Real Time Paddy Field Monitoring System using Wireless Network

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Abstract-*The major concept is to achieve highly enabled monitoring system to maintain crop field which focuses on giving sensing analysis about the paddy field using Wireless Sensor Network (WSN). It monitors the temperature, humidity and water level of the paddy field. The monitored data is send to Personal Computer through Global System of Mobile (GSM). Then, the data is send to server which has database about maximum and minimum threshold value of temperature, humidity and water level. When the monitored data reaches maximum or minimum threshold value then the alarm unit produces an alarm sound to alert the farmer regarding the crop field. The crop field area is monitored by using the GSM module and the water sensors are deployed in the land which detects the water level so that the area that has to be irrigated can be selected. The weather of the land can be sensed by using the humidity sensor. By using this information the farmers gets an idea about the climate so the farmer can conserve water as well as power as he need not turn on the motors.*

Keywords-Crop monitoring, Global System for Mobile Communication (GSM), Liquid Crystal Display (LCD), MSP 430, Wireless Network Sensors.

I. INTRODUCTION

Wireless sensor Network (WSN) is one of the major technology used for real time monitoring of agricultural assets. WSN has the advantages of large scale deployment, low maintenance, scalability, adaptability, less power needs etc. with the disadvantages of low memory, low power, low bandwidth etc. They can be employed in any environments and the features like use of low power and low maintenance makes them the most suitable technology for real-time environmental monitoring. They can be highly useful in monitoring the water level, temperature in the paddy fields.

Paddy field is a large area and is nearly flat in nature. Normally the water level in a field will be uniform throughout the field. Water wells can be made as per the need and the water level in each well can be monitored. Water level sensors can be used for sensing the levels. These sensors can monitor the level according to their needs. A server is connected to the database, which has minimum and maximum threshold value of temperature, humidity and water level. If the sensed data attains maximum or minimum threshold level stored in the data base, the alarm unit produces an alarm sound so as to get the attention of the farmer regarding the crop field.

In paddy crop field where the land has to be fully irrigated regardless of ups and downs of the soil, there is a need to locate the places where irrigation is needed. Transmitting the electrical signal from the device in the field to the farmer through copper wire is not practical, since it is so long and we many wells and sensors at different locations in the field. A farmer may have hectors of area as paddy field and need hundred of sensors for monitoring. Hence wired devices are not practical. Use of commonly used wireless communication technology is also not advisable due to complexity of the communication system and the high power needs of such systems. Low cost communication devices which needs low power and less maintenance, which can operate on a wireless architecture is the solution. The new generation wireless sensor networks can be considered for this situation.

Wireless sensors would permit data acquisition at higher resolution and for longer durations than existing monitoring solutions. The communication protocols for data transfer can enhance efficiency in agricultural. The installed sensor networks can also monitor and detect changes in field. These small sensor nodes allow the subject a greater freedom of movement and allow identify pre-defined symptoms earlier.

II. LITERATURE REVIEW

After the research in the agricultural field, researchers found that the yield of agriculture goes on decreasing day by day. Use of technology in the field of agriculture plays important role in increasing the production as well as in reducing the extra man power efforts, water requirement and fertilizer requirement. Some of the researchers tried for betterment of farmers and provides the systems that use technologies which are helpful for increasing the agricultural yield.

Aniket H. Hade, Dr. M.K. Sengupta in their paper “Automatic control of drip irrigation system & monitoring of

soil" by wireless described the farmer has to maintain watch on irrigation schedule in the conventional drip irrigation system, which is different for different types of crops. In remotely monitored embedded system for irrigation purposes have become a new essential for farmer to accumulate his energy, time and money and will take place only when there will be requirement of water. In this approach, the soil test for chemical constituents, water content, and salinity and fertilizer requirement data collected by wireless and processed for better drip irrigation plan. This paper reviews different monitoring systems and proposes an automatic monitoring system model using Wireless Sensor Network (WSN) which helps the farmer to improve the yield.

