Xbee Wireless Sensor Network for Automation in Lab

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Abstract: The proposed work investigates the different wavelets at feature level for Palm print based recognition using an indigenously developed peg-free image acquisition platform. The results depict the superiority of different wavelets for the Palm print recognition, using coarse level information. The recognition rate for the proposed model is 97.5% and the value of FRR and FAR is 0.05 and 0.05 respectively. Use other transformer for processing to improve the performance of matching algorithm. Also use best method to perform recognition process.

IndexTerms— Xbee, lab automation

Introduction By default, XBee 802.15.4 Module modules are configured to operate in a point-to-point network topology and therefore are not dependent upon master/slave relationships. This means that devices remain synchronized without the use of master/server configurations. Our point-to-point architecture enables fast synchronization and quick start times. This default configuration accommodates a wide range of data or reading applications.

I. INTRODUCTION

Selective collection of different sensors, controllers, repeaters and actuators is merely considered as an Industrial Automation Environment. They altogether work to implement, monitor and control a discrete or continuous process [8]. As per application usually industrial automation networks consist of PLCs “programmable logic controllers” which communicates with remote sensors in order to gather data of so many variables such as pressure, temperature, voltage, current, vibration, sound, and strain. PLCs act gratefully on the data that is collected under control function and processes it among the actuators such actuators as relays, motors, solenoids, and valves. Monitoring programs are enabled by sensor inputs and controller outputs.

Provision of alarms is done for indication purpose, whether the preset value exceeding or else. Security and privacy are important in the industrial automation. Reliability is an important factor where some measurable difference in implementation is required. Moreover, industrial wired networks are expected to deliver power to each node, and also to carry the network signals through it. In many process industries, it is also expected to be safe, meaning that a cable break will not cause flammable gases to catch fire. Wireless networks definitely have the advantage of not using wire and are inherently safe [9].

In this paper, a method of collecting data is introduced from the remote sensor nodes. It enhances the response and feedback of readings at the machine for reducing the continuous monitoring the sensor nodes. Here, the sensor nodes are made intelligent by using the node controller to reduce the number of query responses. This reduces the Zigbee power consumption to a great extent. It reduces the delay in case of relays and actuators, after execution of the programs in PLCs.

II. TECHNOLOGY

A. Zigbee

The IEEE 802.15.4 standard is intended to address applications where existing wireless solutions are too expensive and the performance of a technology such as Bluetooth is not required. While other wireless network standards aim to achieve long distance, large throughput, and high quality of service (QoS) level; the 802.15.4 standard is designed to provide simple wireless communications with short-range distances, limited power, relaxed data throughput, low production cost, and small size. These are exactly the properties of the industrial plant energy evaluation and planning system. In addition, Zigbee can be implemented in mesh networks larger than is possible with Bluetooth.

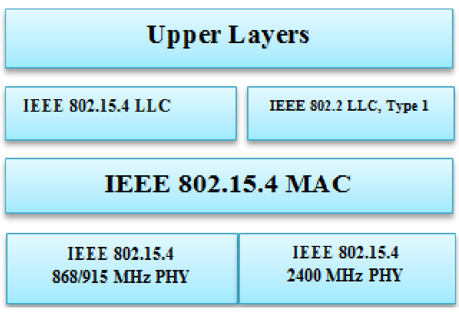

Figure 1. ZigBee Architecture

As shown in the Figure.1, the physical and data link layers for ZigBee are defined by the approved IEEE 802.15.4 standard. Two of the primary goals for 802.15.4 are low cost and low power, which leads to low complexity and simplicity.

