IJBPAS, November, Special Issue, 2021, 10(11): 454-463

ISSN: 2277–4998

International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

# INTERNET OF THINGS TO ENHANCE DEVELOPMENT FOR SUCCESSFUL PLANTATIONS, CONTINUOUSLY REGULATED AGRICULTURAL COMPONENTS

**CHIRRA KESAVA REDDY[1*], MERIGILA KISHORE BABU[2], DIVAKARA RAO V.D[3], RANJAN WALIA[4], RAJEEV SHARMA[5] AND SHYAM KUMAR KATTA[6]**

**1:** Professor & Principal, Department of Mechanical Engineering,Universal College of Engineering & Technology, Perecherla,Guntur, Andhra Pradesh,India.

**2:** Associate Professor, Department of Computer Science & Engineering,Universal College of Engineering & Technology, Perecherla,Guntur, Andhra Pradesh, India

**3:** Associate Professor, Department of Computer Science and Engineering, Raghu Engineering College, Dakamarri, Visakhapatnam, Andhra Pradesh, India

**4:** Associate Professor, Department of Electrical Engineering, Model Institute of Engineering and Technology, Jammu, J&K, India

**5:** Assistant Professor, Department of Electronics & Communication Engineering,The Technological Institute of Textile & Sciences, Bhiwani

**6:** Director Programs , Flat #304, Sai Saran Apts, Anand Nagar Colony, Kharitabad, Hyderabad, Telangana, India

***Corresponding Author: Chirra Kesava Reddy; E Mail: ckreddy3838@gmail.com**

**Received 20th July 2021; Revised 22nd Aug. 2021; Accepted 30th Sept. 2021; Available online 1st Nov. 2021**

https://doi.org/10.31032/IJBPAS/2021/10.11.1040

## ABSTRACT

An Internet of Things (IoT) is becoming increasingly important in intelligent agriculture. Intelligent farming is a new phenomena, and IoT devices might give information about various croplands. One goal of this plan is to leverage new innovations like the Internet of Things (IoT) and automated intelligent agriculture. So order to improve that development for successful plantings, environmental components should be constantly regulated. These paper features continuous temperatures and comparative moisture monitoring in croplands employing detectors built on the CZC3160 special microchip. Its webcam is linked to the CZC3160, that shoots photographs and delivers them wirelessly over MMS to the founder's cellphone.

**Keywords: Temperatures, Internet of Things, Wireless Sensors Networks, CZC3160, Intelligent agricultural**

## INTRODUCTION

An IoT would be a popular way of interconnecting gadgets and documenting. IoT platforms are being used to manage and engage in digital information via the Internet of Things. Create an account for various sensors, generate data streams, and analyze the records. Create an account for various sensors, generate data streams, and analyze the records. Metropolitan areas, Smart Atmosphere, Smart Water, Clever Metering, Surveillance and Rescue, Industrial Control, Intelligent Farming, Home computerization, and e-Health are examples of IoT apps.

According to a poll conducted by the United Nations Food and Farming Agency, agricultural production should rise over 70% by 2050 to accommodate the growth. Agriculture is the backbone of a human species since it provides the primary food source and contributes leading to the success of a country's growth. Moreover, it provides them with a significant number of job options. Farm owners are all still practicing traditional techniques, which leads to low crop and fruit yields. As a result, overall crop output could be increased by utilizing automated machinery. To enhance productivity, contemporary science & technology must be implemented in farming. They can expect higher yield at a cheap cost through using IoT to monitor soil utilization, humidity and temperature, rainfall monitoring, fertilizers reliability, irrigation storage space monitoring, and theft detecting in farmlands.Farming modernization could be achieved by combining conventional methods with cutting-edge technologies such as the Internet of Things and Wireless Sensor Network (WSN) information from various sensing devices and transmits it via Wi - fi router to a server computer.Several additional elements have a significant impact on the efficiencies included insect and parasite attacks, which may be handled by applying the appropriate insecticides and pesticides, as well as wildlife species attacks as the agricultural production. Agricultural production is decreasing as a result of unexpected monsoon rains, water shortages, and unsustainable water consumption.