"Wireless Sensor Networks for Paddy Field Crop Monitoring Application in Kuttanad" by Santhosh Simon, K Paulose Jacob describes the application of wireless sensor network for crop monitoring in the paddy fields of kuttand, a region of Kerala, the southern state of India. The prime objective is to select the appropriate wireless network to collect the data from moisture sensors, water soluble fertilizer sensor placed in the field, temperature sensors of various areas of the field, pressure sensors in the irrigation system to monitor the proper drip of water along with the fertilizer which are kept in a separate tank.

"Wireless sensors to field mapping: Anatomy of an application for precision agriculture"

This paper describes a simulated application for precision agriculture in which a network of wireless sensors report their measurements to a collector point, where their measurement to a collector point, where an estimate for the field properties is calculated. Estimation is obtained using the sensors network for processing and transport of the measured data.

III. SYSTEM MODEL

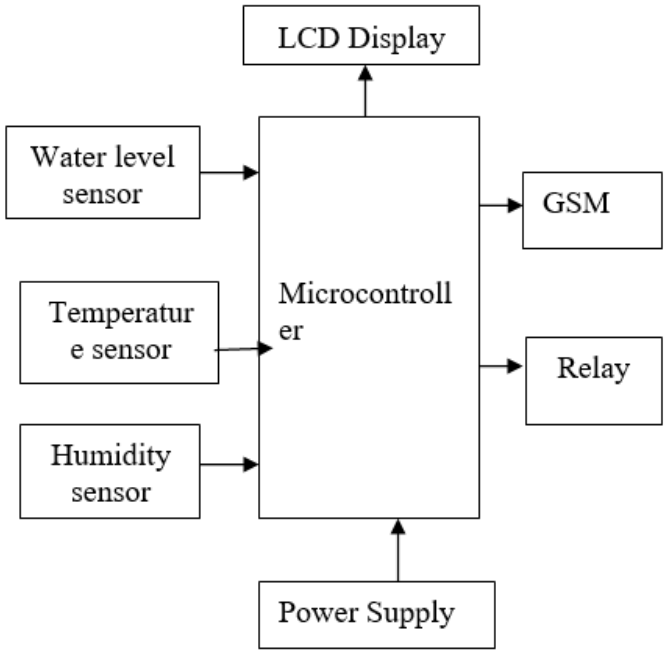


Fig.1 System Model

The fig.1 shows the system model of the "Real time Paddy crop Field Monitoring System''. We get 230V of power supply but as we need only 3.3V and 5V for the MSP430, instead of directly connecting the power supply to the microcontroller we use a transformer, capacitive filters and generators to convert 230V of power supply to the voltage that is required for the micro controller. The operating voltages for transmitter and receiver sections are 3.3v and 5v.

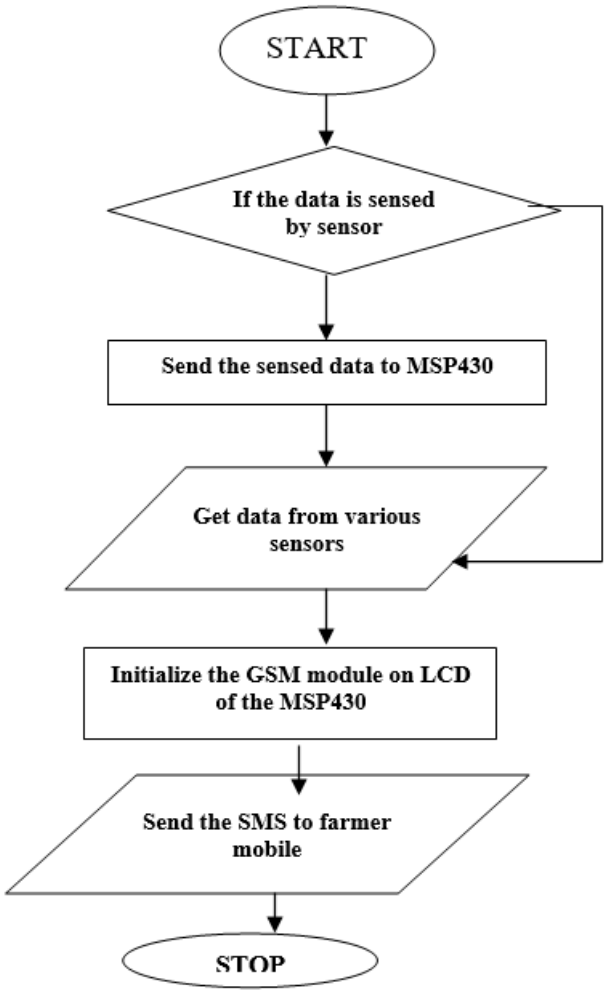
In this project, MSP430 plays a major role and is ideal for applications which provide high performance, low power consumption and is small in size.

