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# In Combination of WSN and GSM for Long Distance Sensor Monitoring and Parameter Control

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*Abstract:-*This paper presents environmental monitoring and parameters controlling system based on GSM and ZIGBEE technology. As sensor network consist of several sensor which are smaller in size, cost of this nodes is less, in which it collects and distributes the environmental sensed data using ZIGBEE. The received data is identified, displayed at the coordinator node using ZIGBEE and then it is transmits data to the android smart phone through GSM (Global System for Mobile Communication) module for controlling actions This design is considers various applications, where sensed environmental parameter value are generally collected at an intermediate node which in turn redirects the environmental parameter value to mobile using GSM technology. The objective of the work is to simplify the method using android smart phone.

*Keywords: Wireless Sensor Networks, GSM, Zigbee, Embedded system.*
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## I. INTRODUCTION

Wireless sensor network consist several nodes which are smaller in size, consume low power, low cost node deployed large in number which are capable of monitoring and communicating remotely. These nodes are termed to be sensor node. Sensor nodes are responsible for collecting the environmental information and distributing this information remotely from the remote location with better accuracy. Processing capability of these nodes is very less, but is effective in measuring physical environment in details. There is no fixed structure defined for the sensor nodes they remain ad-hoc in nature. Sensor nodes are said to be low powered node. As there exist large number of wireless communication technologies like Bluetooth, Wi-Fi, ZIGBEE etc. Among all of this communication technology, ZIGBEE is low power communication technology with greater useful range. ZIGBEE is IEEE 802.15.4 standard. With respective to constrain of sensor ZIGBEE is more efficient which provide remote communication with low power over a long distance. Form past few years there is rapid development in GSM technology. As GSM is global system for mobile communication used for wireless transmission of voice or the data over the secured channel in the digital cellular network. GSM will digitalize the information and minimize the information. This information is distributed over the channel A GSM modem requires a SIM card to be worked and works over a range subscribed by the system administrator. This paper presents dual purpose operation of the sensor in wireless sensor network for monitoring and controlling multiple parameter like temperature, soil moister, illumination etc . This system provides more benefits and also used in various application. For remotely monitoring and controlling several environmental parameters by wireless sensor by using GSM and ZIGBEE technology. As several sensor nodes are deployed in the surroundings to collect the real time value then distribute this real time value to the coordinator node with ZIGBEE technique. This coordinator node collect, analyses at same time send this constant value to mobile device with help of GSM technology. and then perform controlling activity with the help of relay. In this proposed framework, we have composed one master node or coordinator node which comprises of 16/32 bit microcontroller, GSM module and ZIGBEE module. Slave or sensor modules are outlined utilizing 16 bit microcontroller and ZIGBEE module.

## II. LITERATURE SURVEY

[1] As WSN are used in particularly application like agriculture and environmental due to the feasible nature of the sensor nodes in WSN network. The new proposed architecture is been designed for greenhouse based on GSM-SMS. A typical standalone greenhouse sensing unit system is able to operate independently to record the various climatic parameters like(temperature, carbon-di-oxide, carbon-mono-oxide ,nitrogen-di-oxide etc. after senescing this real time values need to be report back to mobile in from of SMS via base station. The wireless communication is taking place by making use of GSM-SMS technology.

[2] The proposed system is designed for environment parameter sensing based on GSM/GPRS using wireless remote network. As sensor network consist of large number of remote sensors which are small in size, cost of this devices is less, which collect and distribute the environmental data. The main feature of the sensor is not only monitoring the parameter but also controlling too with accuracy. Monitoring the environments, gathering the information from the inhospitable locations etc there are various constraints in case of sensor node in terms of computation. This system is designed to use GPRS/GSM and ZIGBEE technologies for controlling various parameters and monitoring.

[3]The system is designed to be implemented in the Agriculture field by making use of embedded technology. Wireless Sensor Nodes (WSN) with the embedded microcontroller. From the last few decades there is significant growth in wireless sensor networking. In the existing system as there communication distance between the nodes is very less, so there is enhancement in the existing system to increases the communication gap between this node by making use of the advance wireless technology. Data aggregation and data dissipation to mobiles using GSM technology.

