IOT Based Smart Monitoring System

[1]Amrin A Tintoiya, [2]Ms. Sneha Shah
[1]Student, [2]Assistant Professor
Department of Electronics & Communication
L.J Institute of Engineering & Technology, Ahmedabad

***Abstract*— In irrigation systems, there are many problems arrived due to lack of information about soil temperature, moisture and humidity. Due this there are major problems in selecting crops and possibility of wasting water. Manually farmers feed the plants but using this technology we can collect the data related to the soil and can give water and fertilizer as per the requirement of crop and soil. In this project we design a flexible, real time and low power consumption system to collect data using zig-bee, iot and cloud concept to collect the data related to soil. Using this system, user need not to be in farmland area but can access data anywhere in world and can know about changing condition of soil.**

Keywords—: IOT, zig-bee, monitoring, Raspberry Pi.

INTRODUCTION*:*

The Internet of Things (IOT) is the development and production of the computer science and communication technology. The Internet Of Things is a technological revolution that represents the future of computing and communications, and its development depends on dynamic technical innovation in a number of important fields, from wireless sensors to nanotechnology. As IOT is broadly used in many fields, the security of IOT is becoming especially important and will take great effects on the industry of IOT. The Internet of Things (IOT) is the development production of the computer science and communication technology. As IOT is broadly used in many fields, the security of IOT is becoming especially important and will take great effects on the industry of IOT [1].Through IOT we can connect anything on the internet.

There are different applications which can be controlled and monitored by IOT technology. Here, I am going to discuss some application. The applications of IOT technology in medical and health related services can solve problems in medical [2](one can eye on baby who is at home, one can make remember to take medicines which is make us to stay out of doctor). Home automation (we can light our home efficiently, and can light our home anyway and also can have control on different gadgets in home), environment monitoring (we can track the level of water so that we can be aware of flood, and also can monitor the pollution level), agricultural environment monitoring controlling.

I. Definition of related concepts

[A] IOT in agriculture environment:

Agriculture provides gainful business and livelihood for majority of community and offers significantly to the national income. Adaptation to climate change is inevitability for all agricultural producers. In India, 83% of farmers accepted agriculture as their main business. 79% of farmers earn a main income from their farming occupation for their house hold and 60% of farmer like farming as their main occupation and overall 73% of farmers have mobile. So, for an accurate result of farming I wish to use IOT technology in agriculture soil monitoring. I have contiontrated a system based on IOT technology for monitoring soil data and get the information about farm related data from anywhere in the world.

It is difficult for farmers to analyze data manually related to soil and crops. It is hectic work for farmers to analyze data related to soil condition. So, IOT technology can be used in agricultural environment to collect and store data[4].

The basic concept of this paper is based on soil monitoring using IOT technology for fast decision and by using this concept we can make use of resources in better way in low cost system so that small to small farmer can manage their farm from anywhere in the world. Adaptation to climate change is inevitability for all agricultural producers; this technology has to be appropriate for the local circumstances.

[B]Benefits of IOT in agriculture [3]:

The following are the benefits of IOT applications in agriculture:
1. Improvement in the use efficiency of inputs (Soil, Water, etc.)
2. Reduced cost of production
3. Increased profitability
4. Sustainability

[c]conceptual diagram for system:

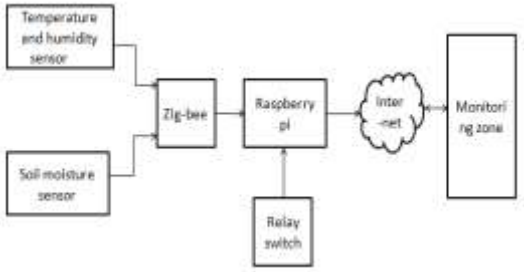

Figure1: conceptual diagram

An agricultural environment on the other hand concerns the utilization of pervasive and ubiquitous technologies for delivering the different services. Wireless technologies enable the real time transmission of data about a crop‘s condition to farmers. Here I am using IOT concept and cloud for the patient monitoring soil condition. For this system I am going to use different sensors(temperature, humidity and moisture), zig-bee (IEEE 802.15.4), Raspberry pi Board, Cloud (one type of data center), and End monitoring devices (laptop/mobile/desktop). Conceptual diagram of this system is as shown in fig.1.