B. Circuit Diagram

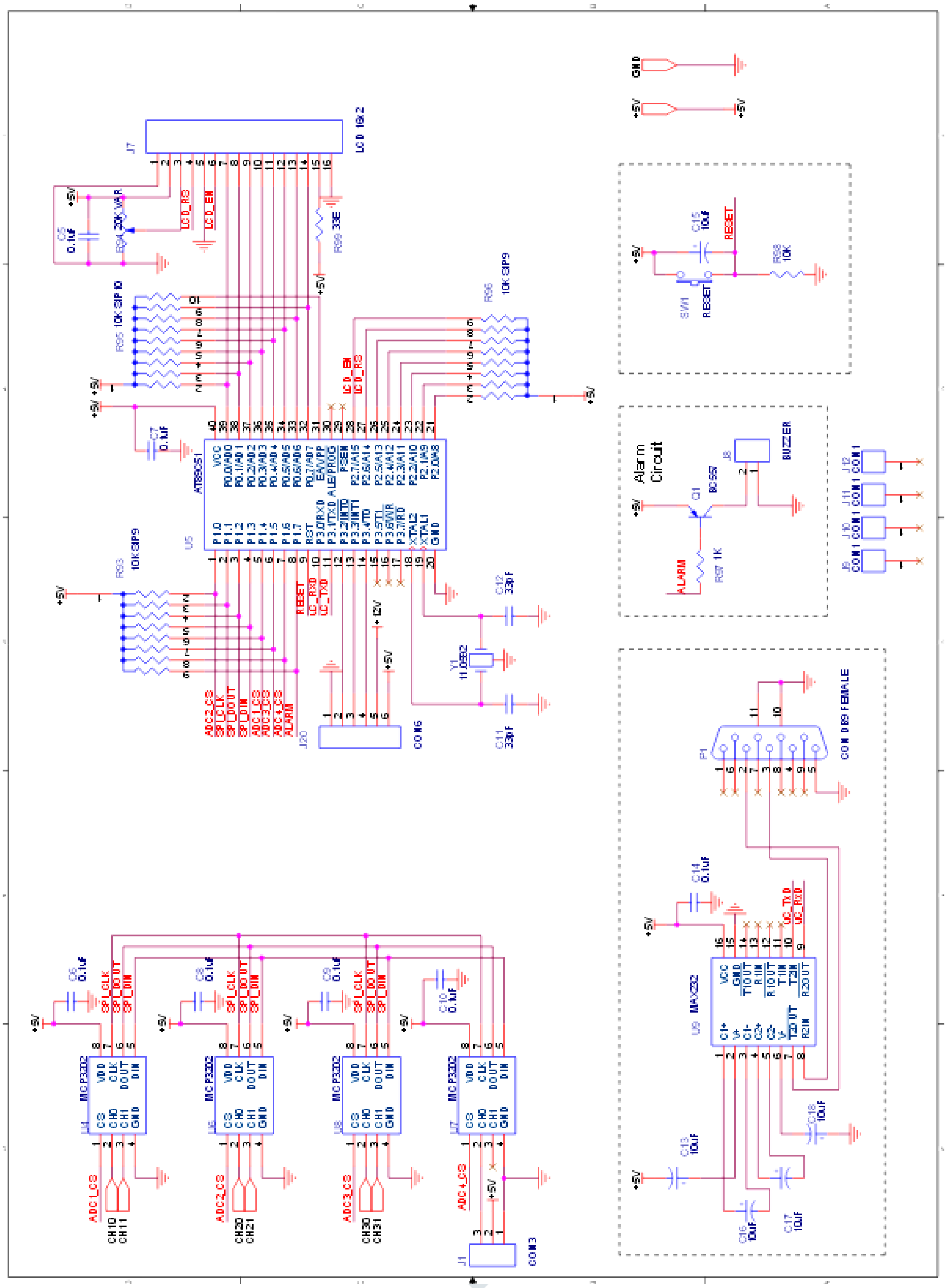

Fig.2 Circuit Diagram

C. Main Program for Display

```
#include<reg51.h>
#include "Proto.h"
#include "PortConfig.h"
#include "datamem.h"

extern code const unsigned char Temp1[];

void main()
{
        InitLCD();
        DisplayTitle();
//      InitTimer0();
        InitSerial();
        init_cs5532 ();
        Delay_us(200);

        while(1)
```

```
        {
                CS1 = 0;
                Voltage1 = ReadADC(0);
                CS1 = 1;
                Delay_ms(150);

                Phase1();
                SendLCDCommand(0x01);
                Delay_ms(5);
                Phase2();
                SendLCDCommand(0x01);
                Delay_ms(5);
                Phase3();
                SendLCDCommand(0x01);
                Delay_ms(5);
                check_Temp();

                Pressure = ReadWtSamples(1);
                Pressure = Pressure/3 ;

//              Send_Serial(Pressure);
                IntToAscii(Pressure);

                Printline(0xC0, "Pressure:" ,9 );
                SendLCDCommand(0xCA);
                Delay_us(200);
//              SendLCDData(AsciiBuff[4]);
                SendLCDData(AsciiBuff[3]);
                SendLCDData('.');
                SendLCDData(AsciiBuff[2]);
//              SendLCDData(AsciiBuff[1]);
//              SendLCDData(AsciiBuff[0]);

                SendSerialByte('P');
                SendSerialByte(':');
                SendSerialByte(AsciiBuff[3]);
                SendSerialByte('.');
                SendSerialByte(AsciiBuff[2]);
//              SendSerialByte(AsciiBuff[1]);
//              SendSerialByte(AsciiBuff[0]);
                SendSerialByte(0x0d);
                SendSerialByte(0x0A);

                Delay_ms(2000);
                SendLCDCommand(0x01);
                Delay_ms(5);

        }
}

void check_Temp()
{
//      buzzer(1);
        Printline(0x80, "Temp:" ,5 );
        CS4 =0;
        Temp = ReadADC(0);
        CS4 =1;
        Temp = (Temp /8.192);
        Display_Temp(0x8A,Temp);

//      Delay_ms(2000);
        if(Temp > 39 /*& i==0*/ )
