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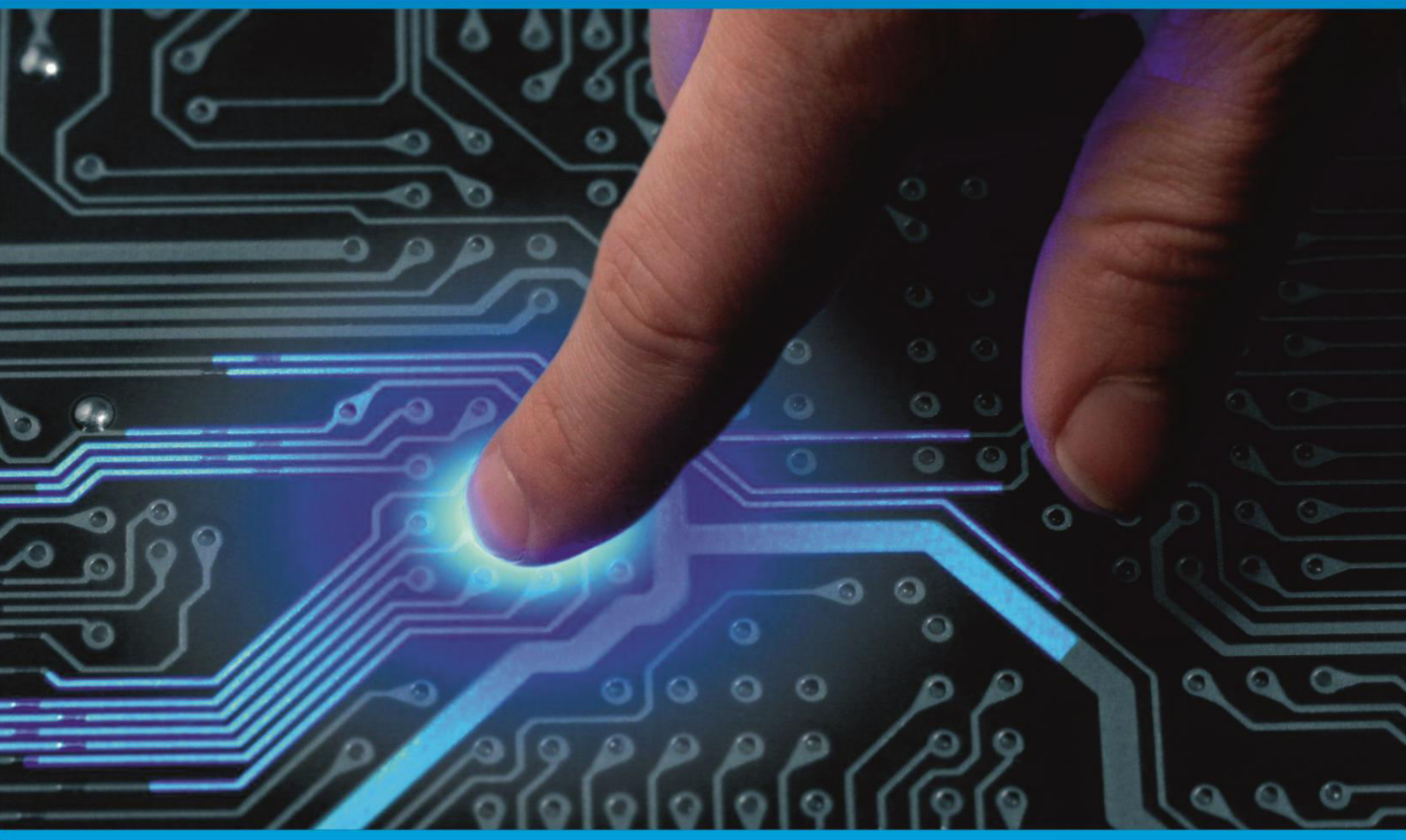

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Forest Fire Detection System Using IOT

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ABSTRACT: Natural disasters have perpetually been mankind's constant companion since time old. fire is one such disaster that once happens at massive scale not solely destroys the flora, fauna, vegetation of the forest however additionally puts the lifetime of human being and animals at a really high risk. Within the recent past years, managing this type of crisis, viz., an oversized scale hearth has become a really tough and difficult task. Things that area unit common in most of the fire that occur at massive scale area unit loss of life (human or animal), loss of vegetation, loss of flora and fauna, and communication failure. Therefore, a comprehensive survey on the present forest fire detection and observation mechanisms is extremely desired. this text is geared toward providing a birds eye read of those existing detection and observation mechanisms for forest fires.

