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Review of Wireless Sensor Network for Agriculture

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ABSTRACT: The highly developed in wireless sensor networks can be used in monitoring diverse parameters in agriculture. Attributable to spread in technologies and reduction in size, sensors are becoming involved in almost ever since of life. Agriculture is one of such domains where sensors and their networks are productively used to get several benefits. Assortment of sensors and their effective consumption to solve agricultural domain problems has been an arduous task for novice users due to unavailability of conglomerated information in literature. Traditional agricultural environmental monitoring system supplies power and transmits statistics through cable.

KEYWORDS: Global Standards Initiative (GSI), Internet of Things (IOT), Precision Agriculture (PA), Wireless Sensors Network(WSN), Wireless Sensor and Actuator Network (WSAN).

I.INTRODUCTION

Wireless Sensor Networks (WSN), sometimes called WirelessSensor And Actuator Network (WSAN) Most of the agricultural practices in developing countries are sub-optimum and continue to be traditionally carried out with unskilled laborers who are commitment to the traditional knowledge and reluctant to innovate. In-depth research in this area is still lacking. In this term paper an effective approach to rise above some of the issues related to agricultural productivity is presented. When deployed in the field, the microprocessor automatically initializes communication with every other node in range, creating an ad hoc mesh network for relaying information to and from the gateway node. This negates the require for precious and ungraceful cabling among nodes, instead relying on the flexibility of interconnect networking algorithms to transport information from node to node.

II.LITERATURE REVIEW

They work on 65 motes, which have only eight hops, to collect the data of pH values. Predesigned crop management in precision agriculture is studied in the Lofar Agro project, in Europe. In this project, Proper application of pesticides and fertiliser as per real time environmental changes is explored. For effective control of crop diseases like phytophthora, the information collected from a weather station and the wireless network is very much useful. Kemal Akkaya, Mohamed Younis, “A Survey On Routing Protocols For Wireless Sensor Networks ”, Ad Hoc Networks 3, pp. 325-349 (2005). This paper surveys current routing protocols for sensor networks . Data-centric, hierarchical and location-based are three main classifications that are examined in this paper. Network flow and QoS modeling are also discussed.[1] Jennifer Yick, Biswanath Mukherjee, Dipak Ghosal “Wireless Sensor Network Survey”. This paper was published in 2008. This paper gives an overview of several new applications and then reviews the literature on various aspects of WSNs. This paper classifies the troubles into three different categories: • Internal platform and underlying operating system • Communication protocol stack and • Network services, provisioning, and deployment. This paper reviews the major development in these three categories and outline new challenges.[2] Baranidharan and B. Santhi, “An Evolutionary Approach to improve the life time of the Wireless sensor network”. In this paper, they worked on the approach that how energy efficiency in the wireless sensor conserve its energy reserves, thereby, increasing the life time of nodes [3].

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III.USE OF WIRELESS SENSOR NETWORKS IN PRECISION FARMING

In this paper a Precision farming has the benefit of providing real time feed-back on a number of different crop and site variables. As its name implies, Precision farming is precise in both the size of the crop area it monitors as well as in the release amounts of water, fertilizer, etc. This technology can separate a single plant for monitoring in the tens or hundreds of square feet. The WSN system requires a central manage unit among user interface. Precision Farming requires a exclusive software sculpt for each geographical area, the intrinsic soil type and the particular crop or plants. The frequent data collection doesn't it provide other useful information for the software model and becomes a burden to the Wireless Sensor Network in requisites of power consumption and data transmission. The data collection, monitoring and resources machine to the crops allows for higher yields and lower cost, with less impact to the environment.A general Agricultural application can be employed for: Large crop area monitor, Forest / Vegetation monitoring, Forest fire prevention, Biomass studies, Tracking Animals, harvest give in Improvement.

Figure1: Source:Farm management.pro

VI. WSN SYSTEM ARCHITECTURE

Wireless sensor networks cause unique challenges with regards to unit power consumption, heat transfer and overall size, so the security protocols used for sensor data protection must be efficient, resource friendly and fast. Formal verification is the process used to permit hope and security issues to be verified in relation to security protocol design for the information communications sector. This research program combines these topics and is concerned with the design and formal testing/verification of cryptographic based security protocols suitable for use with wireless sensor systems to perform tasks such as: key agreement, key transport and node authentication. The each day expenses sensor nodes are equally variable, range commencing a few to hundreds of dollars, depending on the complication of the individual sensor nodes. The topology of the WSNs can differ from a easily understand star network to an highly developed multi-hop wireless mesh network.

