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Research Paper

Smart irrigation using WSN based on IOT

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Abstract

To set right the usage of water for crops of agriculture an automated irrigation system has been implemented. A moisture soil sensor; and a temperature measure sensor which is called as network of the distributed wireless is used at base of the plant. Along with these, we implemented a gateway unit. which gathers information and regulate it and by activating the triggers actuators, it can send and receive the transmits data to and from the web application. I proposed the algorithm which having the temperature and soil moisture threshold values that embedded in a gate way based on micro controller. It implemented panels of the photovoltaic; and having a duplex communication link; and works with the interface i.e. cellular-Internet which offers that data inspection & irrigation timing. All this can be programmed by using a web page. Implemented automated Crop water saving system tested for 136 days in sage crop field. It can be saved 90% water compared to others. The main 3 advantages of this automated system make it place successfully in any place for 18 months. As it is energy self-rule, cost less, so it can be efficiently useful in limited water geographical lands.

Keywords: *temp sensor, humidity, GPRS.*

1. Introduction

We have so many existed methods and system are many systems for saving water in various fields, that re developed at basically to advanced ones. For a case history, a method that used for monitoring the status of plant water monitored and scheduled plan temperature distribution, with the help of thermal imaging method. Along with this other method also used in various and different crops for schedule irrigation & saving of water with the help of crops water index. By using the Canopy temperature of infrared; temperatures of the ambient air, and vapor pressure of the atmospheric deficit values will be taken for calculating the index while using the broccoli using drip irrigation. We have automated Irrigation systems based on the information of water content volume of a soil, with the use of the moisture sensors that works on dielectric principle for regulating the actuators, optimizing the water, along with help of pre-known irrigation time at specific time of a day; and in a particular time, duration. A micro Controller used irrigation system can be detected index value & can applied water to bedding plants such as impatiens; petunia; salvia; and Vince when the water level for plant is lower than specified value.

2. Literature Survey

Primary Motto of the "Automated Irrigation System Using a Wireless Sensor Network & GPRS Module" which I implemented is cost effective.

Main purpose of the implemented system is providing cell phone that associated with the embedded system for irrigation for decreasing filed monitoring manually and detect the GPRS information. Proposed method is for trying for growing farmers flexibility.

Different types of WSNs that are commercial exist, feeding from restricted value & a resolution devices which are low having the sensors & processors of the embedded systems for finishing and acquisition systems which having high cost and guide sensors that are diverse in nature having excellent features for several communications. Various advancements in microelectronics as well as in wireless technologies made the cost effective; and components that are works with low-power, those are major considerations for the systems especially for WSN. management of power is also very important in both hard ware and software. Coming to the design of power aware the selection of microcontroller is also considerable. "Modern CMOS and micro-electro-mechanical systems" which are simply say as MEMS offers to produce 3 year enhance circuits to by using the sensors; signal conditioning; signal processing; digital output; communications; and power supply.

