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Smart Farming Monitoring System

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ABSTRACT: Agriculture has become the most genuine sector all over the world because of large population. The main obstacle in the agriculture industry is to improve farming quantity and quality without continuous physical monitoring to increasing the demand for the food. Apart from the increasing population, the climate challenges is also a difficult task in the agricultural industry. The aim of this research is to develop asmart farming model based on Internet of Things which can work in every climate condition with having previous sensor generated data for a supervisory control and new data acquisition against that time climate .in this model, we use the different types of the sensors like soil moisture, gas sensor, rain detection, temperature and humidity sensors for a different purpose. The data will collect on the Arduino cloud and compare automatically. The smart agriculture can be adopted from the crop control, collection of useful data, and analysis automatically. The main aim of this research is how the implement the Internet of Things (IoT) in the monitoring of humidity, soil condition, temperature of field, supply of water to the field, intensity of water in the soil, climate condition, rain detection, smoke in the field, fire detection and co detection. The IoT based Agriculture Monitoring System being planned by this report is integrated with different Sensors, Arduino, node MCU, Bluetooth, lcd display, OLED display and Arduino cloud producing live data feed that can be obtained online.

KEYWORDS*:* Data Acquisition, Wireless communication, Supervisory Control, Crop productivity, Ad Hoc network, Crop forecasts

I. INTRODUCTION

Traditional Farming uses the oldest and conventional ways of agriculture and using old machinery for agricultural occupation and producing crop without knowing any reevaluation of demands of the market and weather forcing reports but smart farming use very innovative technologies like smart devices, IoT sensors nodes, Internet and cloud storage for data collection. Farmers chatting community, time to time measurement of different factors like the best environment for the growth of the plantation, water quality, moisture, temperature are required. By using smart technology, farming has become very easy, economical, and cost-effective. Farmers can reduce the employment cost and improve crop yielding by using smart technology, italso provides better crop production.

Now a day, the agricultural industry is bent on using IoT technology for smart farming to achieve crop performance in the global market and other factors such as minimal humandisruption, time and cost, etc. Advances in technology ensure that sensors collect data from a wide variety of nodes. Networks are also readily available worldwide .and that smart farming can be achieved with full promise. Focusing on improving agriculture, smart farming is the best solution to the problems that the agricultural industry currently faces. This may be due to the Internet, smartphones, Sensors, and IoT devices.

IoT devices can be very easy to improve production and harvesting in the agricultural industry as these IoT devices can be used to monitor soil nature, temperature, humidity, etc. In addition, smart agriculture will be helpful in monitoring duration of different type of crops. IoT sensors can provide information about rainfall, crop yields, and insect

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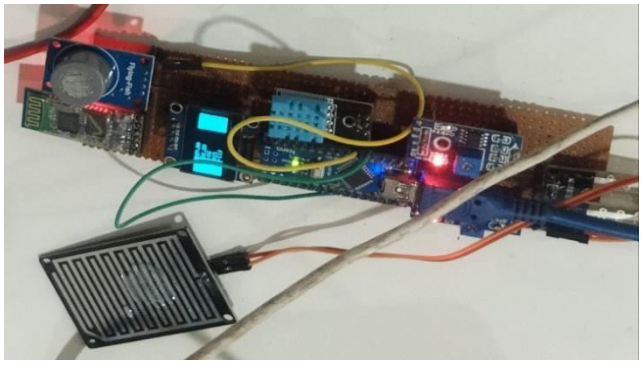
infections. Soil nutrients are very useful in production and provide specific information that can help to find improved farming methods. The Internet of Things, with its real-time, direct, and integral features, will drive a major change in agricultural procurement management and provide the necessary technology to establish a uniform flow of agricultural goods.

II. SMART FARMING MONITORING SYSTEM

Agriculture monitoring system is basically developed for observing agriculture field environment by three major section of agriculture monitoring system i.e sensing unit, control/bridge unit and cloud application .through this system we gather field information for a particular crop growth duration and use that data for the future monitoring of crop growth and we can use that data for artificial agriculture by creating same environment for a particular crop.

i) SENSING UNIT

Sensing unit takes the temperature of an environment, humidity of the surrounding, moisture of the soil , generate water pump relay control data , co gas detection, rain detection, smoke detection and it will detect the fire in the field and then convert that all data in an electrical signal and transfer that signal to the microcontroller, microcontroller process that feild data and then transfer that data to the slave Bluetooth module by serial communication and then after receiving that data by slave Bluetooth module , slave Bluetooth module transfer all data to the masters Bluetooth module of control/bridge unit through wireless communication.



