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CLOUD OF THINGS IN SMART AGRICULTURE: INTELLIGENT IRRIGATION MONITORIN BY IMAGE PROCESSING

[1]Bhukya Sunitha, [2]Md Ashraf, [3]Dr. D SubbaRao
[1]PG Scholar, MTech, Dept of ECE, Siddhartha Institute of Engineering & Technology, Ibrahimpatnam, T.S.
bhukyasunithaece@gmail.com
[2]Assoc Professor, Dept of ECE, Siddhartha Institute of Engineering & Technology, Ibrahimpatnam, T.S.
[3]Professor & HOD, Dept of ECE, Siddhartha Institute of Engineering & Technology, Ibrahimpatnam, T.S.

ABSTRACT
There has been much research and various attempts to apply new IOT technology to agricultural areas. However, IOT for the agriculture should be considered differently against the same areas such as industrial, logistics. This paper presents the IOT-based agricultural production system for stabilizing supply and demand of agricultural products while developing the environment sensors and prediction system for the growth and production number of crops by gathering its environmental information. Currently, the demand by consumption of agricultural products could be predicted quantitatively, however, the variation of harvest and production by the change of farm's cultivated area, weather change, disease and insect damage etc. could not be predicted, so that the supply and demand of agricultural products has not been controlled properly. To overcome it, this paper designed the IOT-based monitoring system to analyze crop environment, and the method to improve the efficiency of decision making by analyzing harvest statistics. Therefore, this paper developed the real time monitoring of healthiness of the crops in the agriculture field and updates the status to the cloud serer and also providing necessary water to crop at required time.

I. INTRODUCTION

Deployment of a Cloud of Things (CoT) network, which can include Internet of Things and cyber physical system, in smart agriculture can make energy use more efficient and less costly. For example, data analytics collected from the CoT network (e.g., either situation, land condition, and type of soil) can provide practical information when used in combination with data captured by energy uses for pumps, lighting, boosters, and other purposes and remotely control the status, working conditions, and performance of equipment. For example, data analytics and CoT can be used to determine equipment status, e.g., whether a gate or alive is opened or closed, an irrigation pump is turned on or off as well as other indicators that signal the need for maintenance or emplacement

II. IMPLEMENTATION

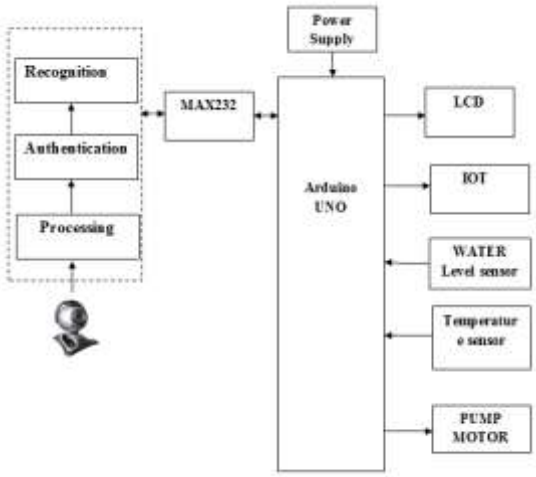
POWER SUPPLY

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V.

The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

BLOCK DIAGRAM



ARDUINO UNO

Arduino/genuino Uno is a microcontroller board based on the atmega328p (datasheet). It has 14 digital input/output pins (of which 6 can be used as pwm outputs), 6 analog inputs, a 16 MHz quartz crystal, a usb connection, a power jack, an icsp header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a usb cable or power it with a ac-to-dc adapter or battery to get started. You can tinker with your Uno without

worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

TECHNICAL SPECIFICATIONS

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

LIQUID CRYSTAL DISPLAY (LCD)

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

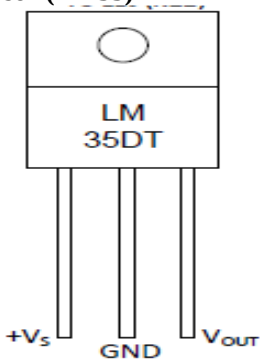
Fig. 16x2 LCD

Temperature sensor

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications.

A large distinction can be made between temperature sensor types. Sensors differ a lot in properties such as contact-way, temperature range, calibrating method and sensing element. The temperature sensors contain a sensing element enclosed in housings of plastic or metal. With the help of conditioning circuits, the sensor will reflect the change of environmental temperature.

Temperature sensor (LM35)



Pin Definition

The definition of gray-scale sensor pin is

1. Signal Output
2. GND
3. Power

RELAY

History

The principal hand-off was created by Joseph Henry in 1835. The name hand-off gets from the French thing transfers' that demonstrates the steed trade spot of the mailman.

