IOT BASED SMART AGRICULTURAL SYSTEM

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Abstract: *Agriculture plays vital role in the development of country. In India about 70% of population depends upon farming and one third of nation's capital comes from farming. This paper entitled IOT based smart agricultural system makes major development in agricultural domain. Internet of thing is a network of object where this objects interacts through internet. Smart agriculture is one of the application of IOT. Internet of things enables various applications crop growth monitoring, selection and irrigation. System uses a different types of sensors, for e.g. Temperature sensor, soil moisture sensor. Setup of arduino with sensors is used to control the irrigation.*

IndexTerms **- IOT, Wifi Module, Sensors, Arduino.**

I. INTRODUCTION

The global population is predicted to touch 9.6 billion by 2050. 18% of India's GDP (Gross domestic product) based on agriculture and is responsible in providing employment to half of the nation's workforce. Agriculture is considered as the basis of life for the human species as it is the main source of food grains and other raw materials. This poses a big problem for agriculture. Despite combating challenges like extreme weather condition, rising in climate change and farming environment impact, the demand for food has to be meet. To meet the increasing needs, agriculture has to turn to new technology. Smart agriculture involves integration of advanced technologies into already persisting agricultural practices with a view to boost production quality and efficiency for farming products. It helps in automated farming with the collection of data for further analysis to provide the operator with accurate information for better decision making to gain high quality output of the product. IOT based Smart Agriculture system gives information about irrigation having facilities like smart control and making intelligent decision depending upon real time data from field. The term "Internet of Things" (IoT) was first used in 1999 by British technology pioneer Kevin Ashton to describe a system in which objects in the physical world could be connected to the Internet by sensors. An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments.

II. LITERATURE SURVEY

Plenty of research has been done in smart agriculture system. [1] The system is proposed to develop a smart agriculture system that uses advantage of cutting edge technology such as arduino, Iot and wireless sensors network. The main feature of system is monitor temperature, humidity, moisture and even movement of animals which may destroy the crop in agriculture

[2]The system proposed an automated control system of a form using a cloud based IOT solution to monitor and control multiple areas of the form which play crucial role in entire forming process. The system uses network of several node MCU's (ESP8266), Microcontroller to monitor and control multiple system over the cloud.

[3]The author suggest a low cost IoT enabled smart agriculture system which can evaluate the farmland and predict which crop is best for that land varying from humidity to soil moisture content.

[4] The feature of the system included smart GPS based remote controlled robot to perform task like spraying, weeding, moisture sensing etc. secondly it included smart irrigation with smart control and intelligent decision making based on accurate real time field data. All these operation will be through any remote smart device or computer connected to internet and the operation will be performed by interfacing sensors, wifi or zigbee module, and actuators with microcontroller and raspberry pi.

III. BLOCK DIAGRAM

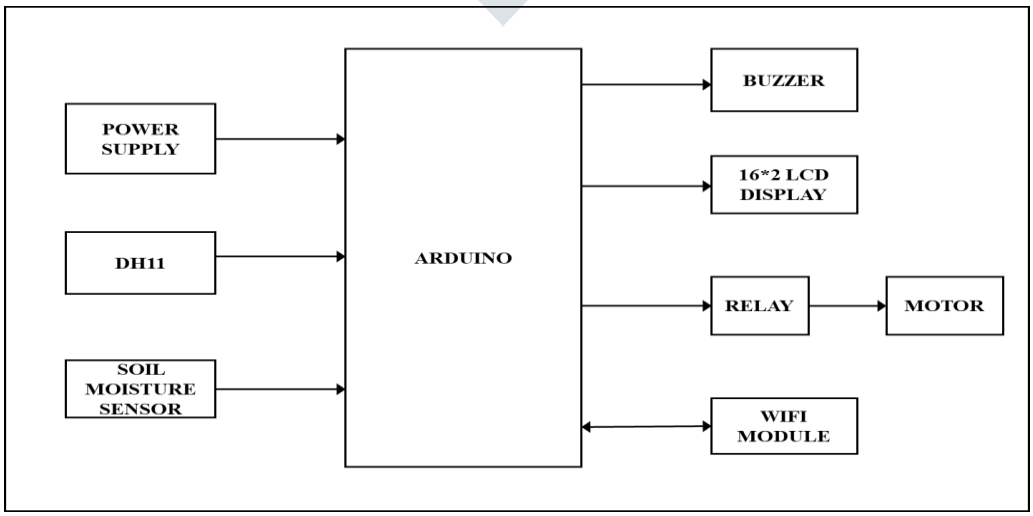

Figure1: Block diagram of system

The block diagram of IOT based smart agricultural system is shown above. It consist of DH11 (temperature and humidity sensor), soil moisture sensor, LCD display, relay, motor and wifi module. Hardware of system is divided into two parts, i.e. input side and output side. DH11

