SMART AGRICULTURE MONITORING SYSTEM BEST ON IOT AND AUTOMATION TECHNOLOGY

GOVERNMENT POLYTECHNIC PATNA-7

DETAILED PROJECT REPORT

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Scope/Objective of project:

Agriculture plays vital role in the development of agricultural country.In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Issues concerning agriculture have been always hindering the development of the country.

The only solution to this problem is smart agriculture by modernizing the current traditional methods of agriculture. Hence ,the project aims at making agriculture smart using automation and IOT technologies. This IOT based Agriculture monitoring system makes use of sensor networks that collects data from different sensors deployed at various nodes and sends it through the wireless protocol. This smart agriculture using IOT system is powered by Arduino , it consist of Temperature and Humidity sensor, Moisture sensor, Water level sensor, PIR sensor(It is used to detect the movement of people , animals or other objects), DC motor, GSM module , Wi-fi module.

Literature Survey :-

1. S.R. Nandurkar, V. R. Thool, R. C. Thool, "Design and Development of Precision Agriculture System Using Wireless Sensor Network",IEEE International Conference on Automation, Control, Energy and Systems (ACES), 2014.

2. JoaquínGutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta-Gándara, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module",IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT,0018-9456,2013.

3. Hayes, J.; Crowley, K.; Diamond, D. Simultaneous web-based real-time temperature monitoring using multiple wireless sensor networks. Sensors IEEE, October 30-November 3, 2005, p. 4.

4. Q. Wang, A. Terzis and A. Szalay, "A Novel Soil Measuring Wireless Sensor Network",IEEE Transactions on Instrumentation and Measurement, pp. 412–415, 2010.

Methodology :

This automatic control system based on sensor networks that collects data from different sensor deployed at various nodes and sends it through wireless protocol to the server . we various sensor are deployed in the field like temperature and humidity sensor, moisture sensor , PIR sensor and water level sensor . The data collected from these sensors are connected to the arduino UNO.

In control section, the arduino board collect data from sensors and then it display on 16*2 LCD display .

At the same time, received data is verified with the threshold values.if the data exceed the the threshold value the buzzer is switched ON and the LED starts to blink fan and water pump is turn ON. ie.

- Soil moisture sensor is detect the moisture in soil, if moisture of soil is greater then 35% then the water pump is turn ON.

- PIR sensor detect the activity of human and animal , if human and animal are detected then buzzer is switched ON.

- Temperature sensor is detect temperature Of field, temperture of field is 30*C then fan is turn ON.