        {
//              i=1;
                buzzer(3);
        }
}

void IntToAscii(unsigned int hval)
```

```
{
        register unsigned int tmp1;

        tmp1 = hval / 10000;
        tmp1 = tmp1 | 0x30;
        hval = hval % 10000;
        AsciiBuff[4] = tmp1;

        tmp1 = hval / 1000;
        tmp1 = tmp1 | 0x30;
        hval = hval % 1000;
        AsciiBuff[3] = tmp1;

        tmp1 = hval / 100;
        tmp1 = tmp1 | 0x30;
        hval = hval % 100;
        AsciiBuff[2] = tmp1;

        tmp1 = hval / 10;
        tmp1 = tmp1 | 0x30;
        hval = hval % 10;
        AsciiBuff[1] = tmp1;

        tmp1 = hval;
        tmp1 = tmp1 | 0x30;
        AsciiBuff[0] = tmp1;

}

void buzzer(unsigned char Beeps)
{
        for(Beeps; Beeps>0; Beeps--)
        {
                Buzzer = 0;
                Delay_ms(40);
                Buzzer = 1;
                Delay_ms(40);
        }
}
```

III. ZIGBEE WIRELESS SENSOR NETWORK SYSTEM ARCHITECTURE

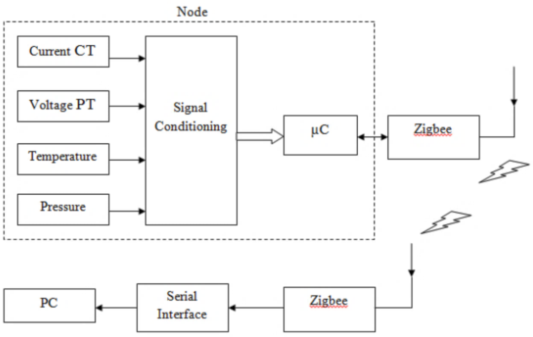

Fig. 03. Architecture

The architecture of the Zigbee Wireless Sensor Network is shown in the Figure 3. It is connected to the user network through the wires. This coordinator module is responsible for collecting the data from the sensor nodes and for real time monitoring. The Zigbee modules communicate with the coordinator on the server side through the RS232 cable and with the node controller on the client side. The Zigbee module plays a key role in collecting the real time data from the sensor nodes and sending and receiving the data, viz. pressure sensor, temperature sensor, current CT and voltage PT. The Node controller at the sensor node collects the data from different sensors are sends the data to the trans-receiver coordinator on screen. It continuously monitors the values of the sensors with the predefined threshold values and keeps them in track in case of any deviation from the predefined values. It performs the different controlling operations when those values exceeds like it will turns off the relay connection, alarms the buzzer etc. It will display the typical values of the sensor readings on the LCD.