Working

By and large, the transfer comprises an inductor loop, a spring (not appeared in the figure), Swing terminal, and two high power contacts named as regularly shut (NC) and typically opened (NO).

At whatever point required power is connected to the inductor loop, the present moving through the curl produces an attractive field which is useful to move the swing terminal and appended it to the typically open (NO) contact. Favorable position of transfer.

SUBMERSIBLE WATER PUMP

Description:

This submersible pump is designed for reliability and ultra-quiet operation to provide years of service. The small profile size makes the pump easy to hide or disguise. Has adjustable flow and is easy to clean. This submersible water pump is great for aquarium, fountains, spout and hydroponic systems.

Working Principle:

It is often used as a booster pump for home water pressure. It can be completely submerged into the fluid and the motor is hermetically sealed. The motor is close-coupled to the body of the water booster pump. It pumps the water to the surface by energy conversion that works in a cycle. The rotary energy is converted into kinetic energy that is further converted into pressure energy.

The submersible pump works by pulling the fluid towards itself. During the intake, the rotating impeller pushes the fluid through the diffuser. From there, the fluid goes to the surface. The submersible pumps are self-priming as they are already submerged in the fluid. Cavitation is never an issue and they are also quiet because they work underwater.

INTERNET OF THINGS (IOT)

In 1995, "thing to thing" was authored by BILL GATES. In 1999, IoT (Internet of Things) was come up by EPC worldwide. IOT interconnects human to thing, thing to thing and human to human. The objective of IoT is draw out an enormous system by consolidating various sorts associated gadgets. IoT targets three viewpoints Communication, computerization, cost sparing in a framework. IOT engages individuals to complete routine exercises utilizing web and in this manner spares time and cost making them increasingly profitable. IOT empowers the items to be detected as well as controlled remotely crosswise over existing system model. IOT in natural observing thinks about the air and water quality, temperature and states of the dirt, and furthermore screen the interruption of creatures in to the field. IOT can likewise assume a noteworthy job in accuracy cultivating to improve the profitability of the homestead.

WATER LEVEL SENSOR

Level sensors detect the level of substances that flow, including liquids, slurries, granular materials, and powders. All such substances flow to become essentially level in their containers (or other physical boundaries) because of gravity. The substance to be measured can be inside a container or can be in its natural form (e.g. a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally, the latter detect levels that are excessively high or low.

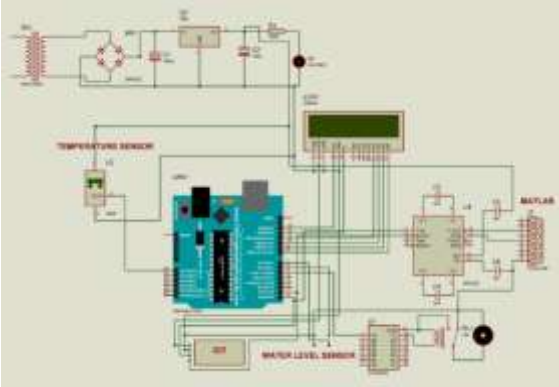
MAX232

The MAX232 is an IC, first created by Maxim Integrated Products, that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case.

The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 VTTL levels. These receivers have a typical threshold of 1.3 V, and a typical hysteresis of 0.5 V.

III. RESULTS AND OUTPUT SCREENSHOTS



IV. CONCLUSION

Time synchronization is a basic factor for WSN on the grounds that sensor hubs have restricted power and number of interchanges expends control. In this paper, an Adaptive Non-Linear Gaussian Regression Synchronization (ANGRS) model has been proposed for vitality productive synchronization. Non-straight with changing relapse coefficient, ANGRS improves synchronization precision over direct expectation plans. Watched results outline that ANGRS performs superior to RBS and TPSN in regard of expanding framework exactness and streamlining vitality utilization. ANGRS lessens the RMSE for check synchronization to 24.85% in correlation of Linear Prediction Synchronization (LPS) with RMSE 28.72%. What's more, ANGRS gives littler variety between the watched worth and the fitted incentive as given by the R-Squared as appeared Table IX.

REFERENCES

[1] D. Upadhyay and P. Banerjee, "An energy efficient proposed framework for time synchronization problem of wireless sensor network", *Advances in Intelligent Systems and Computing*, Springer, vol. 435, Feb. 2016, pp. 377-385.

[2] J. Elson, L. Girod, and D. Estrin, "Fine-grained network time synchronization using reference broadcasts", *SIGOPS Oper. Syst. Rev.*, vol. 36, SI, pp.47-163, Dec.2002.

