



Zigbee based Agricultural Monitoring and Controlling System

K.R.Sarode¹, Dr. P.P.Chaudhari²Assistant Professor¹, HOD²

Department of Computer Engineering

Government College of Engineering, Maharashtra, India¹Government Polytechnic, Jalgaon Maharashtra, India²**Abstract:**

In the agriculture field, real time monitoring of the temperature and humidity in the soil can correctly guide the agricultural production. Due to short rainfall it is very difficult for farmers to monitor and control the distribution of water in the farm as per the requirement of the crop. There is no proper irrigation method for all weather conditions, soil structure and variety of crops which will improve crop production. The proposed system is based on microcontroller for the control of various parameters of agriculture field. The proposed system uses zigbee technology for the long distance communication. This system is expected to help farmers in evaluating soil and weather conditions according to crops.

Keywords: Sensor, wireless sensor networks, Zigbee,

1. INTRODUCTION

The need for intelligent farming especially in developing countries like India has grown to a greater extent. Moreover, research in area of Zigbee based wireless sensor network in agriculture, such as monitoring of environmental conditions like weather, soil moisture content, temperature and monitoring growth of the crop, precision agriculture, automated irrigation facility has taken a new dimension. Nowadays, awareness about implementing technology for agricultural environment has been increased. Manual collection of data for desired factors can be sporadic, not continuous and produce variations from incorrect measurement taking. This can cause difficulty in controlling environmental important factors. Wireless distinct sensor nodes can reduce time and effort required for monitoring the environment. The logging of data allows for reduction of data being lost or misplaced. Also it would allow placement in critical locations without the need to put personnel in hazardous situations. Monitoring systems can ensure quicker response times to adverse factors and conditions. The utilization of proposed technology would allow for sensor node measurement of factors such as temperature, humidity, soil moisture, water level. The purpose of proposed system is to improve the irrigation system of Indian agriculture and also to provide adequate irrigation to particular area. Now-a- days every system is automated in order to face new challenges. In the present days automated systems have less manual operations, flexibility, reliability and accuracy. Due to this demand every field prefers automated control systems. Especially in the field of electronics automated systems are giving good.

2. HARDWARE/SOFTWARE REQUIREMENTS:

Hardware Specification:

- Aurdino : 8-bit microcontroller (AtMega328)
- Zigbee : Indoor range=40m Outdoor range=120m
- Humidity Sensor: Operating Humidity = 30~90%RH
- Soil Moisture Sensor: Value Range: 0~300: dry soil
300~700: humid soil

700~950: in water

- Ultrasonic Sensor: Minimum Range =1cm and Maximum Range = 400cm
- Temperature Sensor: Temperature Range =0⁰C-100⁰C
- LDR Sensor: Resistance = 400Ohm to 400KOhm

Software Specification:

- Operating system : Windows 7 or latest OS
- Coding Language : Java 1.8
- Editor: Eclipse neon 2.0

3. LITERATURE SURVEY

Industrial automations which are mostly depend upon the power systems and which requires distance controlled and regulated systems. The author monitored power related parameters and enabled remote switching devices for proper power management systems using ZigBee and proposed a digital system for condition monitoring, diagnosis, and supervisory control for electric systems parameters like voltage and current using wireless sensor networks (WSNs) based on ZigBee[1]. Recently, the modern agriculturists are demanding sophisticated instrumentation for measurement and control of environmental parameters of the polyhouse. The humidity is important parameter, which plays vital role on the crop yield. Designed and implemented monitoring of humidity of polyhouse and the results of implementation are interpreted. The data from the sensor nodes are monitored and logged using packet sniffer. The available sniffers in the market need additional hardware with dedicated software which costs more. APSIM has been used in a broad range of applications, including support for on-farm decision making, farming systems design for production or resource management objectives, assessment of the value of seasonal climate forecasting, analysis of supply chain issues in agribusiness activities, development of waste management guidelines, risk assessment for government policy making and as a guide to research and education activity. To overcome the problem of power distribution provided an overview of wireless sensor network by managing the equal power distribution by using

zigbee network sensor. He compared Bluetooth and Zigbee and concluded that ZigBee helps to keep costs down, ensure interoperability, and is a future-proof investments made by both utilities and consumers [7]. Sensing technologies allow the identification of pests in the crops, drought or increased moisture. Having such information at a real-time interval, automated actuation devices can be used to control irrigation, fertilization and pest control in order to offset the adverse conditions. Zigbee characteristics like self-organizing, self-healing networks that can manage various data traffic patterns, longer life with smaller batteries, high reliability and larger range. He discussed various traffic types handled by Zigbee like Periodic, Intermittent, Repetitive etc. He elaborated on Zigbee architecture and its Frame structure. He compared various Wireless technologies are based on Bandwidth, Power consumption, Protocol stack Size, Applications etc. He concluded Zigbee as the best suited technology for its low power and reduced costs.