IV. RESULTS

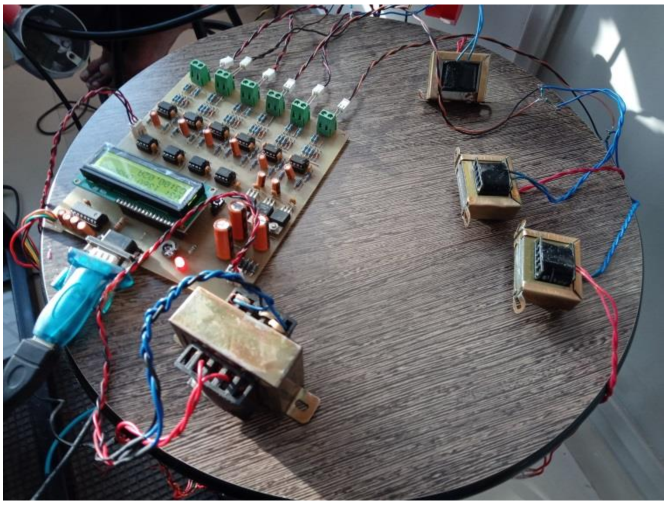

Fig. 3. The complete Zigbee Wireless Sensor Network System

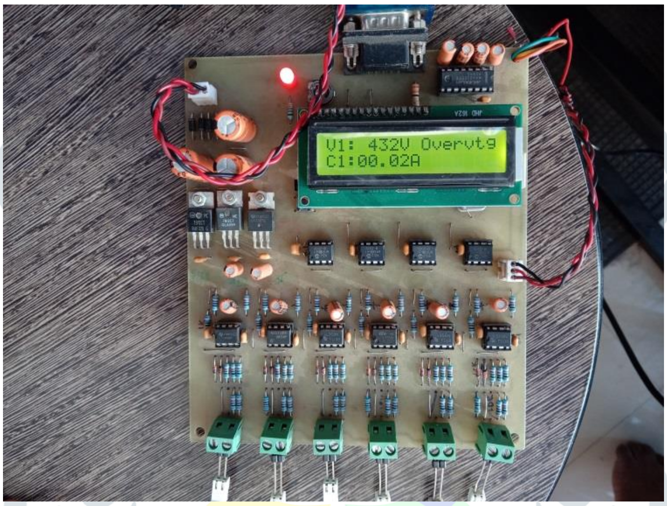

Fig. 4. Display indication Voltage and Current, Value 1

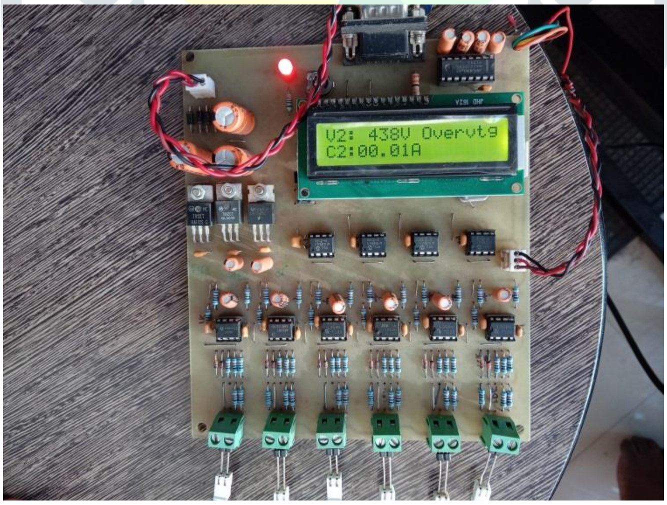

Fig. 5. Display indication Voltage and Current, Value 1

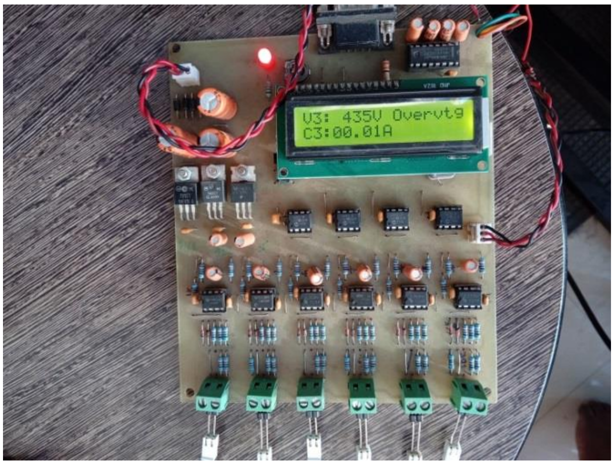

Fig. 6. Display indication Voltage and Current, Value 1

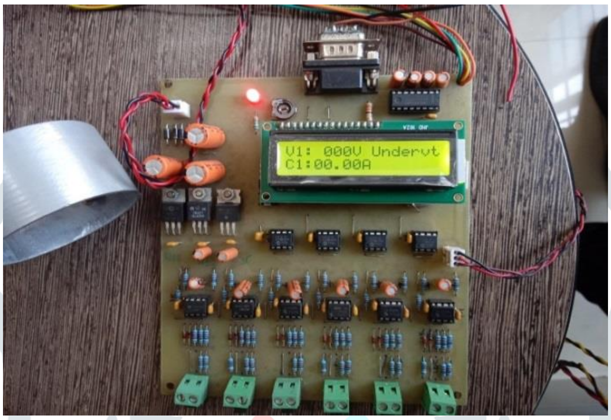