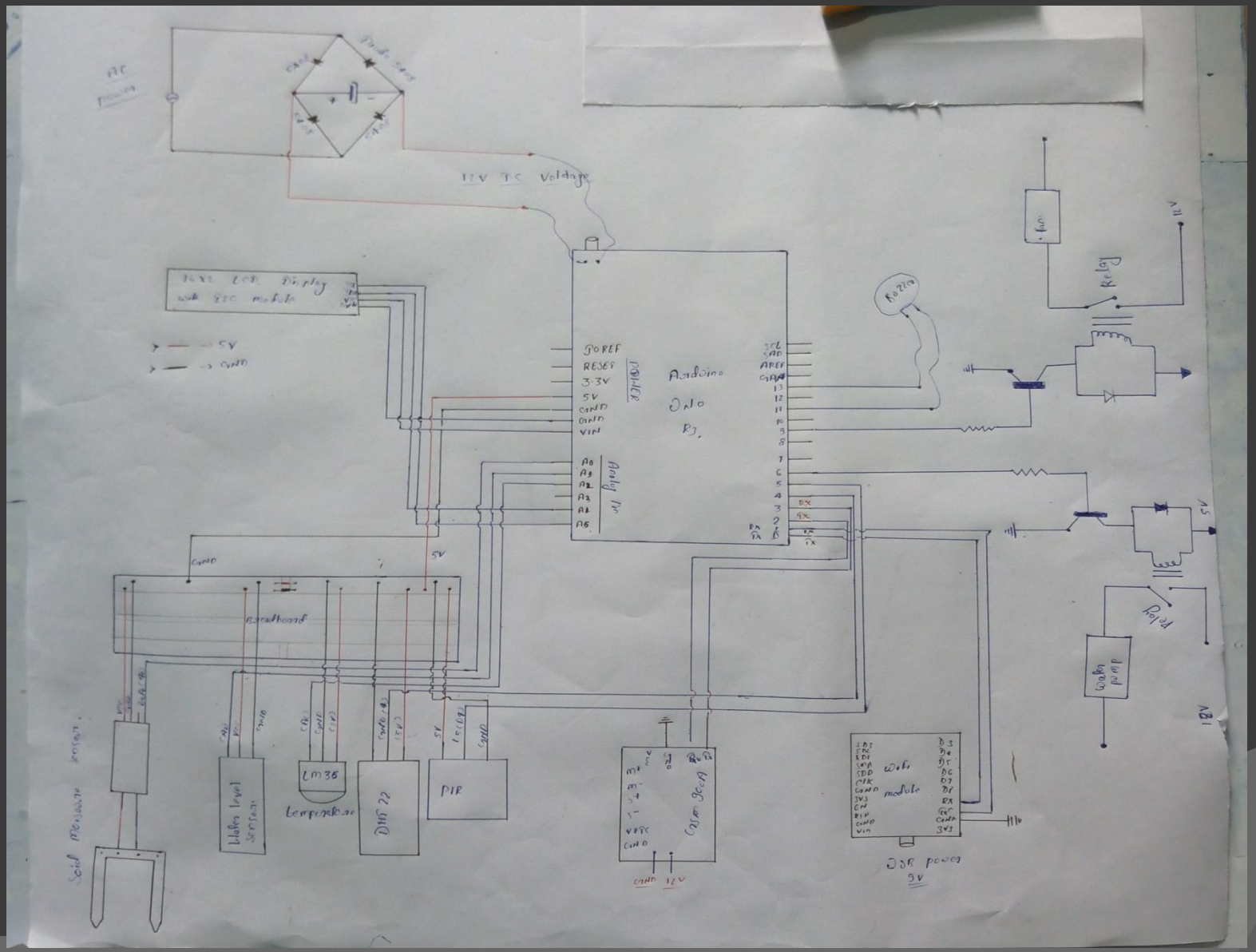
- **Water level sensor is detect the level of water in field.**

After operating all sensor , the date of sensor are SMS to farmer using 900A GSM module. The value are generated in the web page and it send real time data on the server using esp8266 wi-fi module.

In manual mode , the user has to switch ON and OFF the microcontroller by pressing the button in the Android Application developed. This is done with the help of GSM module.

In automatic mode , the microcontroller gets switched ON and OFF automatically if the value exceeds the threshold point . soon after the microcontroller is started, automatically an alert must be sent to the user through the GSM module.

CIRCUIT DIAGRAM OF PROJECT:-

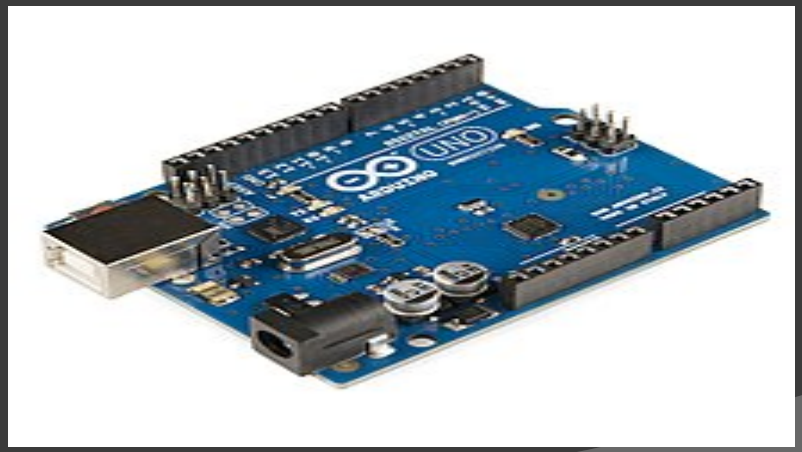


Components and modules:-

In this section , various component and Module being used for smart agriculture monitoring system using IOT and Automation technology development is discussed.

