Wireless Sensor Network for Industrial Application

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Abstract— Wireless telecommunications is the transfer of information between two or more points that are not physically connected. Distances can be short, such as a few meters for television remote control, or as far as thousands or even millions of kilometers for deep-space radio communications. It encompasses various types of fixed, mobile, and portable two-way radios, cellular telephones, personal digital assistants (PDAs) and wireless networks. Other examples of wireless technology include GPS units, garage door openers, wireless computer mice, headphones, radio receivers, satellite television, broadcast television and cordless telephones. Wireless operations permit services.

Key words: Wireless Telecommunications, PDAs, Radio Communications

I. INTRODUCTION

Automation is the use of control systems (such as numerical control, programmable logic control, and other industrial control systems), in concert with other applications of information technology (such as computer-aided technologies (CAD, CAM), to control industrial machinery and processes, reducing the need for human intervention. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the physical requirements of work, automation greatly reduces the need for human sensory and mental requirements as well. Processes and systems can also

Many roles for humans in industrial processes presently lie beyond the scope of automation. Human-level pattern recognition, language recognition, and language production ability are well beyond the capabilities of modern mechanical and computer systems. Tasks requiring subjective assessment or synthesis of complex sensory data, such as scents and sounds, as well as high-level tasks such as strategic planning, currently require human expertise. In many cases, the use of humans is more cost-effective than mechanical approaches even where automation of industrial tasks is possible.

Specialized hardened computers, referred to as programmable logic controllers (PLCs), are frequently used to synchronize the flow of inputs from (physical) sensors and events with the flow of outputs to actuators and events. This leads to precisely controlled actions that permit a tight control of almost any industrial process [3].

Human-machine interfaces (HMI) formerly known as man-machine interfaces, are usually employed to communicate with PLCs and other computers, such as entering and monitoring temperatures or pressures for further automated control or emergency response. Service personnel who monitor and control these interfaces are often referred to as stationary engineers. Currently, for manufacturing companies, the purpose of automation has shifted from increasing productivity and reducing costs, to broader issues, such as increasing quality and flexibility in the manufacturing process.

II. PROPOSED SYSTEM

The aim is to monitor and control the boiler temperature and product counting in sugar factory. Basically it provides wireless control for all system and Automaton. Many roles for humans in industrial processes presently lie beyond the scope of automation. Human-level pattern recognition, language recognition, and language production ability are well beyond the capabilities of modern mechanical and computer systems. Tasks requiring subjective assessment or synthesis of complex sensory data, such as scents and sounds, as well as high-level tasks such as strategic planning, currently require human expertise. In many cases, the use of humans is more cost-effective than mechanical approaches even where automation of industrial tasks is possible.