Fig. 7. Display indication Voltage and Current, Under-voltage Value 1

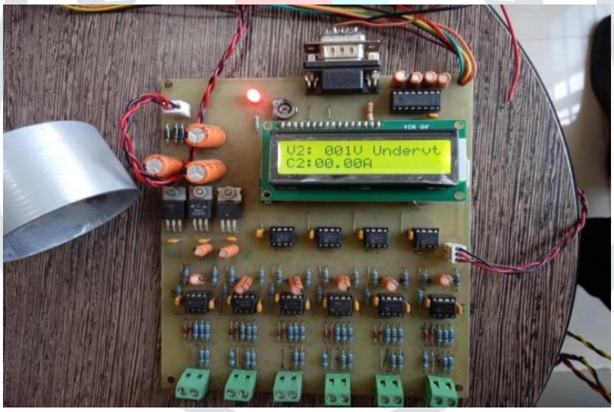

Fig. 8. Display indication Voltage and Current, Under-voltage Value 2

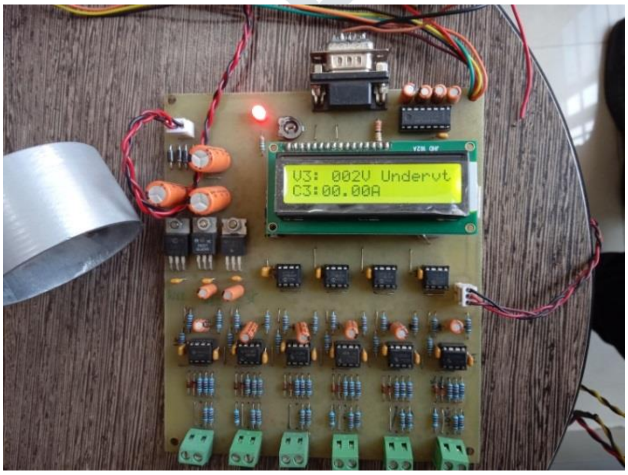

Fig. 9. Display indication Voltage and Current, Under-voltage Value 3

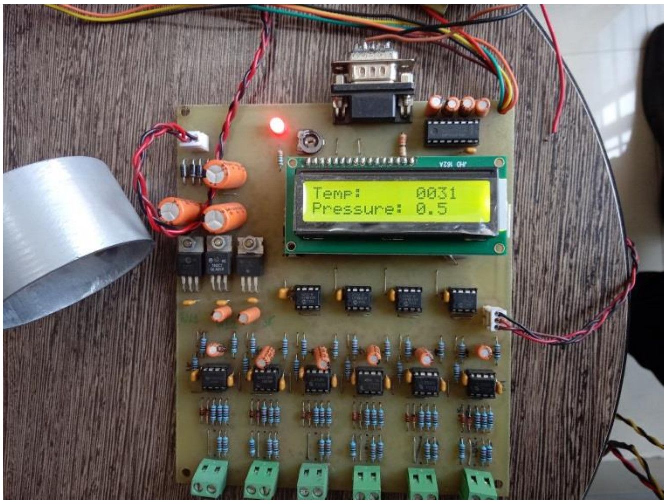

Fig. 10. Display indication Temperature and Pressure

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