FOREST FIRE DETECTION

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Abstract - **In the past few decades many studies and researches have taken place in order to improve security systems and to increase their level of protection in different fields. One of the major problems that security must deal with is the fire outbreak that can happen in everywhere including houses, schools, factories and many other places, and to avoid that or to minimize the damage caused by fire outbreak an IOT technology is used to control such a kind of risk. IoT is a modern system that consist of sensors and switches connected to a central hub which called gate way. In this project we will use temperature sensor known as (Flame sensor) with Arduino device to detect fire outbreak and to measure the amount of heat intensity generated by a fire outbreak or in a specific location in our house, offices and other places. It sometimes takes too much time for the fire station to reach to the fire outbreak location and works on extinguish the fire and so these sensors will work as an early alarm system which will send an SMS notification to our mobile phones, fire stations and hospitals if any fire outbreak occurred to let us know the situation clearly and before it's too late, we act to avoid significant damage in case the fire outbreak was observed after a long time from its outbreak.**

Keywords: GSM (Global System for Mobile Communication), Arduino UNO, DHT 11, Arduino.

I. INTRODUCTION

In the addition to the numerous, advantages of sensor, network over the traditional, security systems, against fire outbreak its considered a as a cheap product in the terms of equipments and installation. Since IOT technology is becoming more and more popular in the commercial market, its related systems and components is becoming more desirable and that include the sensor network which is used in security and in our case security against fire outbreak. Wireless sensor network is considered as a practical method for security systems against fire outbreak which have drawn a substantial amount of attention recently and it has been well established. Fire outbreak is likely to happen in anytime and everywhere, it considered as a sudden event which requires a predictable security system to counter this kind of risk. Fire sensors which are considered as a part of wireless sensor network plays an important role in monitoring and detecting any abnormal increasing in the temperature and humidity rate. A DHT 11 sensor is used in this project to monitor the temperature and humidity rates in a specific location, this sensor is connected to an Arduino chip, this chip is connected to a GSM Module. In case of fire outbreak the temperature will increase and the humidity will decrease , these abnormal changes in the rates will be detected by the DHT 11 sensor , the Arduino then will receive these changes as a Data from the sensor and send it through the GSM to a database which will be stored there as a values, then the data base will sends these values as an SMS Message to a our mobile phones to inform us about the situation , it can be used also to send a notification to the fire stations and hospitals in case of fire outbreak in forests, factories, houses....etc.

II PROBLEM STATEMENT

A Large destructive fire that spread over a forest or area of woodland which leads to damage in Wildlife, humans, property and Environment. The major Causes Are Lightning. Sparks from Rock falls. Volcanic Eruption or any other manual Ignition from the Humans on purpose which leads to the following disadvantages: A forest fire sets up the potential for soil erosion to occur, Forest fires always bring death to life of humans and animals, Uncontrolled fires can cause localized air pollution, Homes can be destroyed without compensation.

III Objective

The project is to design and implement a novel technology using IoT devices to detect fire and smoke in the forest.
The project provides following objectives:

- The main objective of this project is reducing the number of complications that can occur to a plant.
- To make full use of prevalent technologies like IoT and Machine Learning to procure maximum output using them.

- To avoid more forest from getting burned thus maintaining safety of nearby plants as well.
- To maintain the overall productivity of the farming by detecting fire in time.
- To prevent plants from dying; because some fires are deadly.
- To maintain a perfect ecosystem and green environment.

IV LITERATURE SURVEY

As of late, the recurrence of woodland fires has expanded extensively because of environment changes, human exercises and different variables. The counteraction and observing of Forest Fires has become a worldwide worry in Forest Fire anticipation associations.

The global warming will constantly be contributing to increasing the number of fires and the damages caused by them. Each season, besides thousands of hectares of forest being destroyed, there are a lot of assets and properties being affected as well. Even more, both the fire fighters and the civilians' lives are also in danger. Temperature measurements, the levels of methane, gasoline and CO_2 can be used as a leading indicator for the early detection of forest fires. An advanced system for Forest Fire Detection was developed which overcomes the demerits of the Existing technologies of Forest Fire Detection. Remote sensor one of the methods for early woods fire location. For future research, the proposed system can be improved, for example by integrating a surveillance camera for a more precise monitoring process and detection. This system can also be implemented in places where rare wild lives are living and precious trees are planted and to prevent forest fires. The primary requirement for picking this specific application for the recognition of timberland fires is to defeated the bad marks present in the current advancements of MODIS and Basic Remote Sensor Network-based Forest Fire Detection Systems and a high-level framework is created for the discovery of woods fires.

V RELATED WORK

In 2013, Houache Nourekddine, Kechar Bouabdjellah and Larbi Sekfhri made a profound investigation of utilizing remote sensor system to distinguish fire flare-up in woodlands. The system embraced incorporates three noteworthy stages: information collection, communications through the system and investigation of gathered information, likewise catching different climate conditions essential for the figuring of list (or recipes), this runs occasionally until an occasion of location of flame happens.