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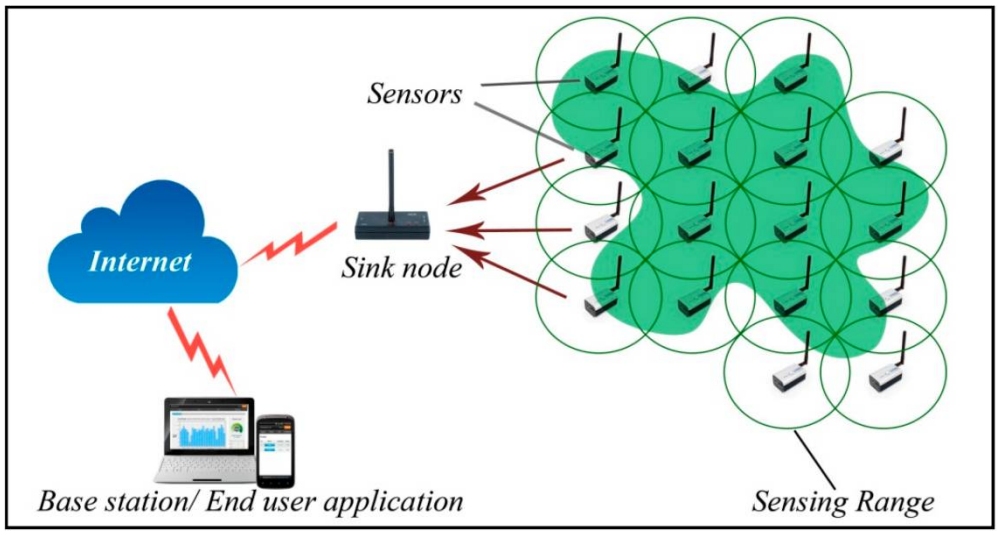

Figure 2:System WSN Architechture

V. SENSORS

A sensor is a device that detects and responds to various type of input from the physical environment. The specific input could be brightness, high temperature, action, humidity, strain or any one of a great number of other environmental phenomena. The production is usually a signal to smooth the progress of is changed to human-readable display at the sensor locality or transmitted electronically over a network for reading or further processing. Sensors are complicated devices that are frequently used to perceive and take action to electrical or optical signals. The use of sensor in exactness farming.Sensors include used in precision agricultural to screen and accumulate data of soil water availability, soil compaction, soil fertility, leaf temperature, leaf area indicator, place in the ground water status, limited environment data, insect-disease-wild plant infestation etc.

VI.FEATURES OF SENSOR

There are assured features which include to be considered when we choose a sensor.

They are as given below:
1. Accuracy
2. Environment provision - usually have restrictions for temperature/ clamminess
3. Range - Quantity limit of sensor
4. Calibration - Essential for most of the measuring devices as the readings changes time
5. Resolution - Smallest increment detected by the sensor
6. Cost
7. Repeatability - The analysis that varies is continually measured under the same Environment.

VII. COMBINATION OF ARM PROCESSOR (LPC 2148)

LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable
option for the beginners as well as high end application developer. ARM7 is one of the widely used micro-controller family in embedded system application.

1. Power Supply

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2. Crystal Oscillator
3. Reset Circuit
4. RTC crystal oscillator
5. UART

VIII.PROPOSED SYSTEM WORK

In this system, the development of water quality system monitoring is processed with the reporting system which is a core technology. while the process of monitoring is depend on gathering the insignificant powered and lightweight process in the network using a sensor nodes. However, the completion is carried out by using the prominent rule control based water quality monitoring system. In this research work, the reporting mechanism is carried out using the basis of SMS the report of the level of water.

