International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1121-1125 www.ijaem.net ISSN: 2395-5252

IOT based Intelligent Agriculture Monitoring and Control System using NodeMCU Microcontroller

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Submitted: 10-03-2021 Revised: 30-03-2021 Accepted: 01-04-2021

ABSTRACT : This project presents about the agri monitoring developed to help agriculture. This project embrace monitoring of parameters of the field area such as temperature, humidity, moisture level, monitoring within the farming area. The system user can monitor and control the greenhouse climate conditions. To deliver the environmental conditions in a timely manner, low-cost sensor is used to monitor parameter in IOT. The pinnacle features of this campaign are the on and off of the motor based on the consignment of water needed in crop choice automatically based on ESP-8266 NODEMCU. The sensors are strapped to the microcontroller. The arduino software is used for getting the output of the sensors. These criterions are sensed by way of IOT to Blynk app. This Blynk app is used for monitoring controlling the parameters.

Keyword: NodeMCU, Moisture level, Motor, Humidity sensor, Temperature sensor.

I.INTRODUCTION

India is the USA of village and agriculture performs an crucial function for improvement of country. In our country, agriculture depends at the monsoons which has inadequate source of water. So the irrigation is used in agriculture field. In Irrigation machine, depending upon the soil kind, water is provided to plant. In agriculture, two things are very critical, first to get records of approximately the fertility of soil and 2nd to degree moisture content in soil. these days, for irrigation, one-of-a-kind strategies are available that are used to reduce the dependency of rain. And in most cases this technique is driven through electrical strength and on/off scheduling. on this method, water stage indicator placed in water reservoir and soil moisture sensors are positioned root quarter of plant and near the module unit handles the sensor records and transmit statistics to the controller which in turns the manipulate the waft of water via the valves.

Internet of Things (IoT) is widely used inconnecting devices and collecting records facts.Internet of factors is used with IoT frameworks tohandle and interact with statistics and statistics. Inthe gadget users can sign in their sensors, createstreams of information and method records. IoT areapplicable in various methodologies of agriculture.applications of IoT are clever towns, cleversurroundings, clever Water, clever Metering,protection and Emergency, industrial manage, smartAgriculture, domestic Automation, e-health and many others.'internet of things' is based on device which iscapable of analysing the sensed records andthen transmitting it to the user.

Internet of Things has capacity to transform the lives of human beings within the global in an efficient way. The ever developing populace would touch extra than three billions in fewyears. so that you could feed such an incredible populace, agriculture industry want to embrace IoT. The demand for greater meals has to deal with demanding situations that encompass excessive climatesituations, climate trade and extraordinary environmental impacts that outcomes from farming practices.

Fig 1 - Smart Farming

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II.COMPONENTS OF NODEMCUMICROCONTROLLER

NodeMCU V3 is an open-supply firmware and development kit that plays a crucial role in designing your personal IoT product the usage of a few Lua scriptlines.multiple GPIO pins at the board permit you to join the board with different peripherals and are able to generating PWM, I2C, SPI, and UART serial communications.

- The interface of the module is particularly divided into parts which includes both Firmware and hardware in which former runs at the ESP8266 wi-fi SoC and later is based totally on the ESP-12 module.

The firmware is based totally on Lua - A scripting language that is simple to study, giving a easy programming surroundings layered with a quick scripting language that connects you with a famous developer community.

Fig2- NodeMCU

Node MCU Pinout

NodeMCU V3 comes with some of GPIO Pins. Following parent shows the Pinout of the board.

- There's a candid distinction among Vin and VU where former is the regulated voltage that can stand somewhere between 7 to 12 V while later is the energy voltage for USB that must be kept round 5 V.