1. ARDUINO UNO:-

The Arduino Uno is a microcontroller board based on the ATmega328(datasheet).It has 14 digital input/output pins(of which 6 can be used as PWM outputs),6 analog inputs, a 16 MHz crystal oscillator, a USB connection ,a power jack, an ICSP header , and a reset button.



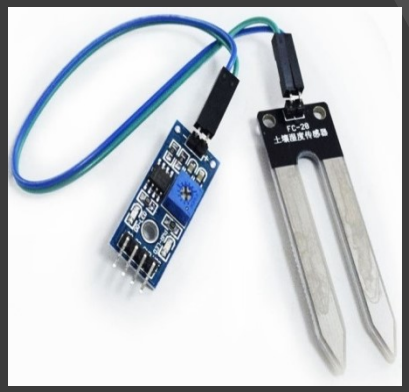
2. **GSM 900A Module:-**

The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mmx24mmx3mm, SIM900A can fit in almost all the space requirements in user applications, especially for slim and compact demand of design.

3. **ESP8266 Wi-Fi module:-**

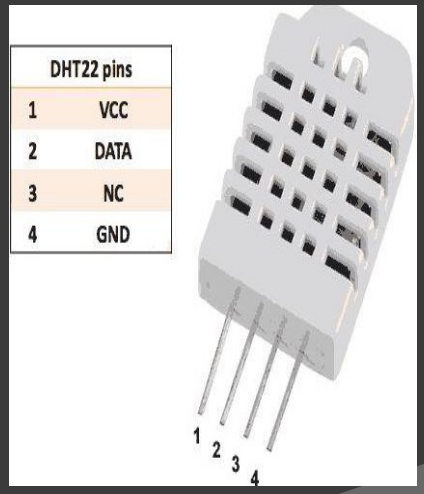
ESP8266 Wi-Fi Module is SOC with TCP/IP protocol stack integrated which facilitates any microcontroller to access Wi-Fi network. ESP8266 module is cost effective module and supports APSD for VOIP Applications and Bluetooth co-existence interfaces. Technical Specifications: 802.11b/g/n; Wi-Fi Direct, 1MB Flash Memory, SDIO 1.1/2.0, SPI, UART, Standby Power Consumption of <1.0mW.

4. **SOIL MOITURE SENSOR:-**



It is a cost-effective soil probe that measures the volumetric water content and soil temperature over multiple depths using a single probe. It can be deployed in sensitive agriculture zones to enable full control of irrigation, increase water-use efficiency and provide an understanding of water movement throughout the soil.

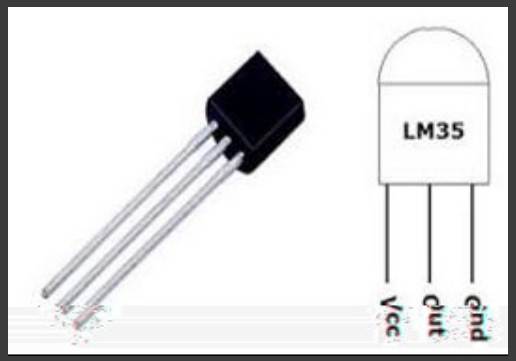
5. **DHT22 SENSOR:-**



The DHT-22 (also named as AM2302) is a digital-output, relative humidity, and temperature sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and sends a digital signal on the data pin

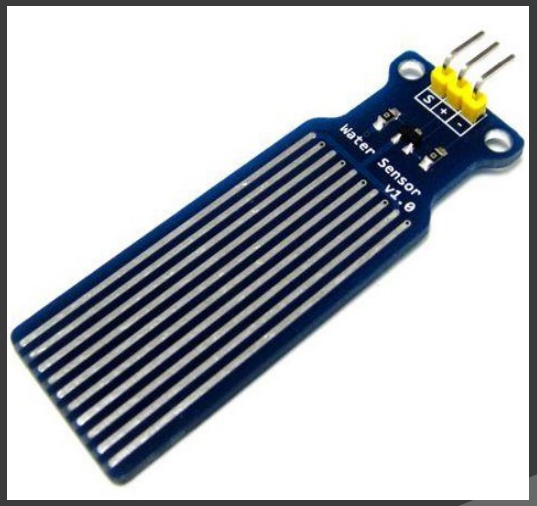
6 .**TEMPERTURE SENSOR:-**

Temperature Sensor LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature.