[3] S. Ganeriwal, R. Kumar, and M. B. Srivastava, "Timing-sync protocol for sensor networks", In *Proc. 1st Intl Conf. on Embedded Networked Sensor Systems (SenSys '03)*, ACM, New York, NY, USA, 2003, pp. 138-149.

[4] Y. Xing, Y. Chen, H. Sun, W. Yi, and C. Duan, "ALPS: Adaptive Linear Prediction for Time Synchronization in Wireless Sensor Networks", In: L. Sun, H. Ma, D. Fang, J. Niu, W. Wang (eds) *Advances in Wireless Sensor Networks, CWSN 2014, Communications in Computer and Information Science*, Springer, Berlin, Heidelberg, vol. 501, 2015, pp. 355-367.

[5] G. C. Gautam and N. C. Kaushal, "Controlled Mobility Time Synchronization for WSNs", *Wireless Sensor Network*, vol. 9, pp. 1-15, 2017.

[6] W. Su, "Overview of time synchronization issues in sensor networks", *In Embedded systems*, ed. R. Zurawski Boca Raton, FL*:* CRC Press, pp. 35-45, 2005

[7] J. Wang, S. Zhang, D. Gao, and Y. Wang, "Two-hop time synchronization protocol for sensor networks", *EURASIP Journal on Wireless Communications and Networking*, vol. 39, pp. 1-10, 2014.

[8] D. Djenouri, N. Merabtine, F. Z. Mekahlia, and M. Doudou, "Fast distributed multi-hop relative time synchronization protocol and estimators for wireless sensor networks", *Ad Hoc Networks*, vol. 11, pp. 2329–2344, 2013.

[9] J. Wu, L. Jiao, and R. Ding, "Average time synchronization in wireless sensor networks by pairwise messages", *Computer Communications*, vol. 35, pp. 221–233. 2012.

[10] T. Schmid, Z. Charbiwala, R. Shea, and M. Srivastava, "Temperature Compensated Time Synchronization", *IEEE Embedded Systems Letters*, vol.1, pp. 37–41, 2009.

[11] G. Huang, A. Y. Zomaya, F. C. Delicato, and P. F. Pires, "Long term and large-scale time synchronization in wireless sensor networks", *Computer Communications*, vol. 37, pp. 77–91, 2014.

[12] Y. C. Wu, Q. Chaudhari, and E. Serpedin, "Clock Synchronization of Wireless Sensor Networks", *IEEE Signal Processing Magazine*, vol. 28, pp. 124–138, 2011.

[13] Z. Zhong, P. Chen, and T. He, "On-demand time synchronization with predictable accuracy," In *Proc. IEEE INFOCOM*, IEEE, Shanghai, China, Apr. 2011, pp. 2480-2488.

[14] C. Lenzen, P. Sommer, and R. Wattenhofer, "Optimal clock synchronization in networks", In *Proc. 7th ACM Conference on Embedded Networked Sensor Systems - SenSys '09*, Berkeley, CA, USA 04-06 Nov., 2009, pp. 225–238.

[15] M. Leng and Y. C. Wu, "On Clock Synchronization Algorithms for Wireless Sensor Networks Under Unknown Delay", *IEEE Trans. on*

Vehicular Technology, vol. 59, no. 1, pp. 182-190, Jan. 2010.

[16] M. Leng and Y. C. Wu, "Low-Complexity Maximum-Likelihood Estimator for Clock Synchronization of Wireless Sensor Nodes Under Exponential Delays", *IEEE Trans. on Signal Processing*, vol. 59, no. 10, pp. 4860-4870, Oct. 2011.

AUTHOR PROFILE'S

BHUKYA SUNITHA doing post-graduation in VLSI and Embedded systems from Siddhartha Institute of Engineering and Technology in Department of Electronics and Communication Engineering.

MD ASHRAF, is currently working as Associate Professor in Electronics and Communication Engineering (ECE) at Siddharth institute of engineering and technology

DR. D SUBBA RAO, is a proficient Ph.D person in the research area of wireless communications from Rayalseema University, Kurnool along with initial degrees of Bachelor of Technology in Electronics and Communication Engineering (ECE) from Dr. SGIET, Markapur and Master of Technology in Embedded Systems from SRM University, Chennai. He has 16 years of teaching experience and has published 98 Papers in International Journals, 2 Papers in National Journals and has been noted under 4 International Conferences. He has a fellowship of The Institution of Electronics and Telecommunication Engineers (IETE) along with a Life time membership of Indian Society for Technical Education (ISTE). He is currently bounded as an Associate Professor and is being chaired as Head of the Department for Electronics and Communication Engineering discipline at Siddhartha Institute of Engineering and Technology, Ibrahimpatnam, Hyderabad.