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Industrial Parameter Monitoring Through Zigbee

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Abstract:- In industries, one of the major functions for operators is to operate and control the process parameters .These process parameters may be temperature, level etc. These parameters are not only important for controlling of the process but are closely related to the safety of the plant as well as the operators, infrastructure and surrounding areas. In process industries, it is very important to achieve real time data of the process as delay in actions during critical situations can lead to catastrophic events. Nowadays industries consist of large number of sensors and controllers and it is not possible and feasible to connect everything by the means of wired communication. Hence the need of wireless communication between devices is necessary and this can be achieved by the IEEE std. 802.15.4.

Keywords:- *ATmega16, LM35, zigbee, GUI.*

I. INTRODUCTION

The system proposed in this paper is a solution for monitoring industrial parameters like level, temperature in process plants directly from the control room. It is necessary to obtain real time data from the plant at any time to ensure the process is operating at desired levels and parameters are not exceeding beyond the safe limits designed for the process. Industries have to adapt to todays technological advancements and one of the prime of the 21 st century is wireless communication. By using Wireless Sensor Networks, the real time data can be sent from the plant to the control room. The need of wireless
communication in today's industries is absolutely paramount as there are hundreds of components that are present in process plants and wiring each component can become tedious and is not cost effective. These wireless connections can be made by implementing IEEE 802.15.4 standard. The need of real time data is a vital piece of information for the operator to ensure that the plant is operating safely and within the desired values that have been set to obtain output from it. This real time data can be sent from the field to the control room using wireless communication .This wireless communication can be achieved by using zigbee. A zigbee module when compared to traditional wireless networks such as Bluetooth, Wi-Fi etc. can handle more devices through a single node as compared to the others. The power consumption is less than the traditional wireless network modules and costs less than them.

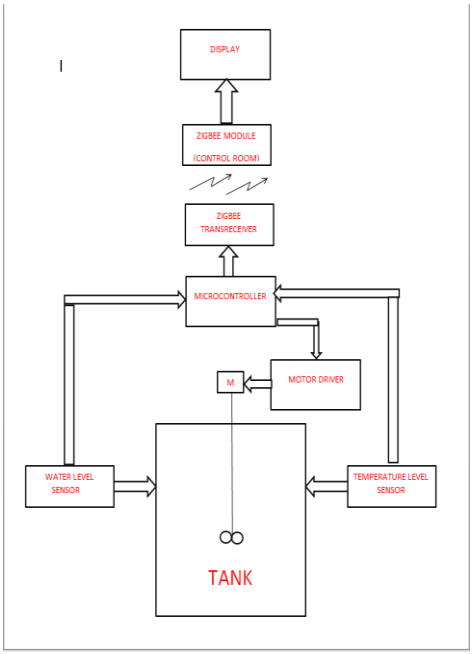

Fig 1:- Block Diagram

II. NRF24L01

The nRf24L01 zigbee module is a high radio frequency trans-receiver module. It operates on 2.4GHz frequency band and has an on air data rate of 1MBPS to 2MBPS. The module requires 3.6 to 5.25V for operation. The module can be operated up-to a distance of 100 metres and has an ultra-low power operation. It operates as per specifications of IEEE standard 802.15.4 of low power wireless transmissions. Zigbee is a wireless ad hoc network which is a

decentralized type of wireless network. The network is ad hoc because it is not reliable on pre-existing infrastructures like routers in wired networks or access points in wireless networks. The biggest advantage for using zigbee over WI-FI or Bluetooth is that each module can handle more nodes connected to it than the others as well as it utilizes the least current of the others which is usually 30mA.

III. ATMEGA16

ATmega16 is an 8 bit microcontroller which is based on Reduced Instructions Set Computing (RISC) architecture. It is a 40 pin integrated circuit and has 32 I/O's which are divided into four ports namely PA, PB, PC AND PD. The microcontroller has a 16KB programmable flash memory and has a static memory of 1KB and an EEPROM of 512 Bytes. The microcontroller operates on 5V DC supply. It has three timers TIMER0, TIMER1 and TIMER2. Both TIMER0 and TIMER2 are 8-bit timers whereas TIMER1 is a 16 bit timer. The microcontroller has built in peripherals like USART (Universal Synchronous/Asynchronous Receiver/Transmitter), ADC (Analog-to- digital Converter), SPI (Serial Peripheral Interface), comparators etc.

IV. TEMPERATURE SENSOR LM35

Temperature is the measure of hot or cold. LM35 is a temperature sensor which provides output voltage proportional to the input temperature in ℃. The range of the temperature sensor is from -55℃ to 150℃. It is an integrated circuit device that has three pins namely input, output and ground. It uses an input voltage in the range of 4-30V. External calibration or trimming is not required as it provides typical accuracies of ±¼°C at room temperature and ±¾° cover a full -55℃ to 150℃ temperature range. The device is a low self-heating device and in still air will heat up-to 0.008℃

V. LEVEL SENSOR

The level sensor used is based on the operation of a pnp transistor. A wire is placed in the tank which acts as the ground for the transistor. When the wire comes in contact with the fluid inside the tank, the wire enables current to be flown through the transistors emitter and collector terminals, thus turning on the transistor and further providing a signal to the microcontroller to indicate the level in the tank.

VI. GRAPHICAL USER INTERFACE (GUI)

The real time data from the process plant that is sent to the control room by the zigbee is displayed on a computer screen, providing the values from the process. These values provide all the necessary information to the operator and can take decisions as per the given data. A zigbee receiver module is connected to the display device in the control room while the other is present in the process plant and wireless communication takes place.

VII. CONCLUSION

Wireless communication has become the norm of today's world and for industries to become smart and efficient, wireless technology plays a crucial role in it. It makes the whole process lot faster, safer and efficient and provides a degree of freedom and flexibility to do more. Zigbee provides the ease of and standards for gaining control of it and most importantly from an economical point of view it is a lot cheaper and hence profitable for the industry to use it.

REFERENCES

ISSN 2278 – 0211 (Online) Texas Instruments LM35 Handbook (SNIS159H –AUGUST 1999–REVISED DECEMBER 2017) nRF24L01 Single Chip 2.4GHz Transceiver Product Specification.