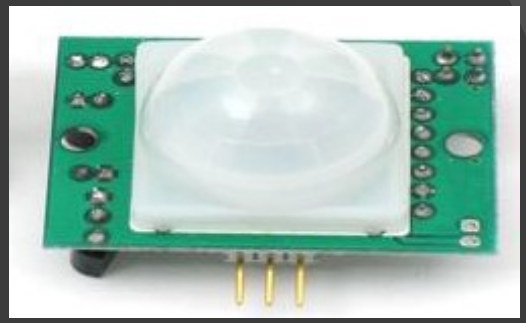
7. **WATER LEVEL SENSOR:-**

It can be used to detect the presence, the level, the volume and/or the absence of water. While this could be used to remind you to water your plants, there is a better Grove sensor for that. The sensor has an array of exposed traces, which read LOW when water is detected.



8. **PIR SENSOR:-**

PIR sensors allow you to sense motion. They are used to detect whether a human has moved in or out of the sensor's range. They are commonly found in appliances and gadgets used at home or for businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.



9**. POWER SUPPLAY UNIT :-**

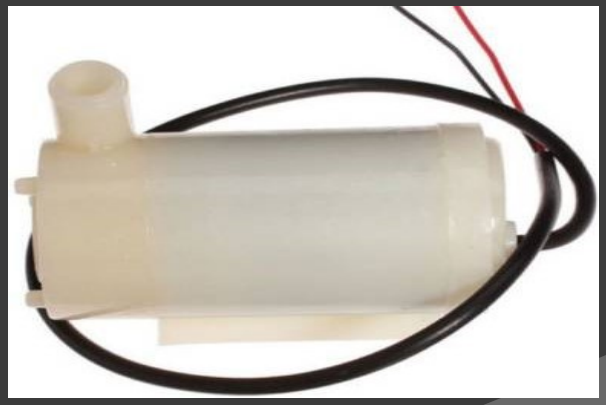
Power Supply unit converts main AC low voltage regrulated AC for the device which takes high voltage Ac and gives 12v regulated DC power supply.

10. **LCD DISPLAY:-**

An LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in Display and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

11. **WATER PUMP:-**

A water pump is a any device for moving water. The water pump is a oldest and most widespred machine ,and exist in an enormous varity of styles.



