www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 6 Issue 11 November 2017, Page No. 22865-22868
Index Copernicus value (2015): 58.10 DOI: 10.18535/ijecs/v6i11.08

Water Level Monitoring and Controlling Using Bluetooth in Agriculture

S.Muthukumaran[1], M.Dinesh kumar[2], V.Panneer Selvam[3]

Assistant Professor[1,2] ,Final Year [3]
Department of Computer Science and Engineering Jeppiaar Institute of technology.

Abstract:-
The application of wireless sensor network (WSN) for a water quality monitoring is composed of a number of sensor nodes with a networking capability that can be deployed for detecting the water level in land. In this project, we use some sensors for detecting the water level from testing the soil, and report the details to famers mobile phone via wirelessly. The farmer mobile phone related to electricity water pump and sensor device, the electricity water pump is controlled by the farmer on wireless network. The Water level was calculated in digitally and it was displayed on mobile application in the farmer’s smart phones. And we can control the electric water pump to set ON/OFF by the mobile app. This paper proposes how such monitoring system can be setup emphasizing on the aspects of low cost, easy ad hoc installation and easy handling and maintenance. In this paper, the fundamental design and implementation of WSN featuring a high-power transmission Bluetooth based technology together with the IEEE 802.15.1 compatible transceiver is proposed. The developed platform is cost-effective and allows easy customization.

Keywords:- wireless sensor network, water quality monitoring, Bluetooth technology

I. Introduction

Watering is the most important cultural practice and most labor-intensive task in daily greenhouse operation. Watering systems ease the burden of getting water to plants When they need it. Knowing when and how much to water is two important aspects of watering process. Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. When a zone comes on, the water flows through the lateral lines and ultimately ends up at the irrigation emitter (drip) or sprinkler heads.

Many sprinklers have pipe thread inlets on the bottom of them which allows a fitting and the pipe to be attached to them. The sprinklers are usually installed with the top of the head flush with the ground surface. When the water is pressurized, the head will pop up out of the ground and water the desired area until the valve closes and shuts off that zone. Once there is no more water pressure in the lateral line, the sprinkler head will retract back into the ground. Emitters are generally laid on the soil surface or buried a few inches to reduce evaporation losses. Healthy plants can transpire a lot of water, resulting in an increase in the humidity of the greenhouse air. A high relative humidity (above 80-85%) should be avoided because it can increase the incidence of disease and reduce plant transpiration. Sufficient venting or successive heating and venting can prevent condensation on plants surfaces and the Green house structure. The use of cooling systems during the warmer summer months increases the greenhouse air humidity. During periods with warm and humid outdoor conditions, humidity control inside the greenhouse can be a challenge. Greenhouses located in dry, dessert environments benefit greatly from evaporative cooling systems because large amounts of water can be evaporated into the incoming air, resulting in significant temperature drops. Since the relative humidity alone does not tell us anything about the absolute water holding capacity of air, a different measurement is sometime used to describe the absolute moisture status of the soil. The vapor pressure deficit is a measure of the difference between the amount of moisture the air contains at a given moment and the amount of moisture it can hold at that temperature when the air would be saturated. Pressure deficit measurement can tell us how easy it is for plants to transpire: higher values stimulate transpiration (but too high can cause wilting), and lower values inhibit transpiration and can lead to condensation on leaf and greenhouse surfaces. In the mid 20th century, the advent of diesel and electric motors led to systems that could pump groundwater out of major aquifers faster than drainage basins could refill them. This can lead to permanent loss of aquifer capacity, decreased water quality, ground subsidence, and other problems. Apart from all these problems and failures, there has been a considerable evolution in the methods to perform irrigation with the help of technology. The application of technology in the areas of irrigation has proven to be of great help as they deliver efficiency and accuracy.

II. Related Works

There are many works on the application of WSN for monitoring system such as in [2], where Bluetooth is used to monitor the condition of long span bridge after considering disadvantages of the currently used wire and cable for data communications such as high installation cost of communication and power supply for the sensors, difficulty in the installation of steel pipeline for protecting the cables, sensor data distortions due to temperature changes on cables, noise affecting cables and sensors etc. The Bluetooth is used for the short distance communication while CDMA (Code Division Multiple Access) infrastructure was used for long distance communication between sensors and the server system. Another application of Bluetooth in monitoring system is found in [3] for parking management system. In this work the Bluetooth module is based on the ATMega128L microprocessor combined with the Chipcon CC2420 transceiver IC. In [4], an electrocardiogram (ECG) signal monitoring system based on Bluetooth is presented. From all the previous related works described, it can be concluded that there are limitless possibilities of Bluetooth in wireless sensor network application. Solution providers of Bluetooth offer various kind of platform in the market based on user requirement. For this paper, the difference is the use of high transmission power with low power consumption Bluetooth platform.

