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SENSORS AND IT'S APPLICATION

Ms. Ashwini Shelar[1], Dr. V.C.Kotak[2], Mr.N.Narkhede[3]

[1]Student of Department of Electronics Engineering, SAKEC, Chembur(E), Mumbai, Maharashtra, India.
[2]Professor of Department of Electronics Engineering, SAKEC, Chembur(E), Mumbai, Maharashtra, India.
[3]Professor of Department of Electronics Engineering, SAKEC Chembur(E), Mumbai, Maharashtra, India.

Abstract - *Intelligent sensor is very useful for monitoring for different application. And one application is Farming. Farming is the primary source in our country for ages. But now due to migration of people from rural to urban there is an obstacle in Farming. So to overcome this problem we used Smart techniques using Different Sensors. This project includes various features like GPS based remote controlled monitoring, moisture & temperature sensing, light sensor, Rain sensor for security, leaf wetness and proper irrigation facilities. It makes use of wireless sensor networks for noting the soil properties and environmental factors continuously. However, many applications (e.g., those in open nature) may have stringent requirements, such as very low cost, large number of nodes, long unattended service time, ease of deployment, low maintenance, which make these generic WSN platforms less suited. The development methodology presented can be reused for platform design for other application domains, or evolutions of this platform. Various sensor nodes are deployed at different locations in the farm. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi with microcontroller. This concept is created as a product and given to the farmer's welfare.*

***Key Words*: WSN, GPS, WIFI, Soil Moisture, Light sensor, Rain sensor etc**

1. INTRODUCTION

As the world is trending into new techniques and implementations it is a necessary goal to trend up in farming also. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity to a greater extent. Hence automation must be implemented in farming to overcome these problems. So, in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in every stage. But complete automation in farming is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the resources. Hence this paper deals about developing smart Farming using Sensors & Smart Techniques and given to the farmers. In past decade, it is observed that there is not much crop development in agriculture sector. Food prices are continuously increasing because crop rate is declined. There are number of factors which are responsible for this, it may be due to water, low soil fertility, fertilizer abuse, climate change or diseases.

2. LITERATURE SURVEY

[1] Chetan Dwarkani M, Ganesh Ram R, Jagannathan S, R. Priyatharshini studied the work of rural farming community that replaces some of the traditional techniques. The sensor nodes have several external sensors namely leaf wetness, soil moisture , sensor, soil pH, atmospheric pressure sensors attached to it. Based on the soil moisture sensor the mote triggers the water sprinkling during the period of water scarcity and switches off after adequate water is sprinkled. This result in water conservation and soil pH is sent to the base station and in turn base station intimates the farmer about soil pH via SMS using GSM model. This information helps the farmers to reduce quantity of fertilizers used. [2] G S. R. Nandurkar, V. R. Thool, R. C. Thool , A development of rice crop monitoring using WSN is proposed to provide a helping hand to farmers in real time monitoring and increasing the rice production. The automated control of water sprinkling and ultimate supply of information is implemented using wireless sensor network.

[3] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel PortaGándara [4] Dr. V .Vidya Devi,G. Meena Kumari proposed a wireless sensor based automated irrigation system to optimize water use for agricultural purpose. The system consists of distributed wireless sensor network of soil moisture, and temperature sensors mounted in the crop field. Zigbee protocol is used to handle the sensor information and water quantity programming using algorithm with threshold values of the sensors sent to a micro controller for irrigation system.

[5] Balaji Bhanu, Raghava Rao, J.V.N. Ramesh and Mohammed Ali hussain, Proposed agriculture monitoring system using wireless sensor network (WSN). The conditions can be monitored in real time are temperature, light intensity, and humidity. [6] LIU Dan, Cao Xin, Huang Chongwei, JI Liang Liang, The experiment involves the hardware and software design of the built modules, network topology and network communication protocol with the challenges. Design explains how the node can achieve agricultural condition information collection and transmission. The system is compact in frame work, light

weight, good in performance and operation. It improves the agricultural production efficiency automatically.

3. WSN & Sensor:

[7] S. Vijayakumar, J. Nelson Rosario A wireless sensor network is a group of specialized transducers with a communications infrastructure for monitoring and recording conditions at diverse locations. Commonly monitored parameters are temperature, humidity, pressur, wind direction and speed, illumination intensity, vibration intensity, sound intensity, power-line voltage, chemical concentrations, pollutant levels and vital body functions.

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to monitor physical or environmental conditions. A WSN system incorporats a gateway that provides wireless connectivity back to the wired world and distributed nodes (see Figure 1). The wireless protocol you select depends on your application requirements. Some of the available standards include 2.4 GHz radios based on either IEEE 802.15.4 or IEEE 802.11 (Wi-Fi) standards or proprietary radios, which are usually 900 MHz[12].

