Design & Implementation of IOT Based Firefighting System to Protecting Farm

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Abstract- Agriculture plays a crucial role in the economy of developing countries, and provides the main source of food, income and employment to their rural populations.Farmers hold the backbone of the agricultural system. Agriculture is the world's leading source of food items.In summer season many of farms are dry and plants also dry there is lots of probability to occurring farm fire in farm due to man-made like, short circuit in electricity distribution line, firing stubble by humans.Because of that action farms are affected badly. This can make affect on further cultivation season. We are building a smart system which is powered by IOT based which will protect our farm from fire. When fire is occurs in surrounding farms then our system will sense the fire and start water sprinklers to put out the fire and share this data on IOT to know the status of farm to farmer.We also doing automation using IOT based irrigation system. We achieving this controlling system world-wide by using IOT based technology.

Keywords- Fire Alert system, IoT alter systems, Irrigation system.

I.INTRODUCTION

Agriculture in India constitutes more than 60% of occupation. It serves to be the backbone of Indian economy.It is very essential to improve the productivity and efficiency of crop and soil in agriculture.But as we seen in latest news in India and other countries this farm fire accidents are very dangerous.It will burn all the crop and also damage the soil it make soil erosion.This accidents are man-made accidents like, electricity line fault and other kind of mistakes.There is not any existing system to take immediate action for prevention from this fire.So we are building system awhich is tackle this condition.We use in farm water to take action.

In this system we put a sprinklers all side of the farm with flam sensors which sense the fire and give input to the microcontroller. Microcontroller will take proper action to put out this fire from farm.In this system is IoT based system so when fire is sensed system will warn u very immediate.Because of IoT we are able to monitor this at anywhere.

Water is the life of plant and must be supply in proper quantity. Most of the soil receive water through the rain also water is added by the way of irrigation from well, tank or canal, etc. too much water may suffocate plants roots and little may not be able to sustain the plants.Excess is water is harmful to crop and soil. Almost all aspects of human life have undergone rapid development is supported by the advance electronic and information technology.Automation of smart system is the essence of today's world.

The automatic water level control is example for smart system.The system will automate the process by placing a single sensor in farm or in system that will periodically take measurement of the water level.This automation done using IoT based irrigation system control.

II. REVIEW OF LITERATURE

Noor Aboor Khaleq, IoT based fire detection system. The Node of MCU is the open source of the IoT stage.It is the incorporates firmware which keep running on the ESP8266 Wi-Fi SoC from Espressif Systems, and the equipment which depends on ESP-12 module.NodeMCU resembles brand name of a board that has a wifi module ESP8266 and some related circuit.ESP8266 module in order has a smaller scale controller with wifi. You can program ESP8266 utilizing Arduino,NodeMCU IDE or ESP8266 SDK.

NodeMCU is improvement board for ESP8266, which is wifi chip with 32bit microcontroller.The ESP8266 has 17 GPIO pins (0-16), be that as it may, you can just utilize 11 of them, since 6 pins (GPIO 6 - 11) are utilized to associate the glimmer memory chip.

Vardaan Mittal, We this study, this is an Arduino based automatic water level controller and indicator project. Here, we are going to measure the water level by using help of water sensor. The motor pump automatically turns

ON when the water level is high. Actually there is a lot of rain water crisis in India and also in other countries .In this project I Am going to implement automatic water level control so that we no longer have to manually switch ON and OFF the motor. This helps in improve the crop wastage as well as soil and reduce manpower.

Srishti Rawal, IoT based farm irrigation system, IOT is used to keep the farmers updated about the status of sprinklers.Information from the sensors is regularly updated on a webpage using GSM-GPRS SIM900A modem through which a farmer can check whether the water sprinklers are ON/OFF at any given time. Also, the sensor readings are transmitted to a Thing speak channel to generate graphs for analysis.

III. PROBLEM STATEMENT

The proposed system is designed for to automate the system using Arduino and Node MCU. Node MCU will give us world-wide connectivity with farm.The interface of sensor and the microcontroller is very user friendly which make easy operation to us. Daily monitoring data will be shown on our mobile phone that's very useful to make advance agriculture.