III. **Hardware Design**

A. Sensor Unit

A sensor unit is basically consists of several sensors used to detect the predetermined parameters that indicate the quality of water. In this work, three types of sensor; pH sensor that senses the acidity of basicity of the water, temperature sensor and turbidity sensor based on phototransistor are used. All the sensors use battery for its operation. The information being sensed by the sensors are then converted into electrical signal and go through the signal conditioning circuit that functions to make sure the voltage or current produced by the sensors is proportional to the actual values of parameters being sensed. Then it is passed to a microcontroller or microprocessor that processes it to the value understandable by human. A sensor's sensitivity indicates how much the sensor's output changes when the input quantity being measured changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, the sensitivity is 1 cm/°C (it is basically the slope Dy/Dx assuming a linear characteristic). Sensors are usually designed to have a small effect on what is measured; making the sensor smaller often improves this and may introduce other advantages.

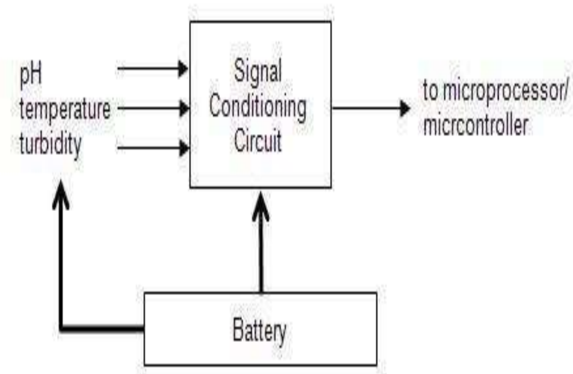

Fig.1 Block diagram of sensor unit

B.Wireless Sensor Node

The wireless sensor node in this work is consist of sensor unit as mentioned in section A; a microcontroller or microprocessor with a task of signal digitizing, data transmission, networking management etc; and radio frequency transceiver for communications at the physical layer. All of them share a single battery as a power source. The following Fig. 1 shows the block diagram of the wireless sensor node. The main microprocessor of the sensor node is based on the Bluetooth compliance product from Cirronet. The high power transmission type ZMN2405HP Bluetooth module is using the CC2430 transceiver IC from Texas Instrument comply to the IEEE 802.15.1 standards with a maximum transmission power of 100 mW using the dipole antenna and 250 mW using the directional patch antenna. The transceiver IC is integrated with the 8051 microcontroller with a low power but high performance of 64 kByte programmable flash features. The module alone requires a 5VDC power supply, multiple sensor inputs/outputs with ADC, operating at a frequency of 2.4 GHz with a configurable sleep mode to get the best of power consumption as low as 3uA [5]. The main microcontroller in the module is reprogrammable whether to function as an end device, router or coordinator nodes. As an end device sensor node, it can only communicate with the router or coordinator to pass the data from the sensor. An end device can only communicate indirectly with the other end device through the router or coordinator. The sensor node defined as a router is responsible for routing data from other routers or end device to the coordinator or to other routers closer to the coordinator. The router can also be a data input device like the end device but in actual application it is generally used to extended the coverage distance of the monitoring system. There can be only one coordinator for the monitoring system. The coordinator responsible for setting the channel for the network to use, assigning network address to routers and end devices and keeping the routing tables for the network that are necessary to route data from one end device to another in the same Bluetooth network. For the actual implementation, a 9V battery supply is used and directly connected to a 5V voltage regulator before goes to the Bluetooth module.