3. Transmitter Section

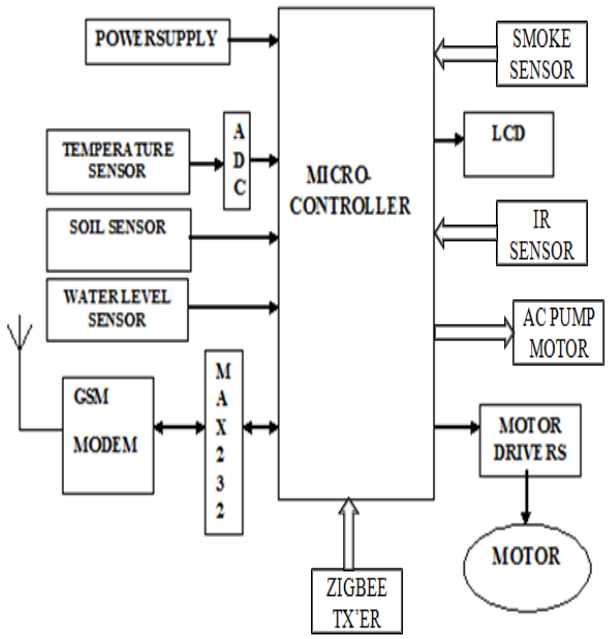

Fig. 1: Block diagram

4. Receiver Section

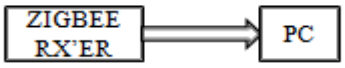

Fig. 2: A simple block diagram

The implemented "automated irrigation system based on microcontrollers and wireless communication" in experimental stage presented in rural areas. Motto of this is providing the automatic irrigation with the use of low water to the crops. For acquisition, of the data & works as transceiver we used a micro controller the sent the signals to microcontroller based on receiver. Used gateway allows the "automated activation of irrigation" while the cut off levels of soil moisture and temperature has been reached below specified vales. Nodes of the sensors and receiver used for data can be Communicated with the help of Zigbee network. The communication link which operate in duplex mode works with cellular Internet interface, and a protocol of the General Packet Radio Service in packet for mobile data service cellular global system; in receiver is for the mobile communications (GSM) .The user allowed for data inspection real time in a website via internet connection there temperature minima and maximum values of the soil-moisture has been displayed in the form of graph that are stored in data base via a integrated application software . It can also activate the irrigation schemes schedule & trigger values through the direct programming of receiver according to the growth of the crop and management of the season. as it has autonomy of the energy & lesser in cost, it can be very well suited for crops.

5. Methodology

Temperature Sensor: One type of resistor is Thermistors where the value of the resistance is completely based on temperature. These are useful in various sectors such as limiter of inrush current, temperature sensors; self-resetting; current protectors, and self-controllable heating elements. The Used TMP103 has the output as temperature measures in digital form in a 4ball; wafer chip-scale package i.e. WCSP. We can obtain 1°C resolution temperatures with the use of this.

Fig. 3: Temperature sensor

Water Level Sensor: For detecting the levels of the fluids; we used level sensor. It consists a wire that capable for sensing the level of fluid accurately such as water; saltwater; & oils. This element of sensor will be insulated electrically; isolated with liquid. We can adjust range of measurement for few centimeters or over various meters. The included vibrating; rotating paddle; mechanical (diaphragm); microwave (radar); capacitance; optical; pulsed-ultrasonic; and ultrasonic level sensors.

Fig. 4: Capacitive water level sensor

Soil Moisture Sensor:
Soil Moisture Sensor Functional Description:
Two copper leads presented in this can be act as probes for sensor. inserted in to specified soil where the content of moisture is under test. A soiled can be divided in to 3 types.
STEP1: As Dry condition; - where the probes of the sensor dipped in to the soil dry conditions; to a soil fair depth. the two copper leads do not have conduction path then it becomes open circuit. The emitter output voltage measures in terms of voltage from 0 volts to the 0.5Votls.
STEP2: Optimum condition- When the soil having moisture then the conduction occurs between wires and the output is taken as voltage output i.e 1.9 volts to 3.4Volts approximately.
STEP3: Excess water condition- when the water level reaches the optimum level then the conduction is in steady state and the output is appeared in terms of voltage which is greater than 4.2Volts.

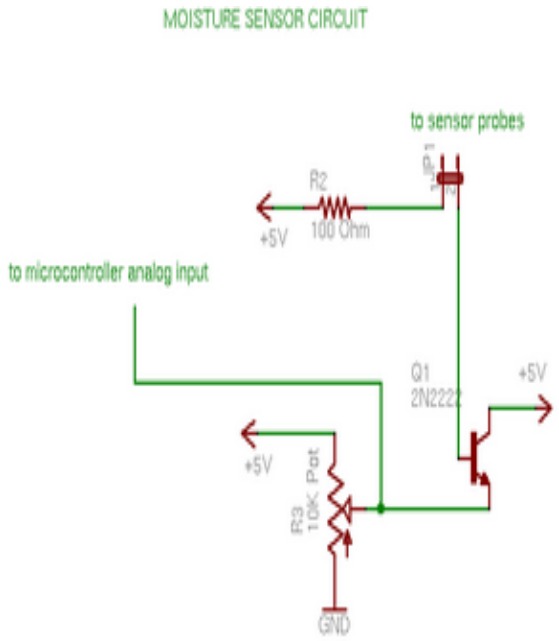

Fig. 5: Moisture Sensor

Co2 Sensor: The gas sensors are also utilized in this which detects the LP; i-butane; propane; methane; alcohol; Hydrogen; smoke. Rs is considered as input and RL is taken as output.
Rs\RL = (Vc-VRL) / VRL

Fig. 6: Co2 sensor

GPRS: general packet radio service is also called as GPRS. That is a packet-based. Works on wireless communication services; which provided as overlay for a network the GSM; CDMA; and TDMA; (ANSI-I36); networks. GPRS works on the principle of packet radio for sending the data packets with an efficient route in between GSM mobile stations; and an networks i.e. external packet data. As Packet switching split data into packets transmitted differently and at receiving end it will be decrypted. Cellular networks with GPRS capabilities are wireless extensions of the Internet and X.25 networks.

