy of 1.22mV and is also compatible to PC and laptops. It can also be interfaced to the commonly available USB port of the PC or laptop. The ADC has 13 channels hence the input of the system can be extended for data acquisition 13 different signals simultaneously. With slight modification of the software the system can also be made useful for controlling purpose using the unused digital input output pins. The data acquisition can be obtained by saving data on android platform using blue-tooth module.

VII. FUTURE SCOPE AND APPLICATION

A. System can be used in area like inertial navigation, appliances control, and robotics application where measuring, monitoring

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and storing is essential.

B. It can also be interfaced to commonly available USB port of PC or Laptop.

C. By use of GPRS weather data viewing and managing from any place can be possible

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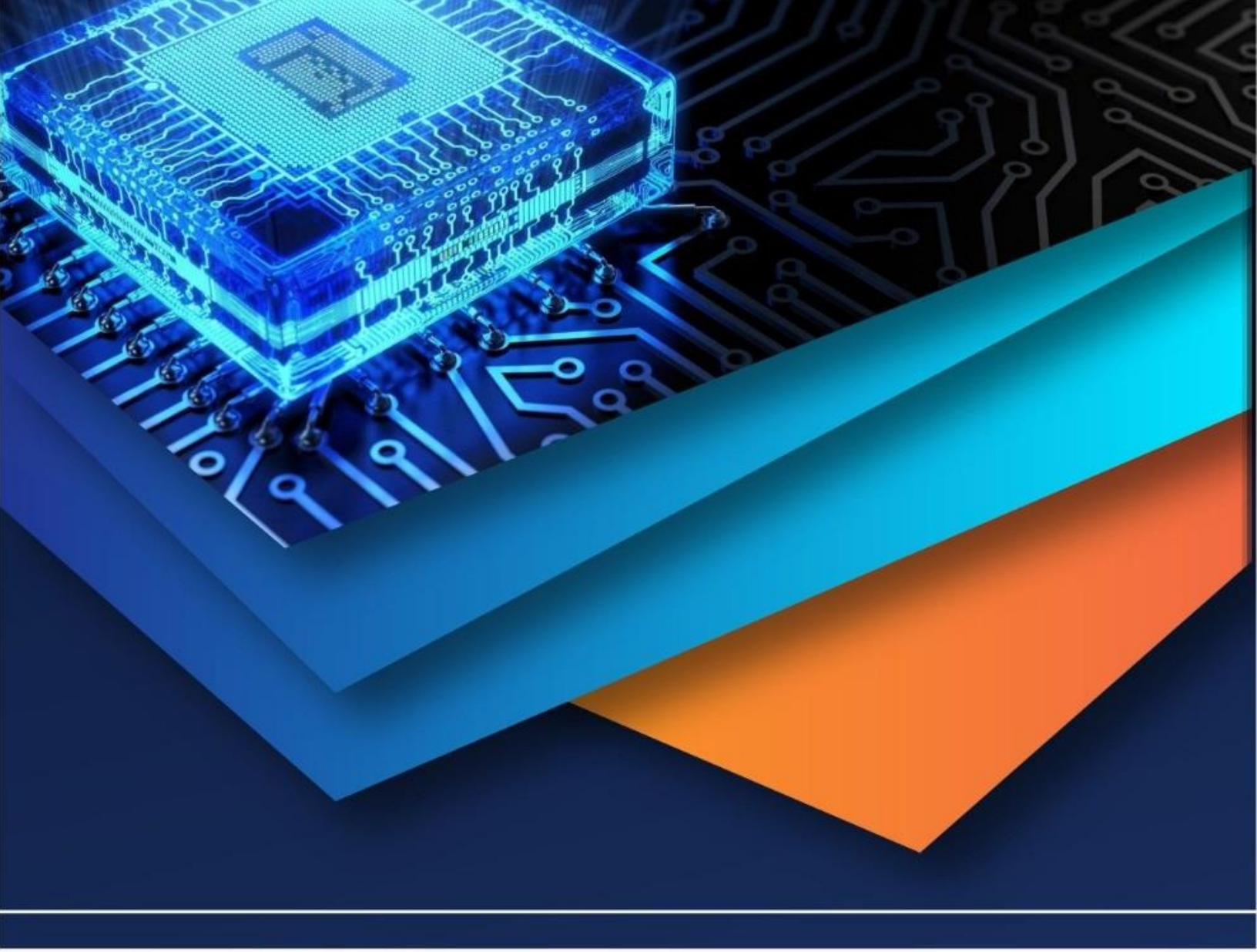

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