GSM (Global System for Mobile communications) modem is a data oriented GSM transceiver system that uses a network provider to connect and transfer data. LCD is used to display the output. LCD is connected to MSP430 so as to transfer the data from the micro controller and to display it on LCD. Temperature Sensor is used to sense the temperature. A server is connected to the database, which has minimum and maximum threshold value of temperature. If the sensed data attains maximum or minimum threshold level stored in the data base, the alarm unit will give an alarm sound to the farmer.

IV.METHODOLOGY

The power supply to the microcontroller is given under the well biased circuit conditions. Transmitter and

receiver are connected to the power supply. Temperature, humidity and water level sensors are deployed in the crop field area. These sensors sense the temperature, pressure, humidity and water level in a paddy crop field. When the threshold value from the sensors is detected, the sensed data from various places of crop field area is transmitted to the central Global System of Mobile (GSM) node which will send the data to computer through gateway. A server is connected to the database, which has minimum and maximum threshold value of temperature, humidity and water level. If the sensed data attains maximum or minimum threshold level stored in the data base, the alarm unit will produces an alarm sound so as to get the attention of the farmer regarding the crop field. The received data is displayed on the LCD attached to the micro controller. The changes that have occurred in the paddy crop field area are sent by the GSM modem as SMS (short message service) to the farmer's mobile.



FLOW DIAGRAM

Experimental results & DISCUSSION

The hardware that is used for the implementation is msp430 microcontroller, power supply, sensors, GSM modem, LCD display, switches. Initializing the msp430 controller and connecting GSM modem to the board. The reset button in the msp430 microcontroller of both the transmitter and receiver sections is pressed for initialization.GSM modem which is used to send SMS to the receiver section is connected to the MSP430 board. After initializing the GSM modem the MSP430 kit waits for the key to be pressed. When the key is pressed the receiver receives the data, later the information is sent through GSM module to the receiver. Through this the farmer gets an clear idea about the temperature, humidity, water level of the paddy field.

VI. CONCLUSION

A new architecture for the real time paddy crop field monitoring system with wireless sensor network has been designed and different ways of utilizing the sensors in the paddy crop field area are proposed and elaborated. Different readings from the temperature, water level and humidity sensors are deployed and analysed in real time. The proposed work which uses wireless sensor network gives efficient monitoring of paddy crop field. To obtain better applications on agriculture we can implement more number of nodes in the paddy field environment.

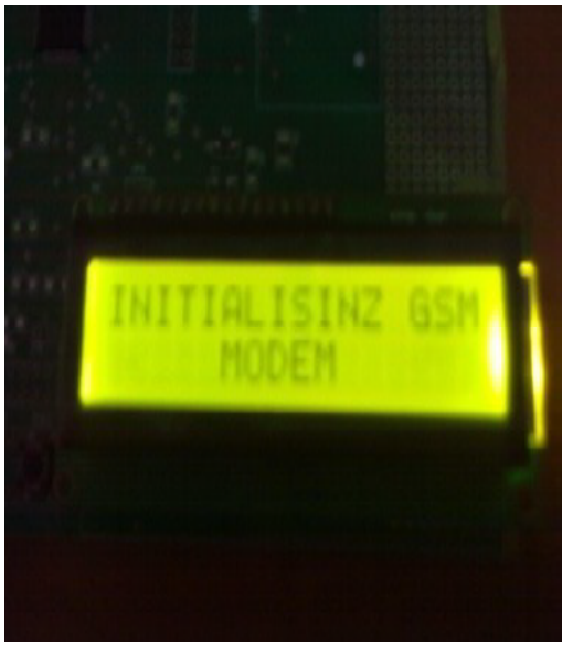


Fig.3 Display of initializing the GSM modem

Fig.4 Sending the information

Fig.5 Completing The Sending Process

Fig.6 Receiving the information at receiver section

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