IV. OBJECTIVES

The objectives of this project are given below:
- Provide highly sensitive flam detection.
- Provide rapid and quick action of water sprinklers.
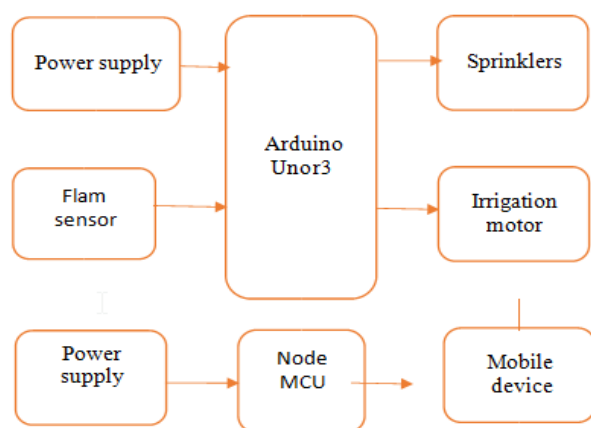- Provide IoT based irrigation system

V. SYSTEM ARCHITECTURE

Fig 1. System Architecture.

1. Working of Sensors :
The opereating voltage of the Arduino is 5v. The recommended i/p voltage ranges from 7v to 12v.

1.1 Temperature Sensor: The basic principle of working of the temperature control. With the IoT Power Relay you can easily sensors is the voltage across the diode terminals. If control the power going to a device with an the voltage increases,the temperature also rises, Arduino, Raspberry Pi or other single-board followed by a voltage drop between the transistor computer or microcontroller.

Fig 2. Tempreture sensor.

2. Arduno Uno r3:
The Arduino Uno R3 is a microcontroller board. IT has 14 digital input/output pins of which 6 can be used as ouputs and 6 can be used as analog platform.The R3 is the third and latest,revision of the Arduino Uno. Arduino Uno is a mocrocontroller board based on the ATmega328.
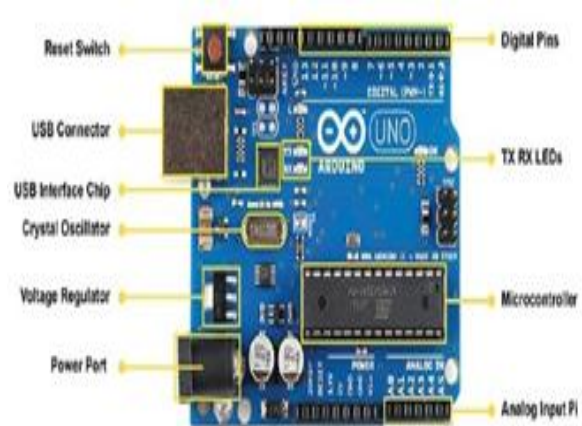

Fig 3. Arduno Uno r3 microcontroller.

3. Relay:
The IoT Power Relay is a controllable power relay equipped with four outputs that help you create an Internet of Things project with safe, reliable power terminals of base and emitter in a diode. The IoT Power Relay is designed to allow you to safely control an outlet device that operates at 3--48VDC or 12--120VAC.

Fig 4. Relay.

4. Node MCU Action:

Node MCU is an open source and low cost IOT inputs It is initially included firmware which runs on the ESP8266 wifi and hardware which based on the ESP-12 module. Node MCU ESP8266 development board comes. It simply connect to a computer with a USB cable with the ESP-12E module containing ESP8266 or power it with a AC-to-DC adapter to get started. chip having 32-bit mocroprocessor.

In this projecttemperature sensor is connected at i/p side of microcontroller and motor driver is connected o/p side of microcontroller. This microprocessor operates at 80 MHZ to 160 MHZ. Node MCU has 128 KB RAM and 4 MB of flash memory to store data.

Firmware is a software program or set of instructions programmed on a hardware device. It provides the necessary instructions for hoe the device communicates with the other computer hardware. Node MCU will give us world-wide connectivity with farm

Fig 5. Node MCU Action.

5. Flam Sensor:

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Flam sensor is the sensor which act very immediate while flam will emit. This give signal to controller to take action that condition.