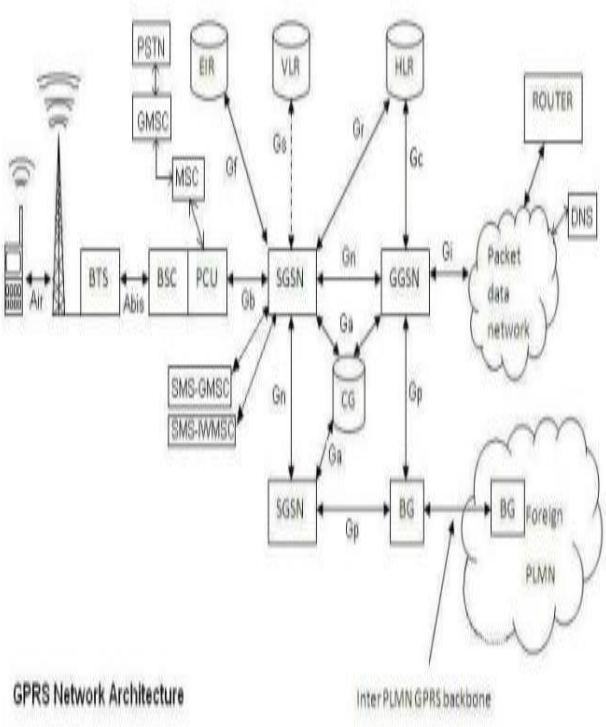

Fig. 7: GPRS Architecture

ZIGBEE: Modules of the ZigBee modules having the Interface of UART allows any type of the microcontrollers; or microprocessor; ZigBee protocol immediate use. The ZigBee hardware levels of port logic levels in serial that are compatible to X Bee's 2.8 volts to the 3.4-Volts. standard RS-232 IC or logic level translators are used for this calculation those are 74LVTH125; a directly connection between host and X Bee UART. With the help of asynchronous Serial port logic levels, X- Bee RF Modules communicate with hosts.
By using the DIN, the Data can be sent to the X-Bee module, it should in asynchronous serial mode, It having the one start bit, a 8 data bits one stop bit. No bit reversion is needed because the bit is transmitted directly. Everything like parity checking can be done with X-Bee's; UART.
DC Motor: DC motor framed with magnetic poles. The coil wounded on the poles having the current passage creates the electromagnetic effect. We can switch magnetic field by on and off the current in coils. also provide switching of magnetic field and current. We can switch the 180° for magnetic field in DC motor.

Fig. 8: DC Motor

Motor driver (L293D): The transistor configuration which can be called as "H-bridge" is used to control the DC motors. which are having the 4 Switches typically the 2 NPN; and 2 PNP transistors are used. At a time 1 NPN; and 1 PNP can be activated. Both are in active motor terminals short crossing, that are helpful for motor

slowing down process. And an EMF created in back side. This H-bridge also known as "full bridge" as it is having 4 switching transistors in “corners" and then we can see the cross-bar motor. At high left or low right theses transistors switches in pair form. we cannot see the both switches in single "side". when 2 are in same side then bridge will go to turned on state then a short circuit created between battery terminals.

IR Transmitter & Receiver: In a Single Housing, we can arrange the Transmitter as well as the also. The TX infrared light betas the an object which will be detected and reflected in an way of diffuse manner. A reflected light some part can be stroked receiver when the operation of switching performs. Both reflection and non-reflection implements the sensing range of object presence or not With the help of this we can detect the any all objects safely. For bad degree of reflection objects (matt black rough surfaces) recommended is utilizing of sensors which are in diffuse reflection mode for low ranges; or with background suppression.

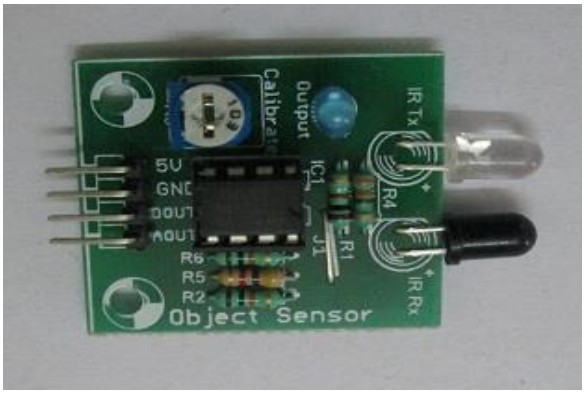

Fig. 9: IR sensor

6. Conclusion

The proposed or implemented "automated irrigation system" is feasible. Also, it will be effective in cost to optimize resources of water in agricultural production. Where there is water scarcity,we can use this irrigation system for good cultivation for enhancing the sustainability. This "automated irrigation system" implemented proves that water use can reduced to a specified level of the production of the fresh biomass. Solar power can be effectively used in system that is very important to the crops, which are organic and various another's agricultural products that are isolated geographically, where there is the expensive electrical power supply is replaced and economically feasible to the agriculture sector and farmer community.