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[4] The system is designed for system automation & monitoring for irrigation. This design can be achieved by integrating the embedded system and wireless communication technology like ZIGBEE to automation & monitoring a water deployment system for irrigation. As large number of remote sensor nodes are been deployed in the field for monitoring the various environmental parameter like (temperature, soil-moisture and humidity) . Wireless Sensor and Wireless Information Unit are the two main units of wireless sensor network . Monitoring the real time values is through wireless Sensor nodes and transmitting the real time values by ZIGBEE technology to wireless information unit .the information that is received to be stored , identify from where the data is been received ,analyze the information then display this information the LCD display of the wireless information unit.   Monitoring data continuously and then the information is been transmitted on the android smart phone through wireless technology GSM for controlling .The objective of the design is to a android smart phone based water deployment system for irrigation.

[5] Wireless sensors make use of wireless technology for precision agriculture in greenhouse monitoring .Due to the advantage of the embedded system used for parameter monitoring and control for agriculture .As there are various monitoring parameter among them like humidity and temperature are efficient for obtaining high-quality environment. In order to improve efficiency and avoid the interference in the environment effective method like remote monitoring.

[6] By using low power wireless technology like ZIGBEE for multi-parameter monitoring system for monitoring and controlling. As several nodes are been deployed in the remote area for collecting and dissipating the information to base station by making use of ZIGBEE technology. Information is continuously received, identified, stored and displayed at the base station for monitoring of environmental parameter like (temperature, moisture and humidity). If the set point value is exceeded then the message is redirected to the farmer mobile phone via GSM network then framer triggers the controlling activity by send a reply message or does manually.

### III.    System Architecture

Architecture design wireless sensor with controlling node .This architecture can be described in three layers:

- Sensor layer
- Coordinator layer
- Supervision layer.

First layer is called as sensor layer. Sensor layer consist of two slave node.  Slave nodes are designed to monitor the parameter values through various sensors and to control them as per the set point values received from the coordinator. They, each, consist of an arduino microcontroller and various sensors to measure the present values of physical parameters like temperature, humidity, illumination, soil moisture etc. The slave nodes control the parameters by turning the power on/off to the load through electromagnetic relays. For example, for the temperature parameter, assuming the coordinator has asked to keep temperature at 50 °C, the analog output from temperature sensor is converted to digital and checked wheatear it is

equal to 50 °C. If it is less, the relay which is connected to the heater is turned on, the heater becomes on and temperature starts to rise. Once it reaches set point or is already above set point, the relay is turned off and the heater becomes off, thus stopping the heating process. This process is repeated continuously at rapid rate to maintain the parameter value as close to set value. Similar kind of operation takes place for other parameters also. When a slave node receives a command from coordinator through ZIGBEE, it takes the new set point vales and adjusts the parameter accordingly and sends a reply to the coordinator with present values of the parameters through ZIGBEE. The DC power required for the slave node is also derived from AC mains supply, by constructing a regulated power supply unit.

Second layer consists of a coordinator node .The coordinator node receives SMS messages from the operator, through the GSM Modem, authenticates the user and sends the new values of parameter set points to concerned slave node using ZIGBEE and waits for the node's response, with the present values of those parameters and sends them to the user through a reply SMS. Thus the user can send the new set points and also know the present values from anywhere in the world by making use of the existing resources of the GSM networks.

Third layer is the supervision layer, this layer is responsible for receiving the real time values sensed by the sensor by making a request to coordinator node via base station in terms of SMS. Security plays very important role in mobile communication. Each end user is associated with user name and password. After authentication is done then the user can view the message. This system will not only allow end user to view the message but also responsible remotely controlling the system by setting the parameter value from anywhere and anytime.GSM communication mechanism is used to communicate with coordinator node from mobile device.