The output of this sensor is an analog signal or digital signal. To indicate the detection of a flame, a buzzer is used.
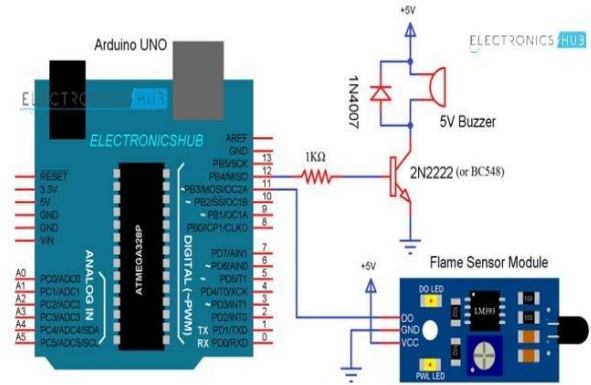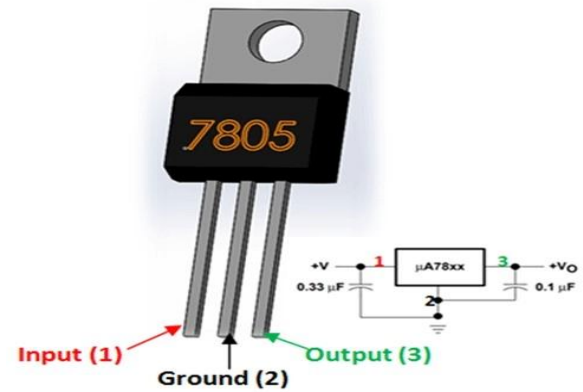

Fig 6. Flame Sensor.

6. 7805 Voltage Regulator:

Fig 7. 7805 Voltage Regulator.

7. Summersible DC Pump:

DC powered pumps use direct current from motor, battery, or solar power to move fluid in a variety of ways. Motorized pumps typically operate on 6, 12, 24, or 32 volts of DC power.

The main advantage of DC (direct current) pumps over AC (alternating current) pumps is that they can operate directly from a battery, making them more convenient and portable. They are easier to operate and control, since AC systems typically require a controller to manage speed. DC pumps also tend to be more efficient. However, AC pumps usually are designed for higher speeds and larger bursts of power.

DC Powered Pumps use direct current from motor or solar power to move fluid in a variety of ways. Motorized pumps operate on 6, 12, 24, or 32 volts of DC power and use hand-operated, electric, pneumatic, or hydraulic motors. ... Many DC powered pumps use centrifugal force or positive displacement to move fluids.
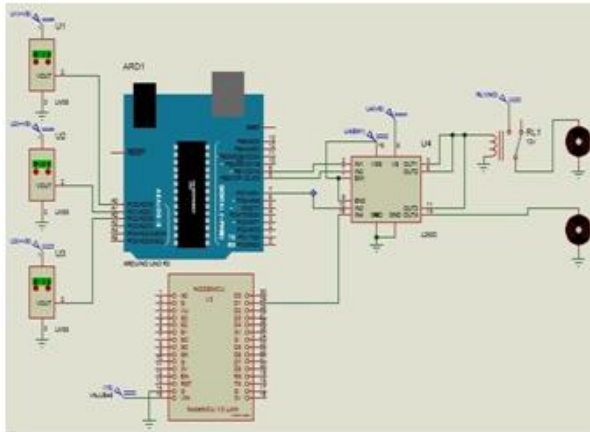
VI. PROJECT CIRCUIT DIAGRAM

Fig 8. Circuit Diagram.

1. Methodology Used:
- Automatic farm monitoring
- Auto irrigation system
- Node MCU action
- Flam sensor

Module 1: Automatic farm monitoring:
In this section we continually monitor our farm and surrounding temperature. And send this date to the farmer. Any fire will occur in the outside the and inside the farm then automatically water sprinklers will turn on.For achieving this state, we using Arduino uno microcontroller and Node MCU.

Module 2: Auto irrigation system:
In this project we continually monitor our farm soil humidity if their humidity below the set value then automatically water pump will turn on to maintain the humidity in the farm this can be done using humidity sensor and microcontroller which we mentioned above.

Module 3: Node MCU action
Basically, Node MCU is a controller which is interfacing with the WIFI which give us to free hand to communicate world-wide. We use this microcontroller for monitor our farm continually.

Module 4: Flam sensor:
Flam sensor is the sensor which act very immediate while flam will emit. This give signal to controller to take action that condition.