References

[1] W. A. Jury and H. J. Vaux, “The emerging global water crisis: Managing scarcity and conflict between water users,” Adv. Agronomy, vol. 95, pp. 1–76, Sep. 2007.

[2] X. Wang, W. Yang, A. Wheaton, N. Cooley, and B. Moran, “Efficient registration of optical and IR images for automatic plant water stress assessment,” Computer. Electron. Agriculture., vol. 74, no. 2, pp. 230–237, Nov. 2010.

[3] G. Yuan, Y. Luo, X. Sun, and D. Tang, “Evaluation of a crop water stress index for detecting water stress in winter wheat in the North China Plain,” Agriculture Water Management., vol. 64, no. 1, pp. 29–40, Jan. 2004.

[4] S. B. Idso, R. D. Jackson, P. J. Pinter, Jr., R. J. Reginato, and J. L. Hatfield, “Normalizing the stress-degree-day parameter for environmental variability,” Agricult. Meteorol., vol. 24, pp. 45–55, Jan. 1981.

[5] Y. Erdem, L. Arin, T. Erdem, S. Polat, M. Deveci, H. Okursoy, and H. T. Gültas, “Crop water stress index for assessing irrigation scheduling of drip irrigated broccoli (Brassica oleracea L. var. italica),” Agricult. Water Manag., vol. 98, no. 1, pp. 148–156, Dec. 2010.

[6] K. S. Nemali and M. W. Van Iersel, “An automated system for controlling drought stress and irrigation in potted plants,” Sci. Horticult., vol. 110, no. 3, pp. 292–297, Nov. 2006.

[7] S. A. O’Shaughnessy and S. R. Evett, “Canopy temperature based system effectively schedules and controls center pivot irrigation of cotton,” Agricult. Water Manag., vol. 97, no. 9, pp. 1310–1316, Apr. 2010.

[8] R. G. Allen, L. S. Pereira, D. Raes, and M. Smith, Crop Evapotranspiration-Guidelines for Computing Crop Water Requirements—FAO Irrigation and Drainage Paper 56. Rome, Italy:FAO, 1998.

[9] S. L. Davis and M. D. Dukes, “Irrigation scheduling performance by evapotranspiration-based controllers,” Agriculture. Water Management., vol. 98, no. 1, pp. 19–28, Dec. 2010.

[10] K. W. Migliaccio, B. Schaffer, J. H. Crane, and F. S. Davies, “Plant response to evapotranspiration and soil water sensor irrigation scheduling methods for papaya production in south Florida,” Agriculture. Water Management., vol. 97, no. 10, pp. 1452–1460, Oct. 2010.

[11] Dr. Seetaiah Kilaru, Hari Kishore K, Sravani T, Anvesh Chowdary L, Balaji T “Review and Analysis of Promising Technologies with Respect to fifth Generation Networks”, 2014 First International Conference on Networks & Soft Computing, ISSN:978-1-4799-3486-7/14,pp.270-273,August 2014.

[12] Meka Bharadwaj, Hari Kishore "Enhanced Launch-Off-Capture Testing Using BIST Designs” Journal of Engineering and Applied Sciences, ISSN No: 1816-949X, Vol No.12, Issue No.3, page: 636-643, April 2017.

[13] P Bala Gopal, K Hari Kishore, R.R Kalyan Venkatesh, P Harinath Mandalapu “An FPGA Implementation of On Chip UART Testing with BIST Techniques”, International Journal of Applied Engineering Research, ISSN 0973-4562, Volume 10, Number 14 , pp. 34047-34051, August 2015.

[14] T. Padmapriya, V.Saminadan, “Performance Improvement in long term Evolution-advanced network using multiple imput multiple output technique”, Journal of Advanced Research in Dynamical and Control Systems, Vol. 9, Sp-6, pp: 990-1010, 2017.

[15] S.V.Manikanthan and D.Sugandhi “ Interference Alignment Techniques For Mimo Multicell Based On Relay Interference Broadcast Channel ” International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE) ISSN: 0976-1353 Volume- 7 ,Issue 1 –MARCH 2014.

[16] Dr. Seetaiah Kilaru, Hari Kishore K, Sravani T, Anvesh Chowdary L, Balaji T “Review and Analysis of Promising Technologies with Respect to fifth Generation Networks”, 2014 First International Conference on Networks & Soft Computing, ISSN:978-1-4799-3486-7/14,pp.270-273, August 2014.