KEYWORDS: GPS, LCD Display, GSM , Smoke Sensor, Ethernet, Radio Frequency.

I. INTRODUCTION

This chapter deals with the general introduction, existing system and the proposed system of the project. Overview gives a broad introduction about the project. Proposed system provides a solution to overcome the limitations faced by existing system.

When plants and tress are affected by the unexpected fire caused by the nature it affects the natural wealth of the country. Usually the forest fire is identified after the it get worse . But this leads . Automatic detection using image processing techniques provide fast and accurate results. This project is concerned with a new approach to the development of plant disease recognition model, based on leaf image classification, by the use of deep convolutional networks.

II. IMPACT OF FOREST FIRE

As expressed by National Institute of Disaster Management, Ministry of Home Affairs in their latest report on fire Disaster Management, fire is that the major cause of injury and loss to forest. This loss because of fireplace contains a major impact on forest ecosystem their by indirectly moving the nature's scheme. As per one estimate of international organization Development Program the loss because of such a fireplace in forest, economically are around `9000/- per angular distance every year (*Reference: http://nidm. gov.in/pdf/pubs/forest%20fire.pdf). tcan flip information superhighway plus of forest into ashes. Therefore, larger stress is set on the survey that may be used for the aim of style and development of detection and observation system. It is as a result of some activities like associate degree uncontrolled phylogenies that makes a fireplace within the forest to occur at regular intervals. Incidents that cause regular forest fires embody synthetic incidents, climate changes, and different factors; there has been a continuing increase within the frequency of forest fires. Out of the incidents mentioned on top of, synthetic incidents, i.e., deliberate cause is that the most common one. generally fires that occur within the forest may be classified into 3 types that are:

1. Ground fires, 2. Surface fires, and 3. Crown fires. Ground fires as given in his suggests one event of forest fire at an oversized scale can continuously cause a loss of price cores which

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Fig.1.Ground Fire

Fig.1. occur primarily on the ground of forest which can produce abundant heat however while not flames. this kind of fireside may be a results of vegetable matter leaves which will be continuously found on the ground of forest. an extra cause may be the organic element of soil which can be fashioned by the method of decomposition of leaves and different plant materials by soil microorganisms. Ground variety of fires is rarest of the 3 and has been seldom recorded as a result of they usually occur at forests that square measure placed at terribly high altitudes like chain of mountains forests. To detect this kind of fires, that may be a terribly troublesome task, sensors which might record and measure even a temperature distinction of as little as one °C additionally ought to be used. Therefore, one will choose the implementation of thermal sensors and radiation sensors for this purpose. Authors of article [1] propose the employment of animals to be used as biological sensors. The animal that is fitted to detection of forest fire square measure Fig. one forest fire 1112 V. Chowdary and M.K. Gupta reptiles like turtle. however drawback with this kind of reptiles is their slow nature because of that their pursuit are terribly troublesome (Figs. 2 and 3).

Fig..2.Surface Fire

Fig.3.Crown Fire

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Surface fires occur on the bottom and also the unfold of this kind can continuously take a regular form and can sometimes rely on the speed of wind. To discover this kind of fire { which will which can} not solely manufacture flames however will generate smoke one can choose smoke detector. One such use of smoke to discover fireplace in home setting is mentioned in [2]. during this article, authors have given importance to the improvement of power in terms of each the hardware and software system. Lastly, the crown variety of fires Fig. two forest fire Fig. three forest fire Automatic fire Detection and observation Techniques … 1113 will burn the whole tree right from the foundation to the highest most inspect the stem. This type of fires can offer far more flame then smoke. To discover these fires one needs a awfully strong detector that may stand up to a awfully heat.