**[1]** Suggested IoT-based precision agricultural research. A focus of the research is to use mechanization and IoT technology to make farming intelligent.Pruning, sprinkling, wetness sensing, and other tasks will be performed by sophisticated Navigation remote-control robots. Intelligent irrigation combined smart control, intelligent data depending on precise, actual field input, and smart warehouse management also is part of it. The warehouse's temperature, moisture, and theft detecting are all surveilled by it. A few of the activities would be managed by a computing device, which will interface sensors, ZigBee units, and cameras. Using Raspberry Pi and wifi devices, all of the sensing and microcontrollers were effectively wired up with 3 Nodes **[2]**. A certain study discusses field activities, irrigation issues, and data handling to use a remote control system for just a smart irrigation system and clever warehouse control.

**Related Works**

**[3]** Reported employing soil moisture content, temperature and relative humidity sensors, light sensors, and a computerized irrigation facilityfor monitoring agricultural production. Every sensor readings are transferred to the web application through wireless signals, and the information is encoded in JSON format to keep the server data up to date. When the temperature and humidity of the farm field fall below certain levels, the drip irrigation will be turned on automatically. Farm owners can evaluate ground conditions from wherever because messages are being sent to their smartphones regularly. Soil moisture Sentinel Event Notification Systems for Occupational Risks, temperature, and relative humidity sensor DHT11, LDR, are the characteristics employed herein. That technique is 92 percent more efficient than the traditional way, making it more beneficial in locations that water is scarce **[4]**. A PHP script will be used to automate the storage of irrigation information in a MySQL database. For the single motor pumps and groundwater needs analysis, the average total daily electricity usage is 2 Ah.

This research **[5-6]** focuses on the security and safety of agricultural goods from rat or insect damage in the fields or cereal storage. When detecting an issue, the surveillance system provides actual-time alerts. Python programs are used to connect electronic and sensor equipment. The algorithm depends on gathering data to give precision in informing the user and activating the Repeller. This equipment is put in the corner of a 10-square-meter testing range. Whenever the PIR system senses warmth, the URD sensor and webcams are activated. Depending on the number of unit testing attempted, 84.8 percent of them were successful. Enhancing a surveillance system to keep rodents out of grain storage will be beneficial.

Wireless sensor networks (WSN) are explained in this section **[7]**. A network consists of three nodes that gather, store, and analyze information such as temperature and soil humidity. Reduced water use and ecological benefits are two advantages of agricultural irrigation. Cloud storage is an appealing alternative for Wireless Sensor and Actuator Networks' high storage and processing capability of huge amounts of information **[8]**. Farming, greenhouses, golf resorts, and landscaping are all part of this project. There are three main elements in the architects: a WSAN element, a user application component, and a cloud platform component. There are three sorts of nodes in this system: sink nodes, actuator nodes, and sensor nodes **[9]**. Soil moisture filters are used to determine which plants need moisture to grow and improve resources.

An Agricultural Production is described in this paper (PA) **[10-12]**. The WSN is the most effective solution to address agricultural issues such as resource utilization, decision support, and field surveillance **[13]**. This study **[14-16]** addresses greenhouse agriculture technology, including formulation and construction using ZigBee technology and the CC2530 chip.It's primarily utilized as a part of an environmental surveillance system. The CC2530F256 component is used in the wireless system and control nodes for data collection, computation, transmission, and receiving. Utilizing wireless technology, the system provides all actual data for the concerned citizen, such as temperature control and fan condition. The above system utilizes intelligent greenhouse control and monitoring. It's indeed beneficial to farms in terms of growing crops in a scientific and balanced way.