Fig:1 Architecture design

### IV.    METHODOLOGY

The testing of immediate trust node and proposal are constantly used to assess the reliability of sensor hubs. The block diagram for proposed architecture is shown in the figure. The block diagram for embedded circuit of sensor network consist coordinator node with two slave node  i.e. slave unit#1 and slave unit#2. The ZIGBEE enable devices like coordinator node and slave node communicate with each other .The coordinator is not only enabled with ZIGBEE but also with the GSM module, this help coordinator node to communicate with mobile end user. This block diagram consist of two slave node  i.e. slave unit#1 and slave unit#2 and one coordinator node.
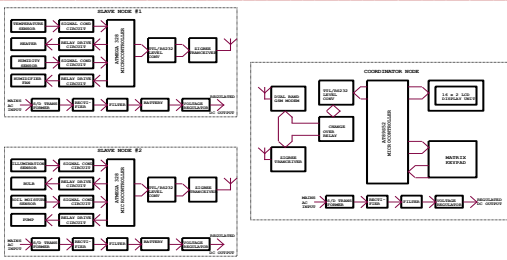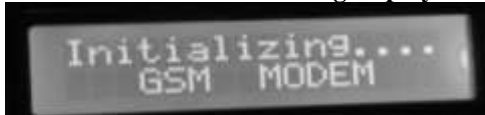
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Fig:2 Block diagram of integration of wireless sensor network to GSM for long distance sensor monitoring and parameter control
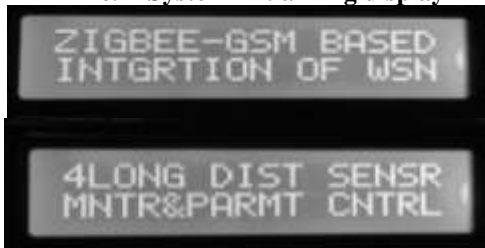
## V.    RESULT
### a.    GSM initializing display



### b.    Successful GSM connection



### c.    System initializing display



### d.    Processing new message



The new message indicate the arrival of the new request. After the new message is received the system will process or read the message and then authenticate the user by the means of the password. If the user is authentic then the new set point values are been extracted and sent to slave nodes.

### e.    Waiting for response from slave nodes .
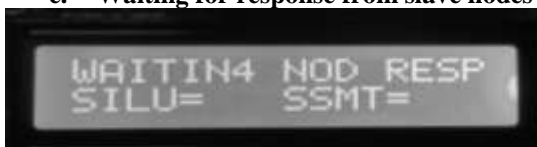


The system is waiting for the present parameter values sensed from the slave node.

### f.    Response received from slave node.
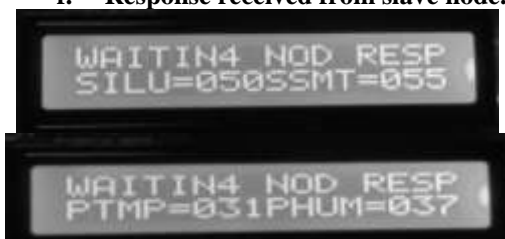


The parameters values received from the slave node are transmitted the android smart phone by using GSM module.

### g.    Smart phone controlling mechanism



Controlling mechanism of the slave node is done by the android phone .The set point values can be set by the android phone. This SMS message consists of new set point. Secret password is maintained for authenticating the use. Ex DROWSSAP is the password for this message.

### h.    Smart phone reading mechanism
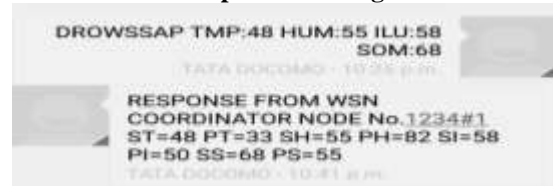


## CONCLUSION

Wireless sensor networking operates in confined zone with several sensors in broad spectrum. This system is designed to record small amount of information. This little piece of information is more valuable to end-user. So we need to enhance the design of the network system with controlling node. The architecture for proposed system is integrating the WSN with GSM for monitoring and controlling the data over a wide coverage area of the network.
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