IX. IMPLEMENTAION

The purpose of the ARM7 processor is that it connects all the components associated with the Development kit. Number of pins in this processor is 64. Each pin is assigned with particular component of the kit for performing particular function. The threshold value of the sensors is set in this LPC 2148 processor which is responsible for the automatic ON and OFF of the motor which is coupled with the pump for pumping water to the agricultural land. The temperature threshold value will be updated to server or system, through IoT for every 1 minute from the integrated development kit. The integrated START Read the data Deployment of Sensor Is Temperature/ the Humidity values in range Is the water values in range Motor on STOP NO NO YES YES Data server (IoT gateway) International Journal of Engineering Science and Computing, March 2017 5219 http://ijesc.org/ circuit has many transistors in it -- two in the middle, some in each amplifier, some in the constant current source, and some in the curvature compensation circuit. The humidity sensor measures the moisture level in the soil. The threshold value is reached (1 RH%-100 RH%) this limits can be set in the microcontroller if its goes above beyond 10 RH% conditions will be abnormal otherwise moisture level will be in normal conditions. Water level indicator is used to measure the water level in irrigation land. In the water level sensor value measure by using scale level and it's represent in cm. If the water level reaches the bottom of the metal rod it indicates abnormal condition and the control will automatically turn ON, the motor. If the water reaches the certain level the motor can be turn OFF automatically. These statuses can be continuously updated to the system using IoT. [1]The Internet of things (IoT) is the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. The module can even be reprogrammed to act as a standalone Wi-Fi. IoT requires 3.3V power–do not power it with 5 volts. Configure the IoT using SIM card (of any service provider). It will automatically configure IP address using DHCP (Dynamic Host Configuration Protocol). Each IoT component has the unique ID (Device Identification). In the development stage itself they integrate code for transmitter and receiver operations such that gather data from multiple sensors by using microcontroller and these values can be send to the IoT modules. By using below link update the integrated sensors value in browsers for every 1 minute.

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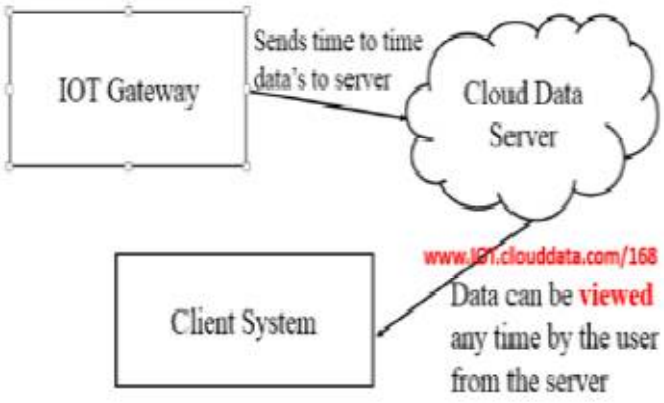

Figure.3. Gateway work flow

X. RESULTS

In the below figure represented what are the components used for developing kit implementation. They are
1.LCD
2.LPC 2148
3.HR 202
4.LM 35
5.Water Level Indicator.

A.DEVELOPMENT KIT

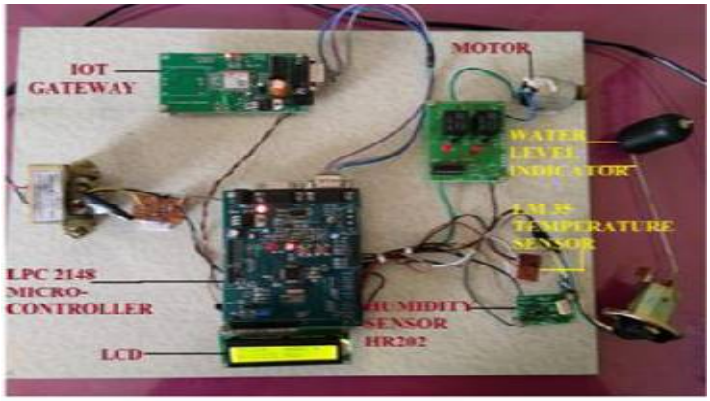

Figure 4:Normal condition of temperature, humidity and water level

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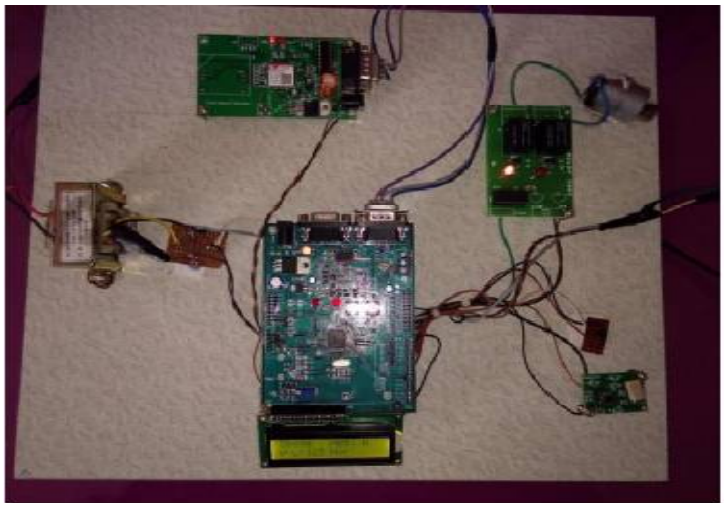

Figure 5: Abnormal condition of temperature, humidity and water level

In the above figure represents the abnormal condition about temperature and humidity sensors. In this situation the motor can be ON automatically and when it goes to normal the pump motor will be OFF.