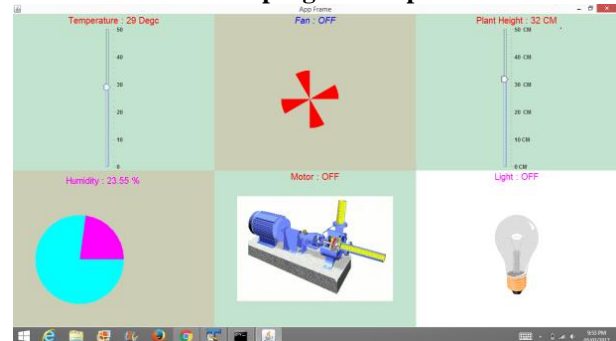
4. IMPLEMENTATION

Using Java language we did serial port communications which are used for receiving data from USB Zigbee receiver. We have developed a Graphical User Interface using Java which is simply representation of data that is received from Zigbee. The user interface components of Zigbee based agricultural parameters monitoring and controlling system. The main components are the search bar, zooming options, panning options, and zoom level indicator, which are discussed below. Indonesian agriculture has great potential for development. Agriculture a lot yet based on data collection for soil or plant, data soil can use for analysis of soil fertility. We propose e-agriculture system for monitoring soil. This system can monitor soil status. Monitoring system based on wireless sensor node that sensing soil status. Sensor monitoring used soil moisture, humidity and temperature. System monitoring design with sensor node is based on microcontroller and xbee connection. Data sensing send to gateway with star topology. Gateway is used in computer and connects to xbee coordinator mode. The system can help famer for monitoring soil and farmer can making decision for treatment soil based on data. It can improve the quality in agricultural production and would decrease the management and farming costs. Wireless technology using various sensors for precision agriculture has become a popular research with the greenhouse effect. People are utilizing the merits of embedded system into monitoring and control system for agriculture parameter. Monitoring parameters of temperature and humidity is an important means for obtaining high-quality environment. Remote monitoring is an effective method in order to avoid interference environment and improve efficiency. Today, Ethernet network, RF module and ZigBee wireless network are used to transmit data in remote Monitoring System. This paper gives a review of remote control and monitoring systems based on existing technologies and ZigBee based sensor node control and monitoring system with automatic irrigation system is proposed. The design presented has the advantage of ZigBee technology. The proposed hardware of this system includes Arduino microcontroller, zigbee module, Temperature, humidity and soil moisture sensors, LDR Sensor, Ultrasonic Sensor. The system is low cost and low power consuming so that anybody can afford it. The data monitored is collected at the server. It can be used in precision farming. The system should be designed in such a way that even illiterate villagers can operate it. They themselves can check different parameters of the soil like moisture etc. from time to time. In this system

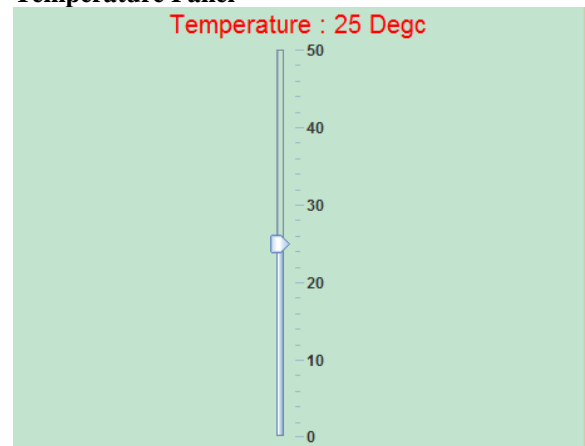
LDR sensor is used to detect the presence of light. If light is not present at night then automatically lamp is on. Ultrasonic Sensor is also used which measure the height of the Plant. At receiver side ZigBee come into picture. There is only one Tx and Rx pins Signal is send to microcontroller and parameters like temperature, soil moisture and humidity are monitored. These parameters are monitored on computer using usb to ttl converter. This data can be used for precision farming.