and soil moisture sensor are interfaced to input side of arduino and similarly buzzer, relay, and LCD display are connected to output side of arduino. When supply is given to arduino board the system will turn on. By using DH11 we can measure temperature and humidity and by using soil moisture sensor we measure moisture content in soil. When temperature reaches above threshold value then buzzer will ring and similarly when value of soil moisture sensor is changed to above predetermined value then relay circuit will on and motor pump will on automatically, Hence system will provide automatic irrigation. The value of temperature and soil moisture sensor are adjusted by using software Arduino IDE. Wifi module esp8266 is used for transmitting data to internet, by using this user can access data such as temperature, humidity and soil moisture sensor through mobile or laptop devices.

IV. HARDWARE

[A] Arduino: Arduino is an open-source electronics platform based on easy to use hardware and software. Arduino Uno is a microcontroller board based on 8 bit ATmega328P, it consists other component such as crystal oscillator, serial communication, voltage regulator etc. Arduino uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, a power barrel jack, an ICSP header and a reset button.

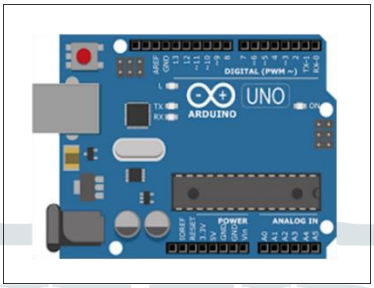

Figure2: Arduino

[B] DH11: DH11 is low cost temperature and humidity sensor. Operating voltage range is from 3.5V to 5.5V and current of 0.3mA . Temperature range of DH11 is from 0-50°C and Humidity range from 20% to 90%. DHT11 sensor has four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 5k to 10k ohms is provided for communication between sensor and micro-controller.

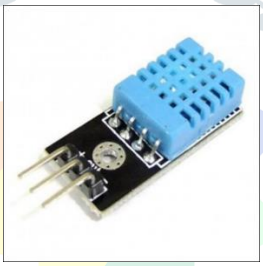

Figure3: DH11

[C] Wifi Module: The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. New version of the ESP8266 WiFi Module has increased the flash disk size from 512k to 1MB.

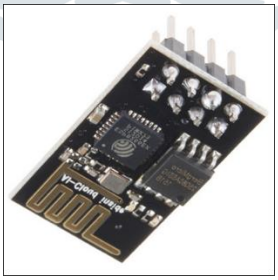

Figure4: Wifi Module

[D] Soil moisture sensor: YL-69 is soil moisture sensor used to detect the humidity of soil. Its operating voltage is from 3.3V to 5V and current of 35mA.

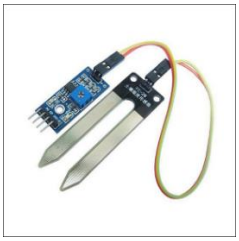

Figure5: Soil moisture sensor

[E] Relay: A static relay of 5V is used to turn on the motor. It operates on trigger voltage of 5 volts and trigger current 70mA.its operating time is 10mS and release time is 5mS.

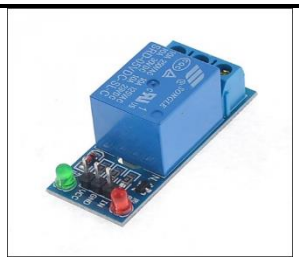

Figure6: Relay

[F] LCD Display: An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. Its operating voltage is 4.7V to 5.3V and Current consumption is 1mA without backlight. It consists of two rows and each row can print 16 characters.

Figure7: LCD display

V. CONCLUSION

IOT based Agriculture system is very helpful for farmer. This system is gives the meaningful data to farmer. Temperature, humidity, moisture values can be used to make statistical analysis regarding the weather condition. This system generates irrigation schedule based on the sensed real time data from field. By using IOT system data can be monitored through web.

VI. ACKNOWLEDGMENT

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