XI.UPDATE VALUE

In the below figure represent the value of various types of sensors and updated to system in browsers through IoT gateways. These have three status values such as indicate Log ID, Data, Log Date, and Log Time. Time standard used in IoT module is WorldClock format i.e. value calculated based on (original time + 5.30 in hours).

Click Here To Delete Logs CLEARLOG

LogID	DATA	Logdate	LogTime
1	1123	11/10/2016	10:47:09
2	Temp:032NormalHumi:0	11/10/2016	11:39:52
3	Temp:032NormalHumi:0	11/10/2016	11:40:49
4	Temp:033NormalHumi:0	11/10/2016	11:41:51
5	Temp:031NormalHumi:0	11/10/2016	11:42:53
6	Temp:031NormalHumi:0	11/10/2016	11:43:56
7	Temp:032NormalHumi:0	11/10/2016	11:44:55
8	Temp:031NormalHumi:0	11/10/2016	11:45:57
9	Temp:031NormalHumi:0	11/10/2016	11:46:59
10	Temp:031NormalHumi:0	11/10/2016	11:48:01
11	Temp:031NormalHumi:0	11/10/2016	12:19:24
12	Temp:030NormalHumi:0	11/10/2016	12:21:03
13	Temp:031NormalHumi:0	11/10/2016	12:21:35
14	Temp:036NormalHumi:0	11/10/2016	12:22:35

Figure. 6.Normal values are updated in data logs through iot gateway

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15	654	11/11/2016	06:36:27
16	Temp:032NormalHumi:0	11/12/2016	05:08:41
17	Temp:031NormalHumi:0	11/12/2016	05:09:38
18	Temp:033NormalHumi:0	11/12/2016	05:10:42
19	Temp:032NormalHumi:0	11/12/2016	05:11:35
20	Temp:032NormalHumi:0	11/12/2016	05:12:26
21	Temp:033NormalHumi:0	11/12/2016	05:13:17
22	Temp:037NormalHumi:0	11/12/2016	05:14:19
23	Temp:031NormalHumi:0	11/12/2016	05:24:47
24	Temp:032NormalHumi:0	11/12/2016	05:25:47
25	Temp:032NormalHumi:1	11/12/2016	05:26:35
26	Temp:032NormalHumi:0	11/12/2016	05:27:24
27	Temp:031NormalHumi:0	11/12/2016	05:28:31
28	Temp:051HighHumi:007	11/12/2016	05:29:22

Figure.7. Abnormal values are updated in data logs through iot gateway

15	654	11/11/2016	06:36:27
16	Temp:032NormalHumi:0	11/12/2016	05:08:41
17	Temp:031NormalHumi:0	11/12/2016	05:09:38
18	Temp:033NormalHumi:0	11/12/2016	05:10:42
19	Temp:032NormalHumi:0	11/12/2016	05:11:35
20	Temp:032NormalHumi:0	11/12/2016	05:12:26
21	Temp:033NormalHumi:0	11/12/2016	05:13:17
22	Temp:037NormalHumi:0	11/12/2016	05:14:19
23	Temp:031NormalHumi:0	11/12/2016	05:24:47
24	Temp:032NormalHumi:0	11/12/2016	05:25:47
25	Temp:032NormalHumi:1	11/12/2016	05:26:35
26	Temp:032NormalHumi:0	11/12/2016	05:27:24
27	Temp:031NormalHumi:0	11/12/2016	05:28:31
28	Temp:051HighHumi:007	11/12/2016	05:29:22

Figure.8. Abnormal values are updated in data logs through iot gateway

XII. CONCLUSION

This paper presents a bring in monitoring system based on wireless sensor network. IoT has important significance in promoting agricultural informal ion. ARM 7 processor is integrating with the sensors (temperature, humidity and water level) used for agriculture monitoring and crops production. Depending upon the threshold value motor is controlled automatically. The monitored crop details are uploaded to the cloud via the IoT gateway. Hence the farmers can easily to access and control the agricultural production, whereas saving the input materials, improving efficiency, productivity and profitability in farming production system.

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XIII. FURTURE ENHANCEMENT

As depending on these parameter values farmer can easily decide which fungicides and pesticides are used for improving crop production. If favourable weather condition and the probability of disease is detected, then it very helpful for farmers to prevent infection of disease and reduce the cost of production.

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