VII. REQUIREMENTS OF NEW FIRE FIGHTING SYSTEM

The new modern fire monitoring system is based on wireless sensor network in combination with Internet of Things. Because of modern advanced technology, the system minimize the losses due to fire. Sensors detects the fire condition and transfers the data to the system.
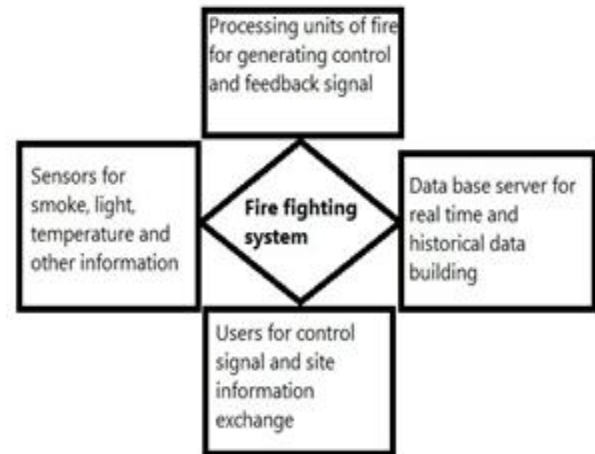

Fig 9. Fire Fightning System.

VIII. FUTURE SCOPE

Using real time data from the weather we can automated our farm. It will helps to give idea to cultivate which type of cultivation is good for next days.

Also using GSM module we will alert the farmers and respected authority to take action any kind of disaster.

IX. CONCLUSION

In present, there is no other system is present to tackle this kind of disasters. It will give world-wide connectivity which give us free hands. Hence, we conclude that by using this system we are able to tackle the condition and prevent our farm from fire also we will doing automation in irrigation so we will save the water.

Firefighting IOT standard system construction can be accelerated, and nationwide IOT platform can be constructed by actively carrying out system integration and information sharing of fire-fighting remote monitoring system.

The IOT technology improves the fire-fighting safety management work from traditional firefighting to modern fire-fighting.This paper discusses about the design concept and construction of fire fighting IOT model and the steps to be followed to do fire-fighting safety management IOT design.

The development of wireless sensors networks with the integration of Internet of Things arise challenges in fire-fighting fields. This new approach gives a reliable solution that can permit to detect fires risks, in order to avoid severe damage of this disaster, when it happens.

REFERENCES

[1] Dr. Narayan G. Hegde, "Water Scarcity and Security in India", BAIF Development Research Foundation, Pune.

[2] Marvin T. Batte, "Changing computer use in agriculture: evidence from Ohio", Computers and Electronics in Agriculture, Elsevier science publishers, vol. 47, 1–13, 2005.

[3] Csoto, Magyar, "Information flow in agriculture – through new channels for improved effectiveness", Journal of Agricultural Informatics 1 (2), 25–34, 2010.

[4] Ransing, Rasika S., and Manita Rajput. "Smart home for elderly care, based on Wireless Sensor Network." 2015 International Conference on Nascent Technologies in the Engineering Field (ICNTE). IEEE, 2015.

[5] Islam, Taoufikul, Hafiz Abdur Rahman, and Minhaz Ahmed Syrus. "Fire detection system with indoor localization using ZigBee based wireless sensor network." 2015 International Conference on Informatics, Electronics & Vision (ICIEV). IEEE, 2015.

[6] Muheden, Karwan, Ebubekir Erdem, and Sercan Vancin. "Design and implementation of the mobile fire alarm system using wireless sensor networks." 2016 IEEE17th International Symposium on Computational Intelligence and Informatics (CINTI). IEEE, 2016.

[7] Ogudo, K.A.; Muwawa Jean Nestor, D.; Ibrahim Khalaf, O.; DaeiKasmaei, H. A Device Performance and Data Analytics Concept for Smart phones' IoT Services and Machine-Type Communication in Cellular Networks. Symmetry 2019, 11, 593.

[8] Zhang, Lei, and Gaofeng Wang. "Design and implementation of automatic fire alarm system based on wireless sensor networks." Proceedings. The 2009 International Symposium on Information Processing (ISIP 2009). Academy Publisher, 2009.020.