The proposed system is as follows—

A. Block Diagram of Receiver:

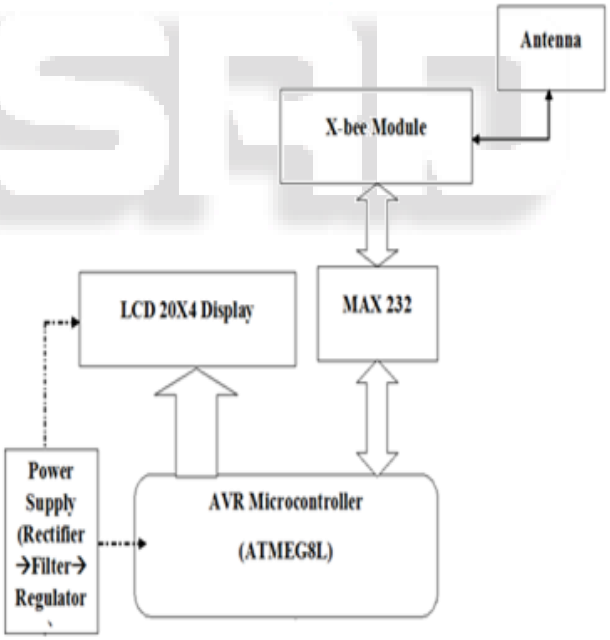

Fig. 1: Block Diagram of Receiver

B. Block Diagram of Transmitter:

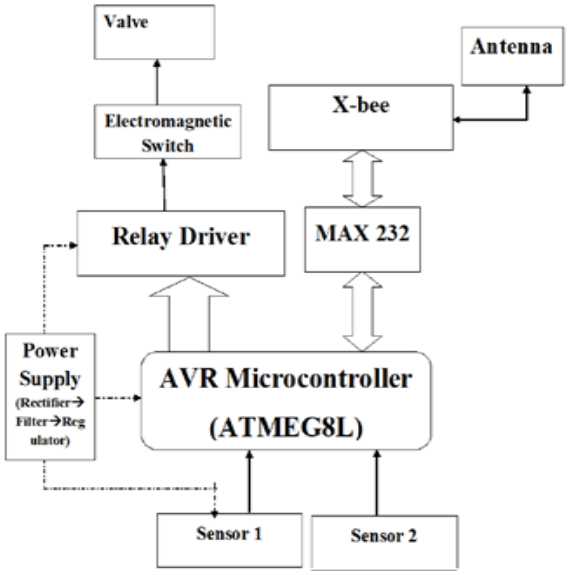

Fig. 2: Block Diagram Of Transmitter

III. WORKING

The main component of the proposed temperature Control of boiler and product counting scheme consist of an Xbee assembly

The main principle of the boiler temperature control and product counting in sugar factory by using Xbee is the concept of wireless automation.

In the implemented design the LM35 will be attached to the boiler of sugar factory and the solenoid valve to the water tank .and the object detector are placed on the conveyer belt . During normal condition when there are no temperature increases solenoid valve is closed and temperature will displayed on the LCD display.

Therefore when the instantaneous change in temperature this changed temperature sense LM35 and temperature goes on the certain level microcontroller sends signal to the solenoid valve then valve is open and water flow is on that time temperature will be decreased.

On the other hand product of the sugar factory sugar is (sugar sag) transfer on the conveyer belt. The object detector detect the sags and counting of the sag will be displayed on the LCD display

IV. COMPONENT

A. Microcontroller:

The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, two 16-bit timer/counters, a five-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next external interrupt or hardware reset.

B. Xbee:

Tarang modules are designed with low to medium transmit power and for high reliability wireless networks. The modules require minimal power and provide reliable delivery of data between devices. The interfaces provided with the module help to directly fit into many industrial applications. The modules operate within the ISM 2.4-2.4835 GHz frequency band with IEEE 802.15.4 baseband [10].

Fig. 3: Xbee

C. Solenoid Valve:

A solenoid valve is an electromechanical device used for controlling liquid or gas flow. The solenoid valve is controlled by electrical current, which is run through a coil. When the coil is energized, a magnetic field is created, causing a plunger inside the coil to move. Depending on the design of the valve, the plunger will either open or close the valve. When electrical current is removed from the coil, the valve will return to its de-energized state

Fig. 4: Solenoid Valve

D. LM35:

LM35 are precision integrated circuit temperature sensors .whose output voltage is linearly proportional to the Celsius temperature. The Lm35 thus has an advantage over linear temperature sensor calibrated in kelvin as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling.

E. IR Sensor:

LED IR s used as IR transmitter which is connected to output of 555 timer which generate 38 KHz frequency and TSOP1738 is used as IR receiver which is low when signal is present. (i.e. Active Low Sensor). So, the output of TSOP1738 is low when reflected signal is present (i.e. Obstacle is Present).Similar circuit of obstacle detector are as follow

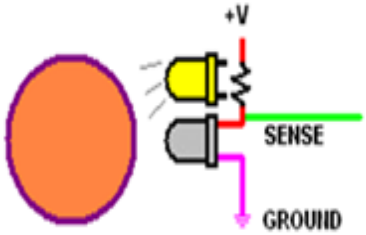

Fig. 5: IR Sensor

F. Relay Driver:

A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay but the relay can control something that draws much more power. Ex: A relay is used to control the air conditioner in your home. The AC unit probably runs off of 220VAC at around 30A. That's 6600 Watts! The coil that controls the relay may only need a few watts to pull the contacts together

V. Result and Conclusion

By using this system we are proposing a System to monitoring the industrial parameter like temperature pressure. In which Temperature is detected by temperature sensor LM35. The microcontroller receive the signal, send by IR obstacle detector TSOP1738. It sends activation signal to other external devices Attached with it. Such as Relay Driver IC (ULN 2003A), Xbee module. In response, many tasks have been performed such as valve open simultaneously message display on liquid crystal display screen, and it sends the signal to Relay driver IC (ULN 2003A) to drives the valve attached it, as a result valve is open when temperature exceeds above threshold level.

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