**Proposed Model**

The block diagram of the proposed framework model is shown in **Figure 1**. The main component of this proposed model is the CZC3160, which combines a micro-controller, network processor, and Wi-Fi device on a single core. It will be lightweight, battery-operated, and establish a safe and quick interface.Differences in ecological conditions will have an impact on the crop's overall yield. For optimum health and growth, the plant needs highly particular circumstances. Sensors can monitor the state of the crop field, which is very important.This measures warmth in actual time and uses a moisture sensor, the HDC1010, to monitor the comparative humidity used to connect the camera to the CZC3160 camera boosting pack through the PCB.It is used to take current photographs of a specific field, which are then delivered to the farmer via GPRS.

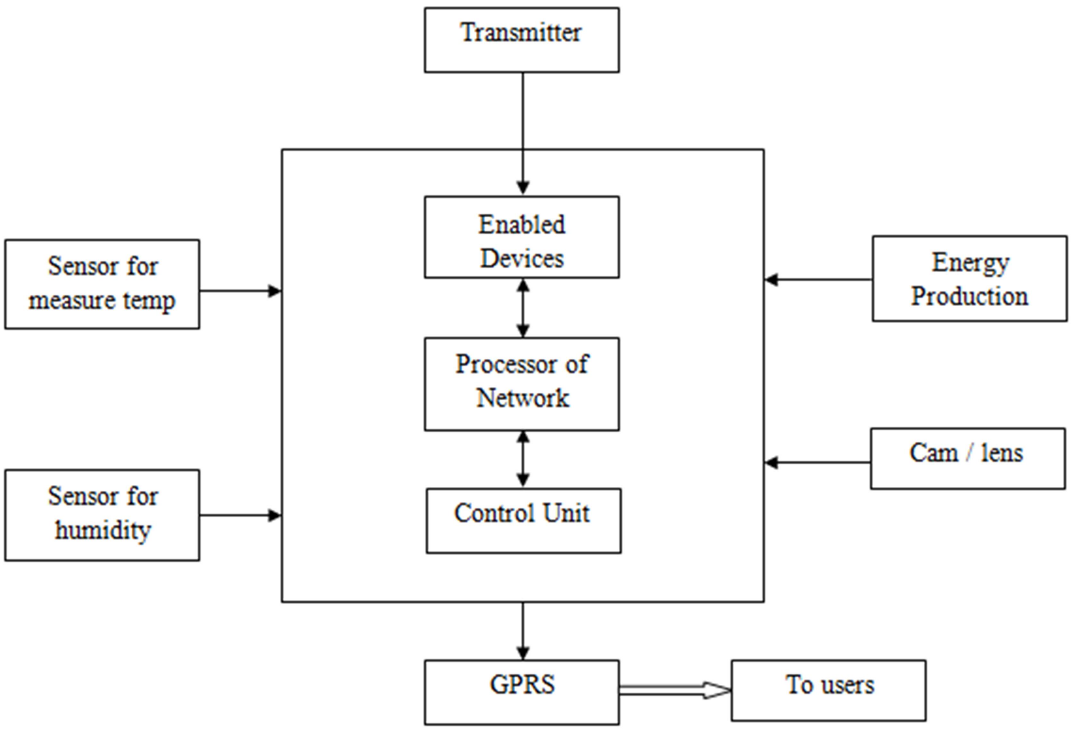


**Figure 1: Block diagram of the proposed system**

## Design

CZC3160 Integrated micro-controller, a network processor (NWP), and WiFi on a microchip. The communications subsystem, as well as an internal MCU program processor, is housed in the CZC3160. It's the world's initial high-performance Wi-Fi wireless micro-controller featuring specific user functionalities and CC3100 features.200kB of program code is accessible on the MCU, which is entirely independent of the Wi-Fi processor. Sequential camera, ADC, SPI, UART, I2C, PWM, I/Os, built-in power efficiency, and RTC are among the accessories. The CZC3160 is a wireless device used to connect that includes a full virtual network for 802.11bgn. The connectivity sub-system in the CZC3160 allows user coding to control the microcontroller's switch mode.