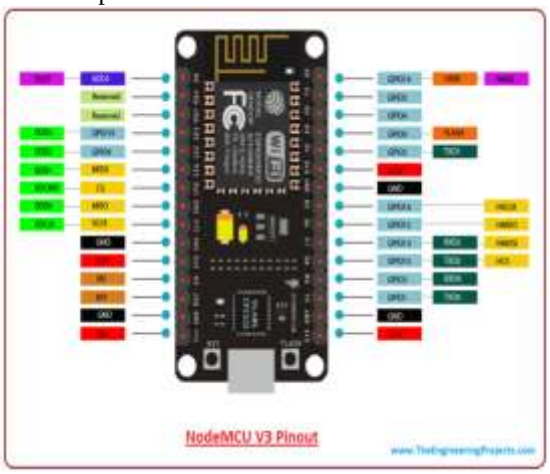

Fig 3- Pin Diagram of NodeMCU

- Power Pins There are four power pins. **VIN** pin and three **3.3V** pins.
  - **VIN** can be used to directly supply the NodeMCU/ESP8266 and its peripherals. Power delivered on **VIN** is regulated through the onboard regulator on the NodeMCU module – you can also supply 5V regulated to the **VIN** pin
  - **3.3V** pins are the output of the onboard voltage regulator and can be used to supply power to external components.
- GND are the ground pins of NodeMCU/ESP8266
- I2C Pins are used to connect I2C sensors and peripherals. Both I2C Master and I2C Slave are supported. I2C interface functionality can be realized programmatically, and the clock frequency is 100 kHz at a maximum. It should be noted that I2C clock frequency should be higher than the slowest clock frequency of the slave device.
- GPIO Pins NodeMCU/ESP8266 has 17 GPIO pins which can be assigned to functions such as I2C, I2S, UART, PWM, IR Remote Control, LED Light and Button programmatically. Each digital enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance. When configured as an input, it can also be set to edge-trigger or level-trigger to generate CPU interrupts.
- ADC Channel TheNodeMCU is embedded with a 10-bit precision SAR ADC. The two functions can be implemented using ADC. Testing power supply voltage of VDD3P3 pin and testing input voltage of TOUT pin. However, they cannot be implemented at the same time.
- UART Pins NodeMCU/ESP8266 has 2 UART interfaces (UART0 and UART1) which provide asynchronous communication (RS232 and RS485), and can communicate at up to 4.5 Mbps. UART0 (TXD0, RXD0, RST0 & CTS0 pins) can be used for communication. However, UART1 (TXD1 pin) features only data transmit signal so, it is usually used for printing log.
- SPI Pins NodeMCU/ESP8266 features two SPIs (SPI and HSPI) in slave and master

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modes. These SPIs also support the following general-purpose SPI features:

- 4 timing modes of the SPI format transfer
- Up to 80 MHz and the divided clocks of 80 MHz
- Up to 64-Byte FIFO

- SDIO Pins NodeMCU/ESP8266 features Secure Digital Input/Output Interface (SDIO) which is used to directly interface SD cards. 4-bit 25 MHz SDIO v1.1 and 4-bit 50 MHz SDIO v2.0 are supported.

- PWM Pins The board has 4 channels of Pulse Width Modulation (PWM). The PWM output can be implemented programmatically and used for driving digital motors and LEDs. PWM frequency range is adjustable from 1000 µs to 10000 µs (100 Hz and 1 kHz).

- Control Pins are used to control the NodeMCU/ESP8266. These pins include Chip Enable pin (EN), Reset pin (RST) and WAKE pin.

- **EN:** The ESP8266 chip is enabled when EN pin is pulled HIGH. When pulled LOW the chip works at minimum power.
- **RST:** RST pin is used to reset the ESP8266 chip.
- **WAKE:** Wake pin is used to wake the chip from deep-sleep.

III. IMPLEMENTATION

The basic constructing blocks of an IoT system are Sensors, Processors and packages. So the block diagram below is the proposed model of our assignment which indicates the interconnection of these blocks. The sensors are interfaced with Microcontroller, statistics from the sensor is displayed at the mobile app of the consumer. mobile app provides an get admission to to the non-stop records from sensors and thus enables farmer to do so to fulfil the necessities of the soil.

