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Zigbee felicitated Wireless Data Acquisition and Measurement System

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Abstract-In recent days the industrial automization is very important tasks as far as the manpower in industry is concern. This is industrial automization, data acquisition and measurement system used to measure all the test point of HT capacitor measured by operator in the manufacturing industry. The same data is to be stored and send through wireless protocol to control room so as to get confirmation of correct process. This is sponsored by Sharada Electronics Pvt Ltd, MIDC Miraj.

Index Terms- Capacitor, Microfarad rating, temperature, LCD, Impregnation Plant, Microcontroller.

1. INTRODUCTION

The main aim behind this project is to monitor different data point of the capacitor as microfarad rating and different temperature. There are two different temperatures of the impregnation process and analog equipment is available for the measurement of microfarad rating of capacitor[1]. Collect all the test points and sent to the control room to ansure the correct process and accurate reading of the capacitor. ZigBee based wireless technology is being used for this measurement automation system. This is sponsored by Sharada Electronics Pvt Ltd, MIDC Miraj.

2. IMPREGNATION PROCESS AND TEMPERATURE

The process of eliminating the water from the elements by pressurizes or vacuum in order to soak the element with the electrolyte is called Impregnation . The elements fully filled with electrolyte is then centrifuged to remove excess electrolyte[4].
There are two temperatures of the impregnation process namely tank and oil temperature. These temperature processes are to be monitored and report to the control room. Temperature data from sensor are interfaced to microcontroller through ADC. Microcontroller processes the analog data and display the temperatures to LCD and same are send through the ZigBee based wireless modem.

3. MICROFARAD RATING

A capacitance meter is a piece of electronic test equipment used to measure capacitance, mainly of discrete capacitors. Depending on the sophistication of the meter, it may display the capacitance only, or it may also measure a number of other parameters such as leakage, equivalent series resistance (ESR), and inductance. For most purposes and in most cases the capacitor must be disconnected from circuit; ESR can usually be measured in circuit.

There are different types of capacitor manufactured in different industries All these capacitor are HT capacitor and it is mainly used for the improvement of power factor (PF).

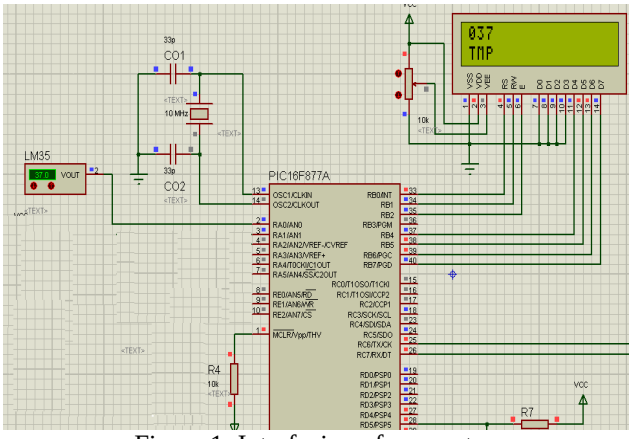

Figure 1: Interfacing of sensor to Microcontroller

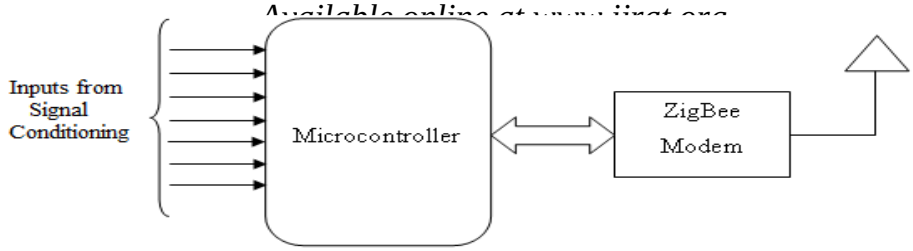

Figure : Xbee Transmitter

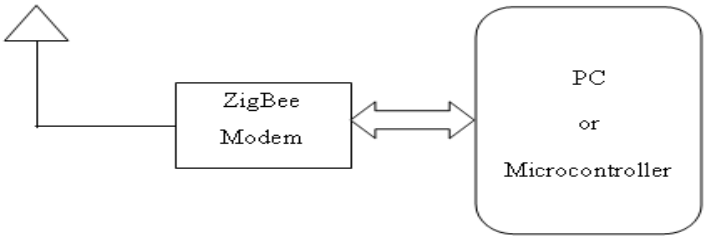

Figure : Xbee Receiver

Figure 2 : Basic block diagram

4. MICROCONTROLLER

PIC microcontroller is used to interface all the analog data to the respective ADC port. The simulation and arrangement of same are shown in figure1.
There are following advantages of the microcontroller.