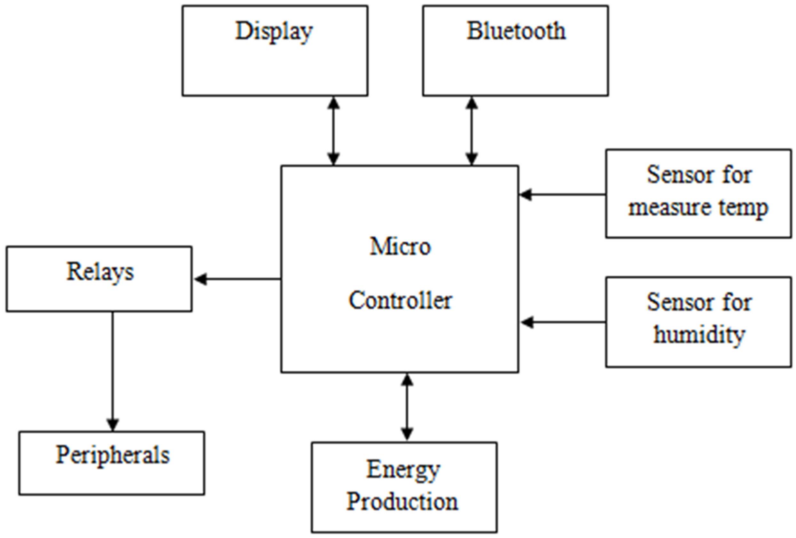


**Figure 2: Functional Diagram of CZC3160**

There is a plethora of Booster Pack contribute boards for interfacing accessories like graphical displays, antenna choosing, environmental monitoring, and so on. CZC3160 has the following characteristics:

• Microcontroller-integrated Internet-on-a-chip method.

• Launchpad and Booster Pack eco-system with 40 pins.

• During Flashing source code, a JTAG emulation serial interface is used.

• Three LEDs & two buttons provide user engagement.

• USB-connected universal asynchronous receiver/sender.

• Antenna built within the chip.

Resource Strategies: The CZC3160 has three power mechanisms based on the three factors listed below. MCU program controls the power source of the micro-controller component.The NWP power method is continually preserved, and the chip serious power mode is regulated by both a mixture of MCU and NWP models. Thermometer (TMP007): TMP007 thermal infra-red thermal sensor with built-in math engine is utilized in this project.In the given field, this sensortransmitspower through an item and frequencies ranging between 4 to 16 um. TMP007's inner block diagram is shown in **Figure 3**. It comprises of a math engine that analyzes the equivalent voltage change across the thermal to an inner standard (±0°C (max) from 1°C to +70°C and ±2.5°C (max) from –60°C to +157°C) computer control on the thermometer to determine the required surface temp. For recording standardizing parameters, the TMP007 utilizes non-volatile storage. This TMP007 was created with portability and low energy consumption in mind (2.0V to 5.0V). TMP007 is 1.8 mm x 1.9 mm x 0.625 mm in dimension.

HDC1010 Thermistor: A HDC1010 computerized temperature sensor is employed, which delivers accurate humidity measurement in a low-power situation maintains better stability in high-humidity circumstances. The WLCSP (Wafer Level Chip Scale Package) streamlines the layout of circuit boards.An HDC1010 is much more resistant to dirt, dust, and some other pollutants in the atmosphere. To storing standardizing parameters, the HDC1010 has nonvolatile storage. I2C is supported by the HDC1010.That transforms a controlled 12-V output from a 390 V to 415 V DC input.The UCC28950 has been used to operate synchronized rectifiers also on the full-bridge converter's secondary side to attain greater performance. The UCC28950 is a burst-type device. That DCM (Discontinues Current Mode) feature improves no-load performance while still meeting Green Mode Standards. For lighter loads, the DCM comparison was made to transform off synchronized rectifiers at crucial conduction.