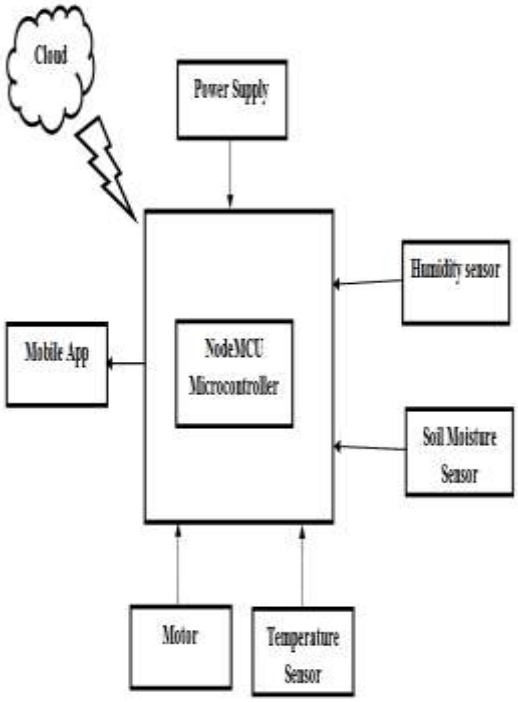

Fig 4 - Block Diagram of Proposed Model

Types of Sensor used

- Temperature Sensor
- Humidity Sensor
- Soil Moisture Sensor

Temperature Sensor

This sensor is used to determine the temperature for the cultivation of the crop .This sensor is used to sense the temperature from 0 degree to 180 degree, this works with a 5v power supply.

Fig 5 -Temperature Sensor

Humidity sensor

This sensor is used to sense the temperature and humidity up to 50 degrees this we can measure the humidity with 20 % - 90% accuracy. This sensor has proven to be efficient in all field.

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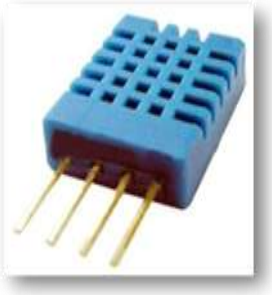

Fig 6 - Humidity sensor

Soil Moisture Sensor

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

Fig 7- Soil Moisture Sensor

IV.RESULTS

We've got measured the moisture of soil at special times of the day and figures under showthe outcomes of all of the sensor readings at unique platforms.

At the time of day

a) The figures proven beneath depict the sensor readings of temperature, humidity andsoil moisture whilst the soil is **DRY** on serial display, cellular Appand Cloud server.
b) The figures shown underneath depicts the sensor readings of temperature, humidity andsoil moisture while the soil is **WET** on serial reveal, cellular App and Cloudserver.

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Fig 8(a) - Readings on the Blynk appFig 8(b) - Readings on the Blynk app

V. CONCLUSION

The clever Farm tracking system may be used asfuture factors of agriculture. this will be a remedy forfarmers because it decreases the burden of guide efforts. Asystem toscreen moisture degrees inside the soil modified intoconstructed and the task furnishes aopportunity totake a look at the prevailing systems, on the side of their capabilities anddownsides. The stated system can be used toswitch on/off the water sprinkler in step with soil moisturetiers thereby automating the irrigation approach of this isone of the most time eating sports in farming.Agriculture is one of the maximum effort-eating hobby.Thedevice makes use of statistics from soil moisture sensors toirrigate soil. similarly, stay understanding (Temperature,Moisture) of farm readings are experimented. The gadgetfacilitates the farmers to increase the common crop yield scores,and plant high-quality thru clever farming.

REFERENCES

[1]. Nikesh Gondchawar, Prof. Dr. R. S. Kawitkar, "IoT based Smart Agriculture" International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 6, ISSN (Online) 2278-1021 ISSN (Print) 2319 5940, June2016.

[2]. Rajalakshmi.P, Mrs.S.DeviMahalakshmi"IOT Based Crop-Field Monitoring And Irrigation Automation" 10th International conference on Intelligent systems and control (ISCO), 7-8 Jan 2016 published in IEEE Xplore Nov 2016.

[3]. Tanmay Baranwal, Nitika ,Pushpendra Kumar Pateriya "Development of IoT based Smart Security and Monitoring Devices for Agriculture" 6th International Conference - Cloud System and Big Data Engineering, 978-1-4673-8203-8/16, 2016 IEEE.

[4]. Nelson Sales, Artur Arsenio, "Wireless Sensor and Actuator System for Smart Irrigation on the Cloud" 978-1-5090-0366-2/15, 2nd World forum on Internet of Things (WF-IoT) Dec 2015, published in IEEE Xplore jan 2016.

[5]. Mohamed RawideanMohdKassim, Ibrahim Mat, Ahmad Nizar Harun "Wireless Sensor Network in Precision Agriculture Application" 978-1-4799-4383- 8/14,

[6]. Mohamed RawideanMohdKassim, Ibrahim Mat, Ahmad Nizar Harun, "Wireless Sensor Network in Precision agriculture application" International conference on computer, Information and telecommunication systems (CITS), July 2014 published