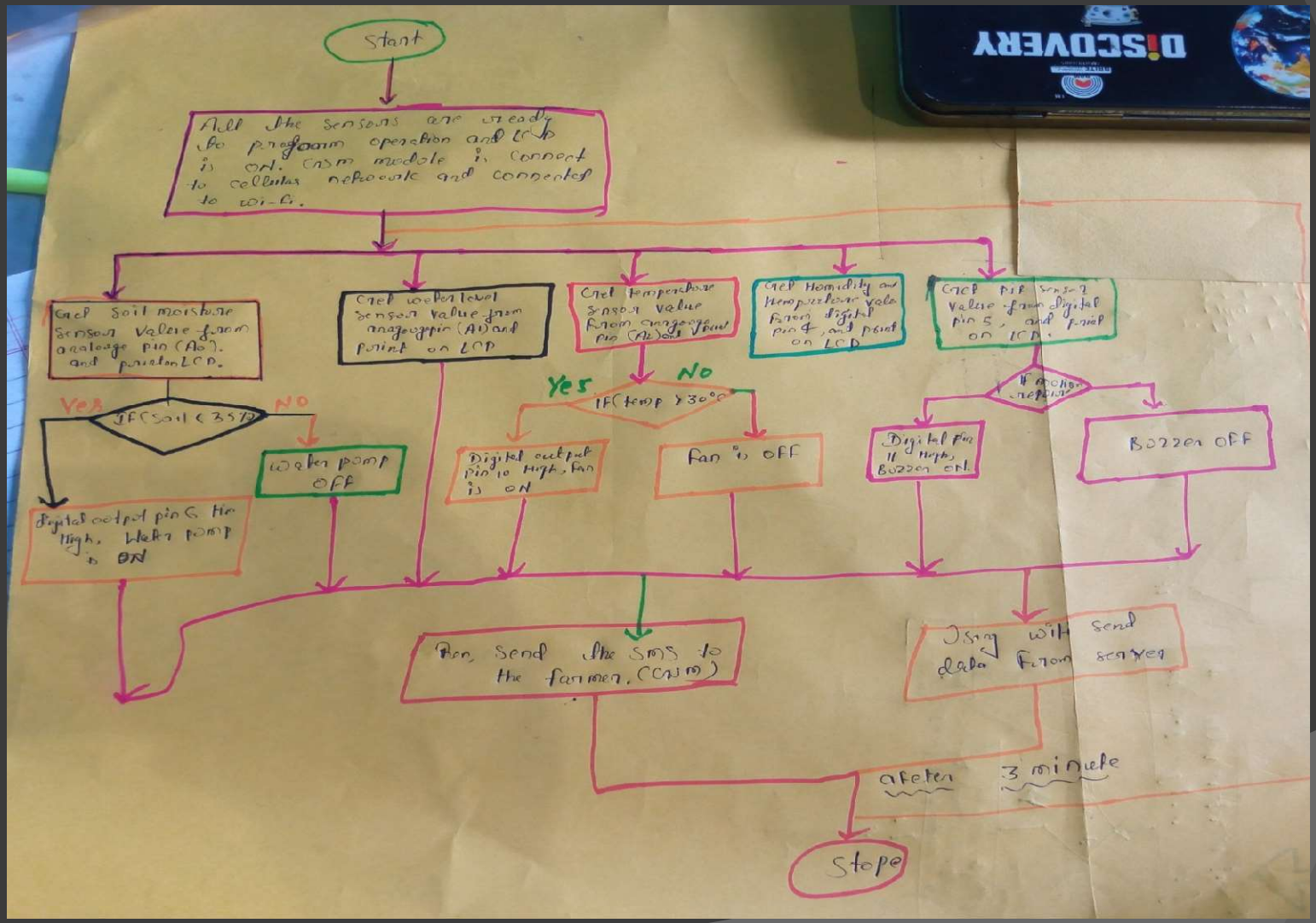
❑ CONCLUSION:-

- SMART AGRICULTURE MONITORING SYSTEM based on IOT and Automation technology for Live Monitoring of Temperature , Soil Moisture, humidity and human and animal activity has been proposed using Arduino and Cloud Computing .

- The System has high efficiency and accuracy in fetching the live data of temperature and soil moisture humidity and human and animal activity.

- SMART AGRICULTURE MONITORING SYSTEM based on IOT and Automation technology being proposed via this report will assist farmers in increasing the agriculture yield and take efficient care of food production as the System will always provide helping hand to farmers for getting accurate live feed of environmental temperature , soil moisture, , humidity and human and animal activity with more than 99% accurate results.

FLOW CHART:-


Start
All the sensors are ready for program operation and LCD is ON. GSM module is connect to cellular network and connected to wi-fi.
Get Soil moisture Sensor Value from analoge pin (A0). and print on LCD.
Get water level sensor value from analoge pin (A1) and print on LCD
Get Temperature Sensor value from analoge pin (A2) and print
Get Humidity and Temperature vale from digital pin 4, and print on LCD
Get PIR Sensor Value from digital pin 5, and print on LCD.
Yes
No
IF(temp > 30°C
IF(soil < 35%)
Yes
No
Water pump OFF
Digital output pin 6 is high, Water pump is ON
Digital output pin 10 high, Fan is ON
Fan is OFF
Digital pin 11 high, Buzzer on.
Buzzer OFF
Fan, Send the SMS to the farmer. (GSM)
Using wifi send data from server
after 3 minute
Stop