5. RESULT

On the execution of a program output



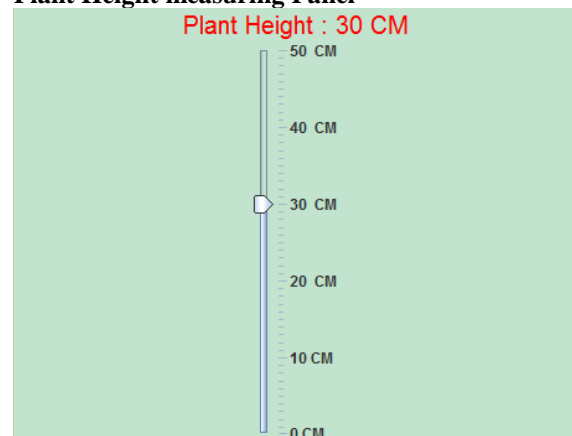
Temperature Panel



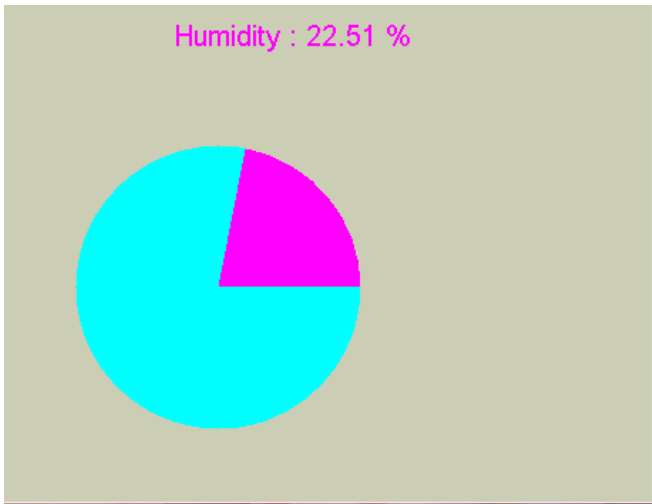
When temperature goes above 40°C



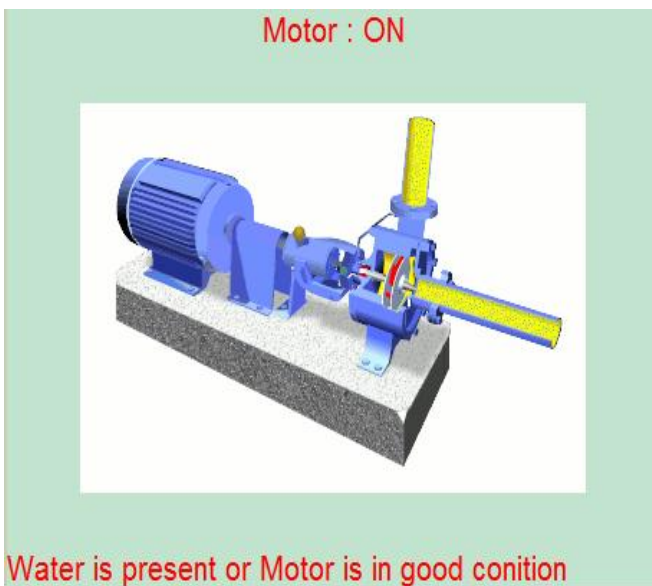
Plant Height measuring Panel



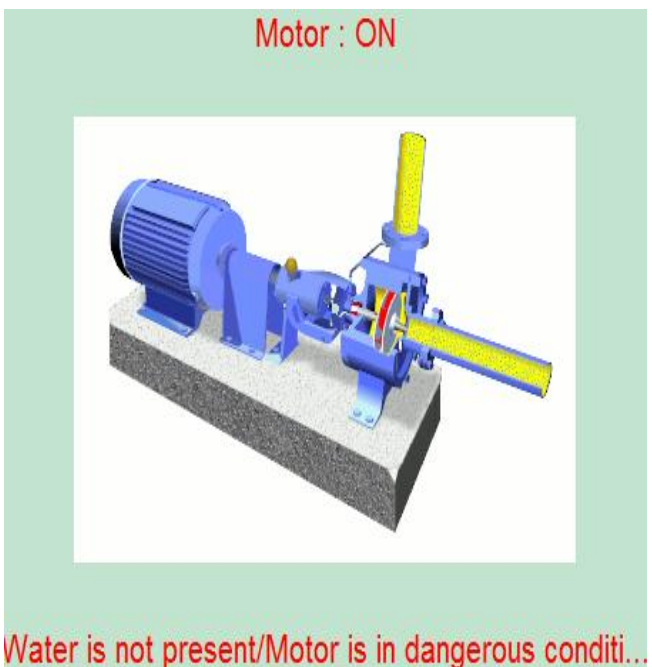
Humidity Panel



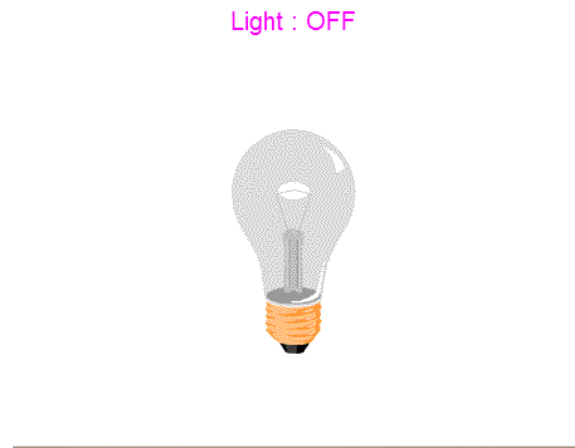
When the water is present then output



When the motor is not serving water to the plant



When the LDR detects light then output



When the LDR not detects light then output



6. CONCLUSION

Zigbee-based agriculture monitoring system serves as a reliable and efficient system for efficiently monitoring of the environmental parameters. The System is designed for the betterment of farmers. The uses of smart sensor based monitoring system for agriculture have been used to increase the yield of crop by monitoring the environmental conditions and providing information to observer. It would be a promising technology for the agriculturists all over the world in the present scenario of unpredicted parameters.

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