- High performance RISC CPU
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two cycle
- Operating speed: DC - 20 MHz clock input DC - 200 ns instruction cycle

Up to 8K x 14 words of FLASH Program Memory,
Up to 368 x 8 bytes of Data Memory (RAM)
Up to 256 x 8 bytes of EEPROM Data Memory

- Pinout compatible to the PIC16C73B/74B/76/77

5. ZIGBEE MODULE

The ZigBee (IEEE 802.15.4) is a new technology that permits the implementation of Wireless Personal Area Networks (WPAN). It is very suitable for wireless sensor networks due to the very low power consumption. This was one of the reasons why it was choose for the implementation of the system presented in this paper. Summarizing, the main advantages of ZigBee in comparison with other technologies such Bluetooth or WiFi are the following:
- flexible network architecture;
- low cost;
- low power consumption;
- large number of nodes (≤ 65.536);
- compatibility of equipments from divers producers;

The ZigBee devices operate in unlicensed radio frequency bands (ISM). These unlicensed bands are not the same in all regions of the world, those theZigBee devices can operate in three frequency bands centered on 868, 915 and 2400MHz.

Frequency Band [MHz]	Data rate[kb/s]	Channel numbers	Geographical area
868,3	20	1	Europe
902-928	40	1-10	America, Australia
2405-2480	250	11-26	Worldwide

Table 1 : Frequency Band Regions

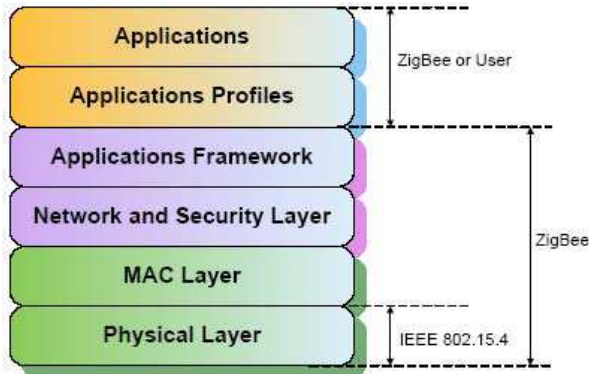

Figure 3 : The ZigBee stack reference model.

6. METHODOLOGY

The main objective of this project is use of monitoring different parameters in manufacturing industry so as to reduce need fo**r human sensory and mental requirements as well.** The basic system has been developed and generally used to monitoring mechanical devices to automate simple manufacturing tasks. However the concept only became truly practical with the addition (and evolution) of the digital computer, whose flexibility allowed it to drive almost any sort of task. Basic Schematic diagram of the proposed work is shown in **figure 2**.

Measurement Automation System, designed and installed with an industry to find out correct process is going on or not. By considering the whole system it is commonly known as digital library.

This is a system or design formed for a particular task to know the current status of any device. Basically there are many more devices are available with this existing system. If one wants to find out the status generated by this particular device in a real time so that it is possible to measure real time parameter associated with this device then it is possible with the help of this system.

Other part of the systems are microcontroller, LCD module, Power supply, Xbee transmitter and receiver module. The general block description for his proposed work is as follows.

The above parameters namely Temperature of the impregnation process, microfarad rating. As per the discussion with Industry, all the parameters under this system are monitored and controlled which is displayed in the control room to find out the correct process is carried out by operator or to detect the faults in measurement readings taken manually by the operator.

The microcontroller reads all the parameter generated by respective analog equipment. For the communication to the other end Xbee transreceiver module interfaced to the controller and another Xbee transreceiver module interfaced to the other end. Microcontroller stores these values and sent all those to control room through Xbee. All the parameter are received and saved to personal computer so that one can check these parameter as per standards. In this way, faults in the actual parameter can be observed manually.

7. CONCLUSION

The main role of this system is to facilitate the Power capacitor research and development, through the automation of the related measurement tasks, and to provide a powerful database system background for data retrieval and research decision support. The paper introduces only a few applications of the entire system. Different Power capacitor measurements were automated. All the measurements have been implemented in a similar manner. During the process the user initializes the measurement, sets the measurement environmental parameters, and launches the execution. Finally all the data readings is to be stored in the database to get variations and faults in the actual reading.

Acknowledgments

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