In 2016, Kargwan Jabbeary, Ebubeckir Erdem, Sercan Vançn, have been the accomplished the participation framework by the utilizing A notice as a strategy for the advising clients, identified with framework. The introduced Arduino gadget which was modified with Android Studio takes got gas, fire, the temperature, and dampness signals from the sensors. So as to pre-screen the capacity of event of a fire, when it recognizes that the gathered information with control levels surpass a predefined edge it will empower the correspondence with WIFI organize and send the notice alert message to the versatile clients.

In 2017, Mahmut Durgun, Seyit Alperen Celtek, Levent Gökrem, planned a simple establishment and no door required. The framework involves a remote temperature arrange which is minimal effort and low control, every remote temperature sensor hub faculty and transmits the varieties in the neighborhood temperature to cloud database. The cloud server gets the information and stores it in a table and plotting the varieties at the same time. The trap of remote temperature checking and alert framework enables the temperature varieties to be seen and the caution is controlled at whatever point client need from anyplace in the world. Also, when the enormous temperature of varieties occur, frameworks will promptly the run alert which is 90 dB and the make an impression on client.

VI SYSTEM IMPLEMENTATION

The Implementation is the most tedious part as we have to take care of the Surrounding influences like plants, animals and Atmospheric conditions that can damage the device or disturb its range and efficiency. The Target range while implementation is estimated to be 20 feet's if we use the most basic model. The sensor detects the presence of Flame in that range and immediately makes the circuit high. The Circuit in turn response to these signals by doing the following things:

- It makes the buzzer high to create a disturbing and alarming sound.
- It notifies the cloud about the raise in reading of the sensor and feeds the location.
- It turns on the pump to sprinkle water to prevent the fire from spreading and trying to cut the source.

The cloud receives the readings from the Microcontroller and is programmed to send a Notification to the forest department and a Mail to the Fire department. The notification sent to the forest department also has Location of the device where the fire was detected and the buzzer makes it simple for them to track and follow the lead. Thus, proper actions are taken by necessary authorities to prevent the spread of the Fir

VII METHODOLOGY

The methodology remains simple, an integrated device powered by Solar Energy is setup in various location of the forest based on the rage and efficiency. These devices use the MQTT Algorithm to send immediate notifications to the cloud and trigger the attached pump. The Following flow chart gives an illustration of the methodology.

The sensors first detect the presence of Flame in their Area of Observation, The Microcontroller immediately sends the necessary sensor readings to the cloud and triggers the pump. The Cloud acts on the readings of the sensors and notifies the necessary departments.

The Node of MCU is the open source of the IoT stage. It is the incorporates firmware's 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. Working framework is XTOS, Memory (128kBytes), Storage is 4Mbytes, Powered by USB, Power Voltage is 3.3v ,5v (utilized with 3.3v Regulator which inbuilt on Board utilizing Pin VIN), IDE Used is Arduino IDE, Interfacing Protocols is Serial, SPI, I2C. It contains everything the expected to help microcontroller; essentially, interface it to a PC the with a USB link or power it with an AC-to-DC connector, or battery to begin. To the make the association, between Arduino IDE and hub mcu we make the accompanying advances:

1-Download Arduino IDE.
2-Open you IDE and snap on "Record - > Preferences".
3-In "Additional Boards Manager URLs" include this line and snap "alright".
4-Go to "Devices - > Board - > Boards Manager", type "ESP8266" and introduce it.
5-Go again to "Devices - > Board" and select "Nonexclusive ESP8266 Module.

VIII System Architecture

1) Real hardship implemented in large area in real time.

2) To conduct reliability.

3) More accurate GPS receiver, natural disaster warning.

4) Reduce death rates.

5) Reduce man power.

IX CONCLUSION

This system presented the development of a fire alarm system using the Arduino UNO. This system undoes the need of a person to continuously monitor the area. The monitoring will be done with the help of sensors. Buzzer and Message alerts are used to alert the required authorities. This system is a low cost, power efficient and based on the instruments that reliable as well as durable. Many future works are also possible in this system design. We can use the multiple nodes for a single receiver node. GPS module could also be used to pin point the exact position of the fire. We can use the wind sensor to determine the rate of fire flow and its direction. Automated fire extinguishing system could be used along with the system. This system is developed to implement the knowledge gained during the engineering program.

X FUTURE SCOPE

1) Enhance the time complexity of the detection of fires to improve the speed.

2) Additional pump can be added so that it automatically sends water when there is a fire breakout. Also, industrial sensors can be used for better ranging and accuracy.

3) One of the limitations of this system is that continuous internet connectivity is required at user end which might prove to be costly for farmer. This can be overcome by extending the system to send suggestion via SMS to the farmer directly on his mobile using GSM module instead of mobile app. Weather data from the meteorolo the future which can help farmer plan accordingly and improve his livelihood.

XI REFERENCES

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