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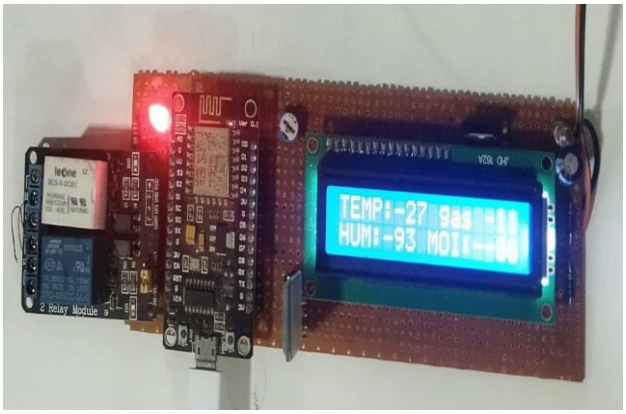
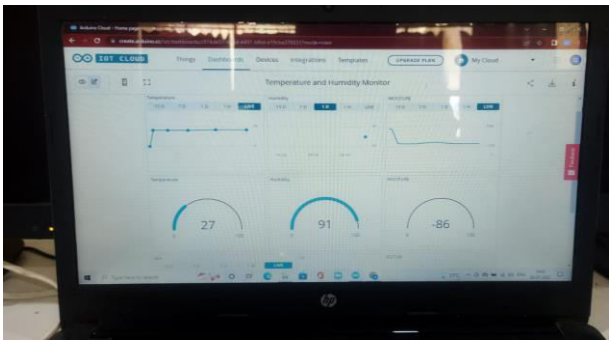
i) ii) CONTROL/BRIDGE UNIT

Control/Bridge unit 's master Bluetooth module take the information from the sensing unit's slave Bluetooth modules and then transfer that signal to the node MCU by serial communication, node MCU process that transfer data for controlling pump relay and display all data in the LCD panel of this unit, then this unit will transfer that all data which is generated by sensing unit to the Arduino cloud by using internet protocol



iii) ARDUINO CLOUD APPLICATION

Arduino cloud Application this application will receive all data that is generated by the sensing unit through node MCU ,after that all data will show in the Arduino cloud's dashboard and that all data will store in the history of that application



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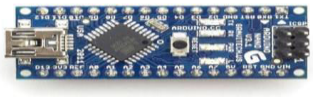
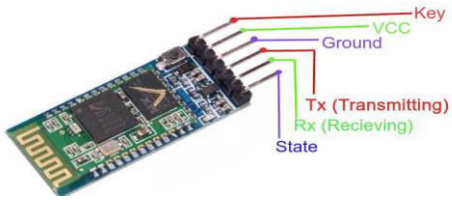
DEVICE AND SENSORS

Arduino nano board designs use a variety of microcontrollers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to diffirent expansion boards and other circuits. The boards provide serial communications interfaces, Universal Serial Bus (USB) on some models, which are also used for loading programs



Nodemcu. included firmware which runs on the ESP8266Wi-Fi system on chip from Espress if Systems, and hardware which was based on the ESP-12 module. Node MCU is an open source firmware. The name "Node MCU" combination of "node" and "MCU"(micro-controller unit). The term "Node MCU" mention to the firmware rather than associated development kits.

Bluetooth Module(HC-05):-HC-05 uses serial communication to communicate with theelectronicdevices, it is used to connectdevices like mobile phones using a short-range wireless connection to transfer and receive data. It uses the 2.45GHz frequency band. The transfer rate of the data can varies up to 1Mbps and it will communicated wireless upto 10 meters. The HC-05 module requied 4-6V of power supply. It supports baud rate of 9600, 19200, 38400, 57600, etc. it can be operated in Master-Slave mode which means it will neither tarnsfer or receive data from other sources



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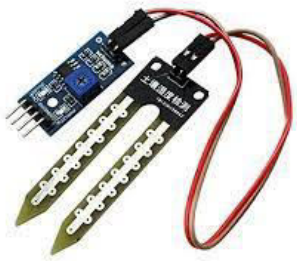
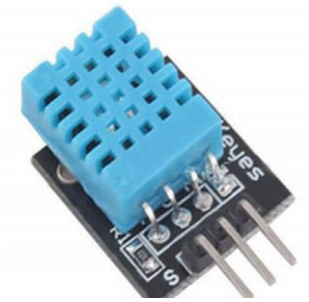
Soil Moisture Sensor:- Soil moisture sensor senses the moisture of the soil. The output of this soil moisture sensor has both analog & digital signals. When the soil is dried the current will be zero.So that the output will be high .it output is varies according to the conductivity/level of wetness of the soil



Humidity Sensor:- They are small in size, power consummation is low . This DHT11 sensor senses the temperature and humidity of the surrounding



Rain Detection Sensor:- Rain sensor module is use to detect rain . This sensor have digital pin and analog pin. digital pin of this sensor we can use as a switch and analog pin of this sensor we can use to detect the intensity of the rain . Rain board and control board separated ,it has LED power indicator and flexible sensitivity with potentiometer.

Relay:- relay module is an electrical switch which is operated by an electromagnet. The electromagnet is activate by a low-power signal that is given by micro controller. When activated, the relay shift from NO to NC or vise versa according to the module design.