II Hardware

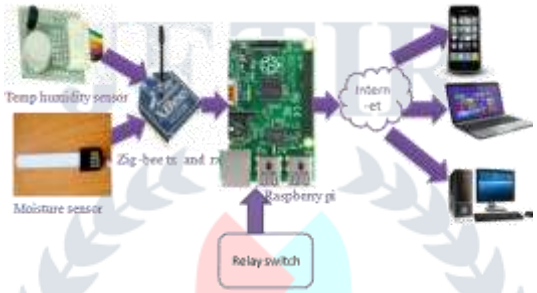

Figure2: block diagram of system

The proposed hardware architecture of system of is shown in fig2. Hardware architecture consists of 32 bit arm processor with raspberry board as a gateway, temperature humidity sensor, moisture sensor, zig-bee transmitter and receiver, cloud concept or IOT technology and different monitoring devices such as mobile, laptop or desktop.

[A] Temperature humidity sensor:

This sensor measures Relative Humidity and Temperature. It outputs in simple serial interface. Output can be viewed on PC’s terminal software at 9600 bps Microcontrollers can use Serial shift interface to read the sensor data through general I/O pins. It measure relative humidity from 1% to 100% and measures temperature from 2 to 60 degree and if supply goes greater than +5.5 can damage the sensor.

Figure3: Temperature Humidity Sensor

[B] Moisture sensor:

The sensor measures the dielectric constant of the soil in order to find its volumetric water content (VWC). It obtains volumetric water content by measuring the dielectric constant of the media through the utilization of frequency domain technology. Since the dielectric constant of water is much higher than that of air or soil minerals, the dielectric constant of the soil is a sensitive measure of volumetric water content.

Sensor works on +5V. It Reads outputs every 100ms. It has very fast response time. It gives Output in format of serial Data at 9600 baud rate (8 bits data, No parity, and 1 stop bits). It gives Output of four ASCII bytes per reading.

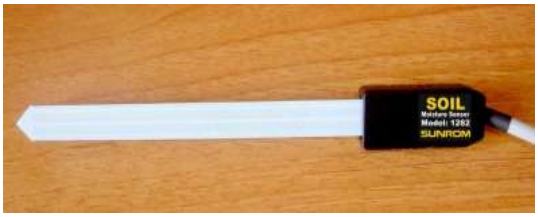

Figure4: Moisture Sensor

[c]Zig-bee:

The Zig-Bee standard works on the IEEE 802.15.4. Zig-bee is the wireless technology which works on ISM 2.4 GHz frequency with range of 10 to 100 m line of sight. It is an open global standard to provide the unique needs of low-cost, low-power wireless M2M networks.

Zig-bee protocol applicable for point to point, mesh networks and point to multipoint networks. Zig-bee has long battery life and low data rate of 250 kbps. It is very much suitable for intermediate data transfer from sensor or input device.

[D] Raspberry Pi:

Raspberry Pi is produced by U.K. which is credit card size, single board computer. The Raspberry Pi based on bcm2835 system on chip(soc) which is cost improved, full HD multimedia processor for embedded and mobile application. It includes ARM1176JZ-s700 MHz processor. Raspberry pi b+ model has 512 MB RAM. The system has four USB and one microUSB port for power supply and one HDMI port. It has MicroSD slot for booting up the media and persistent storage.

Raspberry pi has 40 pin GPIO (general purpose input output). It primarily support Linux kernel based operating system. It is not possible to run windows on raspberry pi.

Arm1176 processor:

ARM stands for Advanced RISC Machine. The ARM11 is based on the ARMv6 instruction set architecture Bi-endian – can operate in either little-endian or big-endian format Most devices today use little-endian. Actually uses two instruction sets – the 32-bit ARM and the 16-bit Thumb

The ARM1176 processor is commonly unified with many other IP blocks to optimize the SOC for performance, security and power. It is low risk processor and well understood and widely established processor.

It is high performance processor with arm system ip, physical ip and available third party design support. This processor has low implementation risk and low implementation cost.

IV CONCLUSION

IOT based agricultural monitoring system provide great potential for improving efficiencies. By designing and bringing out a system for soil monitoring which is rapidly automatic networking and real-time data processing, transmission and real time data transfer. With the characteristics of low cost, low power consumption, flexibility networking, wirelessly, easy interface, etc. and anyone can afford it. Through IOT technology we can realize the function of the data networking, remote monitoring.

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