**Table 1: Power Modes of CZC3160**

| Power Modesfor MCU's | Subsystems for Networking | | |
|---|---|---|---|
| | Deactivated | LPDS | Dynamic |
| Persistent | Persistent | Not Applicable | Not Applicable |
| LPDS | LPDS | LPDS | LPDS |
| Sleep | Dynamic | Dynamic | Dynamic |
| Dynamic | Dynamic | Dynamic | Dynamic |

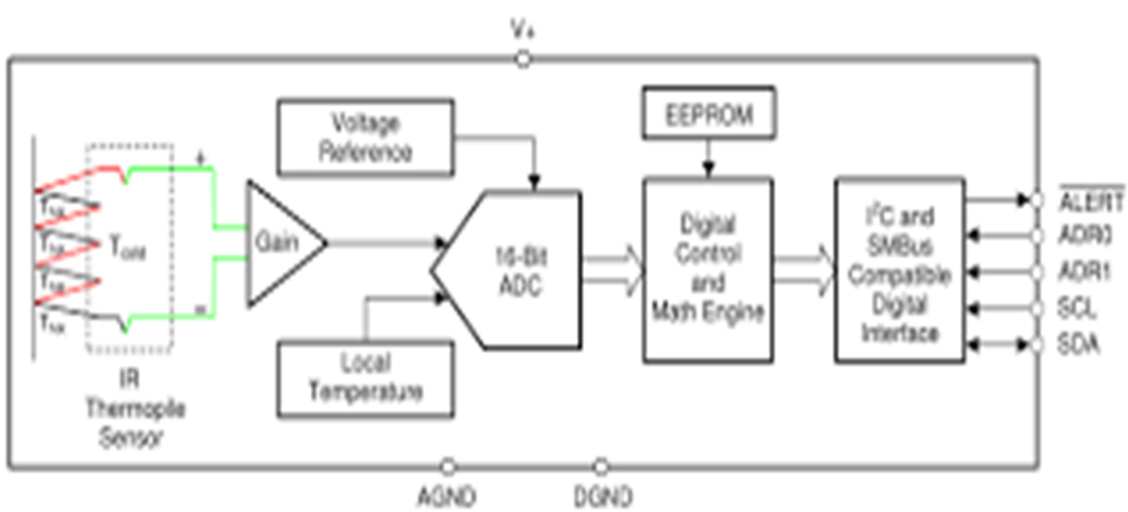


**Figure 3: TMP007 Internal Schematic Block Diagram**

## CONCLUSION

When it comes to connecting gadgets and capturing data, the term "Internet of Things" has a lot of baggage.This farm surveillance system is a dependable and effective method that may be used to take appropriate action.Wireless surface monitoring saves time and effort while also allowing users to view precise changes in crop production.It's much less expensive and uses less energy.A modern agricultural infrastructure is being conceptualized and put together.Farm owners will benefit from the improved system since it is more productive and convenient.If the temperature and air humidity in a crop field falls outside of the appropriate range, it sends information to the owner by MMS.This technology is used in greenhouses and plants that are temperature sensitive.The use of this device inland can undoubtedly help to speed up crop harvesting and universal production.A certain system can be enhanced in the future by incorporating numerous current techniques, such as irrigation and the use of solar electricity.

## REFERENCE

**[1]** Rasooli, M.W., Bhushan, B. and Kumar, N., 2020. Applicability of wireless sensor networks & IoT in saffron & wheat crops: A smart agriculture perspective. *Int. J. Sci. Technol. Res*, *9*(2), pp.2456-2461.

**[2]** Abhiram, M.S.D., Kuppili, J. and Manga, N.A., 2020, February. A smart farming system using IoT for efficient crop growth. In *2020 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS)* (pp. 1-4). IEEE.