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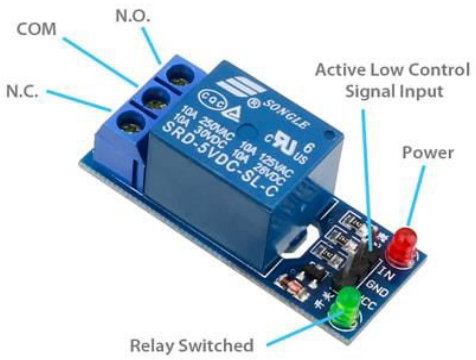
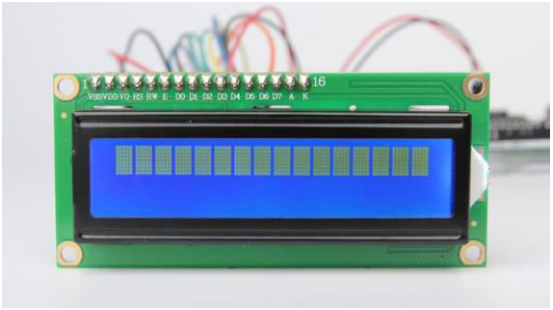


Liquid Crystal Display:- An LCD is a display module that uses liquid crystal to produce a visible data. The 16×2 LCD display is a very common module used in circuits. ThisLCD display 16 characters per line in 2 such lines. In this LCD each character is display in a 5×7 pixel matrix.



OLED:- OLED is organic light emitting diode that emits light according to an electric current. OLED display works with no backlight so it produces display deep black level. It is small in size and light in weight than Liquid Crystal Displays.it have 2 pin for the power supply and 2 pin for the data communication. This display need 3.3 v of power supply and this display I2C communication protocol for communication

Gas Sensor:-This Gas sensor suitable forsensing LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations in the air. This sensor pin has 2 pin for the power supply and 2 pin for analog and digital data transfer. This module required 5v of power supply.

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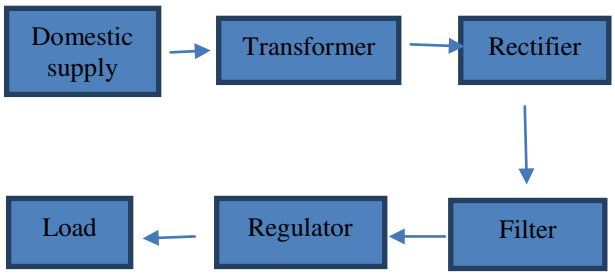
Power Supply:- This is a circuit which is a backbone of any system . This circuit contain transformer, rectifier, filter and regulators.



III. RESULT

time	Humidity value	Moisture value	Rain value	Temperature value	Gas value (co)
2022-06-16T14:09:54.586Z	52	39	326	27	50
2022-06-18T10:11:07.356Z	80	56	265	35	37
2022-06-20T12:48:09.362Z	95	28	663	30	121
2022-06-25T15:29:58.27Z	65	21	672	21	47
2022-06-28T10:26:20.502Z	79	16	680	30	19
2022-07-8T16:22:13.46Z	95	29	650	32	27
2022-07-12T12:43:56.919Z	55	30	641	31	36
2022-07-15T18:49:49.303Z	73	54	326	24	26
2022-07-18T10:47:18.209Z	98	16	611	32	59
2022-07-20T13:59:40.23Z	59	16	619	27	76
2022-07-21T9:50:56.571Z	45	25	709	32	32
2022-07-22T12:25:12.054Z	67	12	675	31	67
2022-07-23T11:37:05.107Z	68	65	299	30	56
2022-07-24T13:10:37.382Z	56	15	696	29	42
2022-07-24T13:53:42.817Z	84	13	679	31	37
2022-07-26T11:50:14.718Z	65	15	668	30	28
2022-07-27T13:23:01.306Z	87	23	803	29	17
2022-07-28T13:14:21.535Z	68	27	795	27	25
2022-07-28T13:55:02.233Z	72	36	766	30	39

IV. CONCLUSION

The main purpose of these models is to expand the centralized monitoring system & organize the agricultural land. This can be managed from any place wirelessly by using the mobile phone. The application users can control the elementary operations of collecting the irrigation data, environmental data, soil moisture, and fertilization data without human interruption .this collected data can be used for the perception of assessing crop performance & calculate crop forecasts and personalized harvest recommendation for any farm using the application and give the free alert to the farmer Smartphone.

The sensor network is planned to acquire the information according to the climatic situation of the farmland such as Temperature, Rainfall, Soil Moisture, Humidity, and Light. From the help of this model, we will monitor the condition

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of different type of crop and provide the best condition and environment for increase the production after getting the sensor generated data

The data from all these Arduino nodes are collected & forward to arduino cloud storage through node MCU. Here, we are using the cloud service as data storage. Data can be sent to the cloud to store in the cloud database. Farmers can log into their particular accounts to view their history, due to this they will understand the climate condition of a particular crop and they will use that data for supervisory control and data acquisition.

In future we will use that stored data for automatic analysis of environment response in an Artificial Intelligence for creating artificial environment for growing different crops in any season with great quality and quality of crop.

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