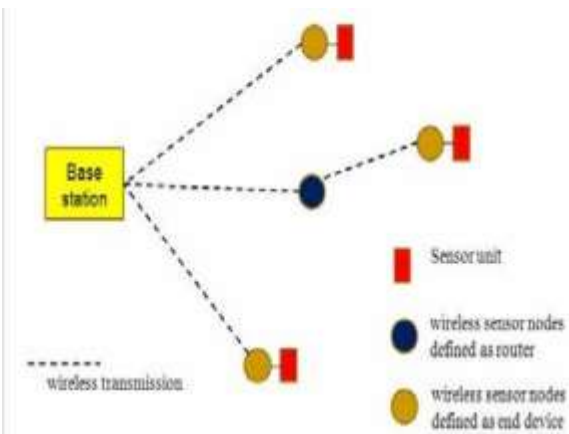

Fig.2. Wireless Sensor Units

IV. Bluetooth

A *Bluetooth*® device uses radio waves instead of wires or cables to connect to a phone or computer. A Bluetooth product, like a headset or watch, contains a tiny computer chip with a Bluetooth radio and software that makes it easy to connect. When two Bluetooth devices want to talk to each other, they need to pair. Communication between Bluetooth devices happens over short-range, ad hoc networks known as piconets. A piconet is a network of devices connected using Bluetooth technology. When a network is established, one device takes the role of the master while all the other devices act as slaves. Piconets are established dynamically and automatically as Bluetooth devices enter and leave radio proximity. With the advent of Bluetooth with low energy functionality (Bluetooth Smart or BLE), developers are now able to create small sensors that run off tiny coin-cell batteries for months, and in some cases, years. Many of these Bluetooth sensors use so little energy that developers are starting to find ways to use scavenged energy, like solar and kinetic, to power them—a potentially unlimited life from a power perspective. This allows you to find Bluetooth technology in billions of devices today, everything from phones to headsets to basketballs and socks—the use cases are limited only by a developer's imagination.

BR/EDR and Bluetooth with low energy are fundamentally different. Bluetooth with the low energy functionality is built on an entirely new development framework using Generic Attributes, or GATT. As a result, Bluetooth not only connects devices together in an ultra-power efficient way, but also directly connects devices to applications on your smartphone, PC or tablet. It's the low energy and GATT features which are at the heart of the current IoT boom. They are also at the heart of Bluetooth, making it the perfect fit for the IoT. On the technical side, Bluetooth 5 has quadruple the range, double the speed, and provides an eight-fold increase in data broadcasting capacity of low energy Bluetooth transmissions compared to Bluetooth 4.x, which could be important for IoT applications where nodes are connected throughout a whole house. Bluetooth 5 supports transfers at 2 Mbit/s instead of the usual 1 Mbit/s. In addition it adds functionality for connectionless services like location-relevant information and navigation of low energy Bluetooth connections.

V. Mobile Application

The android mobile application was Developed and named as SMARTAGRI, It is the main controller of this whole working process and it directly connected with Bluetooth working process.

Fig.3 Mobile Application

VI. Proposed System

In this system, the water level was measured by the moisture sensor level, the measured values are sent to the farmer's smart phones. To control and monitor the sensor device, one mobile application was created and it was adopted with the sensor device. For wireless data transmission, the Bluetooth wireless technology was used in the data transformation. The Water level form the sensor device the values or displayed in digital values in the mobile application screen page. After identify the water level the mobile application was also adopted with the electric water pump motor to control the switch ON/OFF.

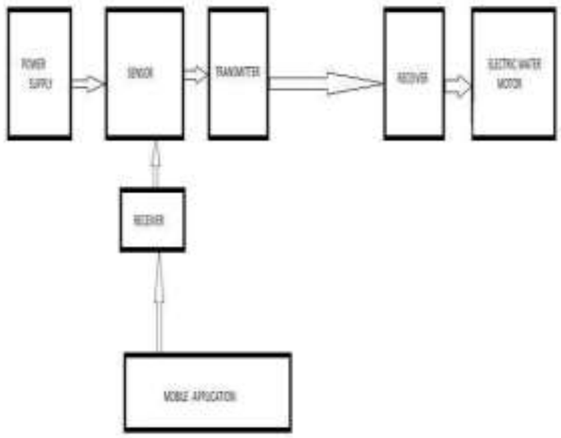

Fig 4.Water Level monitoring System

VII. CONCLUSION

We use some sensors for detecting the water level from testing the soil, and report the details to famers mobile phone via wirelessly. The farmer mobile phone related to electricity water pump and sensor device, the electricity water pump is controlled by the farmer on wireless network. The Water level was calculated in digitally and it was displayed on mobile application in the farmer's smart phones. And we can control the electric water pump to set ON/OFF by the mobile app.

References

1. Energy-Efficient Communication Protocol for Wireless Micro sensor Networks by Wendi Rabiner Heinzelman, Anantha Chandrakasan, and Hari Balakrishnan.
2. Connecting Heterogeneous Sensor Networks with IP Based Wire/Wireless Networks by Shu Lei, Wu XiaolingXu Hui, Yang Jie, Jinsung Cho, and Sungyoung Lee.
3. Optimizing Sensor Networks in the Energy-Latency-Density Design Space by C. Schurgers, V. Tsiatsis, S. Ganeriwal, and M. Srivastava.
4. Mark Forsyth. The etymologicon. // Icon Books Ltd. London N79DP, 2011. p. 139.
5. https://www.bluetooth.com/news/pressreleases/2016/06/16/-bluetooth5quadruples - range doubles speed increases -data –broadcasting capacity -by-800 Bluetooth® 5 quadruples range, doubles speed, increases data broadcasting capacity by 800% . Retrieved *4 September 2010.*