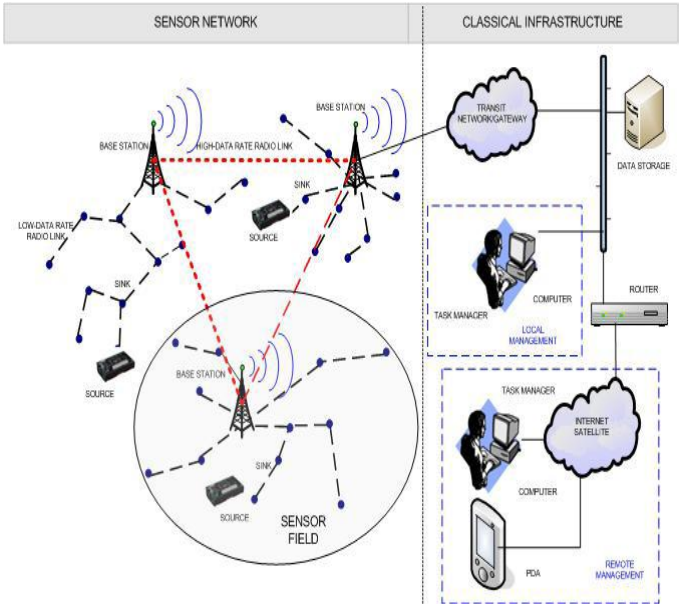

Fig No 1 WSN

WSN TOPOLOGY:

WSN nodes are typically organized in one of three types of network topologies. In a star topology, each node connects directly to a gateway. In a cluster tree network, each node connects to a node higher in the tree and then to the gateway, and data is routed from the lowest node on the tree to the gateway. Finally, to offer increased reliability, mesh networks feature nodes that can connect to multiple nodes in the system and pass data through the most reliable path available. This mesh link is often referred to as a router (see Figure).

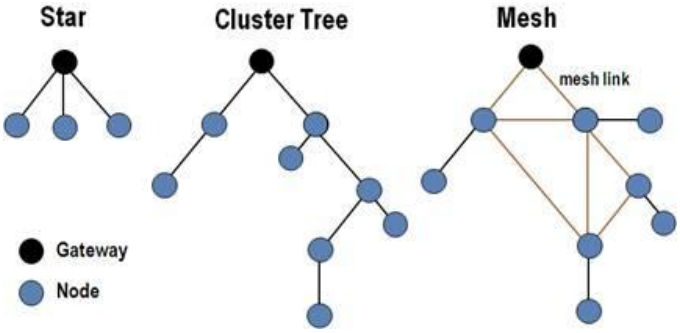

FIG NO.2

3.1 TEMPERATURE SENSOR:

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature in ºC

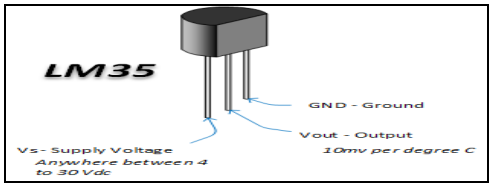

Fig no.3 Temperture Sensor

What Does an LM35 Do? How does it work?

- It has an output voltage that is proportional to the Celsius temperature.
- The scale factor is .01V/ºC
- The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4 ºC at room temperature and +/- 0.8 ºC over a range of 0 ºC to +100 ºC.
- Another important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability. The sensor self-heating causes less than 0.1 ºC temperature rise in still air.

3.2 Light Sensor

A light-dependent resistor, alternatively called an LDR, photoresistor, photoconductor, or photocell, is a variable resistor whose value decreases with increasing incident light intensity. An LDR is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. A photoelectric device can be either intrinsic or extrinsic. In intrinsic devices, the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire band gap. Extrinsic devices have impurities added, which have a

ground state energy closer to the conduction band - since the electrons don't have as far to jump, lower energy photons (i.e. longer wavelengths and lower frequencies) are sufficient to trigger the device.

Fig.no.4.LDR

3.3 Humidity Sensor (SY-HS220)

This sensor module converts relative humidity (30-90%RH) to voltage and can be used in weather monitoring application. Operates at DC 5V. Output humidity-1.98V (at 25 degree and 65RH).

- What is Humidity

Humidity can be defined as the condition of a state, and everyday humidity is shown as a percentage RH of Relative Humidity. In other words, the amount of moisture(saturated water particle pressure) in a gas(usually air). It is indicated as 100 times the ratio of the saturated water particle pressure to that of stream.

Fig -5: Humidity sensor

3.4 Soil Moisture

The Moisture sensor is used to measure the water content (moisture) of soil. When the soil is having water shortage, the module output is at high level, else the output is at low level. This sensor reminds the user to water their plants and also monitors the moisture content of soil. It has been widely used in agriculture, land irrigation and botanical gardening.

Module triple output mode,digital output is simple, analog output more accurate, serial output with exact readings. This is give a digital output of 5v when moisture level is high and 0v when the moisture level is low in soil.