**[3]** Suhaimi, A.F., Yaakob, N., Saad, S.A., Sidek, K.A., Elshaikh, M.E., Dafhalla, A.K., Lynn, O.B. and Almashor, M., 2021, July. IoT Based Smart Agriculture Monitoring, Automation and Intrusion Detection System. In *Journal of Physics: Conference Series* (Vol. 1962, No. 1, p. 012016). IOP Publishing.

**[4]** Dr.P.Sivakumar, "Analytical framework to build predictive and optimization function from manufacturing industry sensor data using cross-sectional sharing", Big Data,2021 (SCI)

**[5]** Dr.P.Sivakumar, "Improved Resource management and utilization based on a fog-cloud computing system with IoT incorporated with Classifier systems", Microprocessors and Microsystems, Jan 2021 (SCI).

**[6]** Ranjeeth, S., Latchoumi, T. P., & Paul, P. V. (2020). Role of gender on academic performance based on different parameters: Data from secondary school education. Data in brief, 29, 105257.

**[7]** Venkata Pavan, M., Karnan, B., &Latchoumi, T. P. (2021). PLA-Cu reinforced composite filament: Preparation and flexural property printed at different machining conditions. Advanced Composite Materials, https://doi. org/10.1080/09243046.2021, 191860 8.

**[8]** Kloibhofer, R., Kristen, E. and Ameri E, A., 2021, September. LoRaWAN with HSM as a Security Improvement for Agriculture Applications-Evaluation. In *International Conference on Computer Safety, Reliability, and Security* (pp. 128-140). Springer, Cham.

**[9]** Tiglao, N.M., Alipio, M., Balanay, J.V., Saldivar, E. and Tiston, J.L., 2020. Agrinex: A low-cost wireless mesh-based smart irrigation system. *Measurement*, *161*, p.107874.

**[10]** Khriji, S., El Houssaini, D., Kammoun, I. and Kanoun, O., 2021. Precision Irrigation: An IoT-Enabled Wireless Sensor Network for Smart Irrigation Systems. In *Women in Precision Agriculture* (pp. 107-129). Springer, Cham.

**[11]** Angelopoulos, C.M., Filios, G., Nikoletseas, S., and Raptis, T.P., 2020. Keeping data at the edge of smart irrigation networks: A case study in strawberry green-houses. *Computer Networks*, *167*, p.107039.

**[12]** Sanjeevi, P., Prasanna, S., Siva Kumar, B., Gunasekaran, G., Alagiri, I. and Vijay Anand, R., 2020. Precision agriculture and farming using the Internet of Things based on wireless sensor networks. *Transactions on Emerging Telecommunications Technologies*, *31*(12), p.e3978.

**[13]** Zervopoulos, A., Tsipis, A., Alvanou, A.G., Bezas, K., Papamichail, A., Vergis, S., Stylidou, A., Tsoumanis, G., Komianos, V., Koufoudakis, G. and Oikonomou, K., 2020. Wireless sensor network synchronization for precision agriculture applications. *Agriculture*, *10*(3), p.89.

**[14]** Avinash, J.L., Kumar, K.S., Kumar, G.A., Poornima, G.R., Gatti, R., and Kumar, S.S., 2020, November. A Wireless Sensor Network Based Precision Agriculture. In *2020 International Conference on Recent Trends on Electronics, Information, Communication & Technology (RTEICT)* (pp. 413-417). IEEE.

**[15]** Goel, K. and Bindal, A.K., 2018, December. Wireless sensor network in precision agriculture: A survey report. In *2018 Fifth International Conference on Parallel, Distributed and Grid Computing (PDGC)* (pp. 176-181). IEEE.

**[16]** Agarkhed, J., Dattatraya, P.Y. and Patil, S., 2021. Precision agriculture with cluster-based optimal routing in a wireless sensor network. *International Journal of Communication Systems*, *34*(10), p.e4800.