Specification

- Working Voltage:5V
- Working Current:<20mA
- Interface type:Analog
- Working Temperature:10°C~30°C

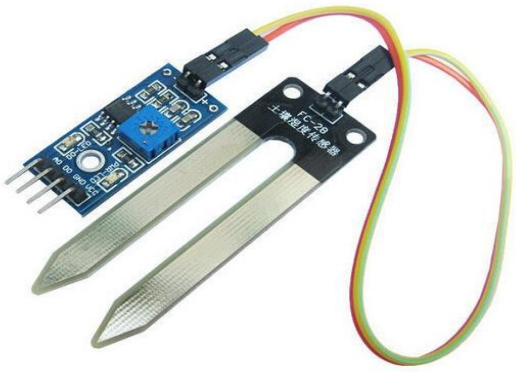

Fig. no 6 SOIL MOISTURE

Applications:

1.Agriculture

2. Landscap irrigation

3.5 Rain sensor

C separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer.

The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high. When dropping a little amount water, DO output is low, the switch indicator will turn on. Brush off the water droplets, and when restored to the initial state, outputs high level.

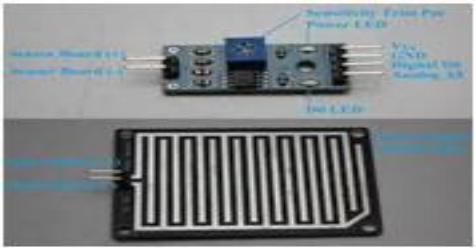

Fig . 7 Rain sensor

4. The System Architecture

[8]G. Nisha, J.Megala, The main purpose of the WSN platform is to provide the users of the IoT application (human operators or computer systems) an updated view of the events of interest in the field. The tiered structure of the used platform (see Fig.) was introduced by one of the first long-term outdoor WSN experiments and allows:

- a good functional separation of platform components for optimization according to application requirements;
- a cloud-based field data access to bridge the latency-energy trade-offs of the low power communication segments and the ubiquitous and fast access to field data for end users (either humans or IoT applications).

The sensor nodes are optimized for field data acquisition using on-board transducers, processing, and communication to gateways using short-range RF communications, either directly or through other nodes. The gateways process, store, and periodically send the field data to the application server using long-range communication channels. The application server provides long-term data storage, and interfaces for data access and process by end users (either human or other applications).

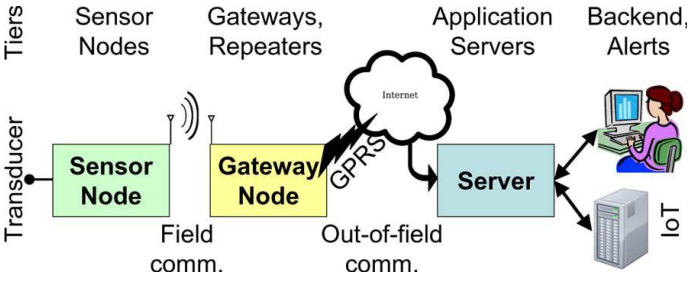

Figure 8 Tiered structure of the WSN platform.

The platform should be flexible to allow the removal of any of its tiers to satisfy specific application needs. For instance, the transducers may me installed on the gateways for stream water level monitoring since the measurement points may be spaced too far apart for the sensor node short-range communications. In the case of seismic reflection geological surveys, for example, the sensor nodes may be required to connect directly to an on-site processing server, bypassing the gateways. And when the gateways can communicate directly with the end user, e.g., by an audible alarm, an application server may not be needed.

5. RESULT

In recent years, intelligent sensor techniques have achieved significant attention in Farming. It is applied in agriculture to plan the several activities and missions properly by utilising limited resources with minor human interference. While the former is well established for low-cost identification and tracking, WSNs bring IoT applications richer capabilities for both sensing and actuation.

In fact, WSN solutions already cover a very broad range of applications, and research and technology advances continuously expand their application field. This trend also increases their use in IoT applications for versatile low-cost data acquisition and actuation.

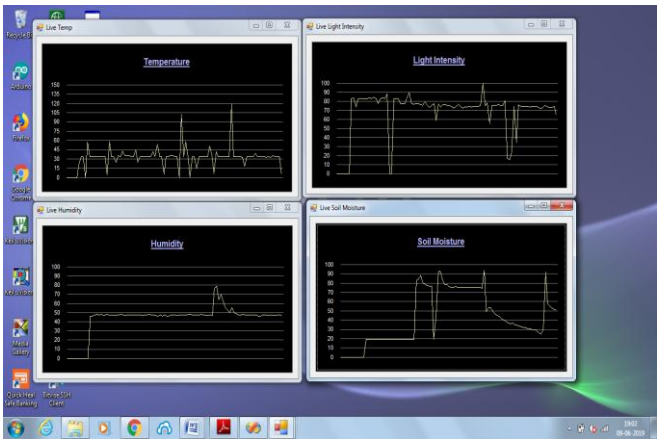

Fig no.9 Result of sensors

6. CONCLUSIONS

All aspects of the WSN platform are considered: platform structure, flexibility and reusability, optimization of the sensor and gateway nodes, optimization of the communication protocols for both in-field and long range, error recovery from communications and node operation, high availability of service at all levels, application server reliability and the interfacing with IoT applications

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