III.PROPOSED SYSTEM

In this proposed system we are implementing the nodemcu with the raspberry pi where this method helps to divide the work into two one where the sensor are actuated by the node mcu whereas the raspberry pi will work as a iot platform

Gas detectors use a sensor to measure the concentration of particular gases in the atmosphere. The sensor serves as a reference point and scale, producing a measurable electric current when a chemical reaction caused by a specific gas occurs. The Grove - Gas Sensor(MQ3) module is useful for gas leakage detection (in home and industry). It is suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer. The output voltage from the Gas sensor increases when the concentration of gas increases. Sensitivity can be adjusted by varying the potentiometer. Please note that the best preheat time for the sensor is above 24 hours. For detailed information about the MQ-3 sensor, please refer to the data-sheet provided in Resources section.

ADVANTAGES OF PROPOSED SYSTEM
1.Indepth and detailing technology
2.Reduce the delay time of data
3.Better quality
4.Can help nature to save the forest
The step-by-step procedure of the proposed system:

1. Case study of the equipment
2. Flow chart preparation
3. Circuit made without raspberry pi
4. C++ programe has made
5. Circuite connected with IoT Platform
6. Out put

IV.ARCHITECTURAL DIAGRAM

The overall architectural diagram is shown below,

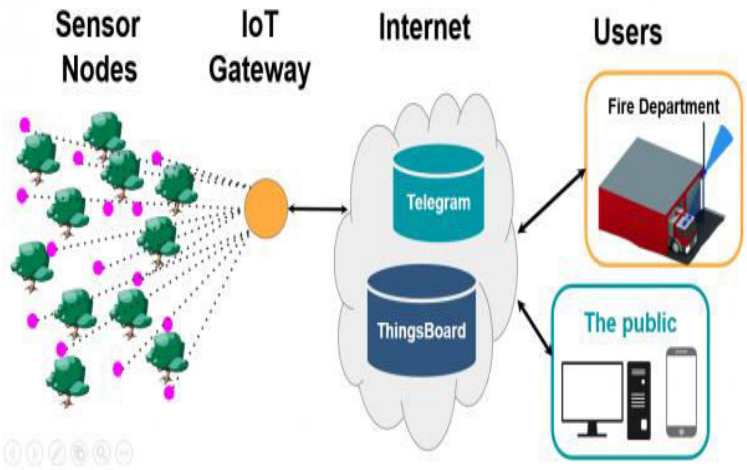

Figure .4.Architectural Diagram

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The explanation for the module is given below.

Sensors are used by wireless sensor nodes to capture data from their environment. They are hardware devices that produce a measurable response to a change in a physical condition like temperature or pressure. Sensors measure physical data of the parameter to be monitored and have specific characteristics such as accuracy, sensitivity etc. The continual analog signal produced by the sensors is digitized by an analog-to-digital converter and sent to controllers for further processing. Some sensors contain the necessary electronics to convert the raw signals into readings which can be retrieved via a digital link (e.g. I2C, SPI) and many convert to units such as °C. Most sensor nodes are small in size, consume little energy, operate in high volumetric densities, be autonomous and operate unattended, and be adaptive to the environment. As wireless sensor nodes are typically very small electronic devices, they can only be equipped with a limited power source of less than 0.5-2 ampere-hour and 1.2-3.7 volts.
Sensors are classified into three categories: passive, omnidirectional sensors; passive, narrow-beam sensors; and active sensors. Passive sensors sense the data without actually manipulating the environment by active probing. They are self powered; that is, energy is needed only to amplify their analog signal. Active sensors actively probe the environment, for example, a sonar or radar sensor, and they require continuous energy from a power source. Narrow-beam sensors have a well-defined notion of direction of measurement, similar to a camera. Omnidirectional sensors have no notion of direction involved in their measurements.
Most theoretical work on WSNs assumes the use of passive, omnidirectional sensors. Each sensor node has a certain area of coverage for which it can reliably and accurately report the particular quantity that it is observing. Several sources of power consumption in sensors are: signal sampling and conversion of physical signals to electrical ones, signal conditioning, and analog-to-digital conversion. Spatial density of sensor nodes in the field may be as high as 20 nodes per cubic meter.

An IoT Gateway is a solution for enabling IoT communication, usually device -to-device communications or device-to-cloud communications. The gateway is typically a hardware device housing application software that performs essential tasks. At its most basic level, the gateway facilitates the connections between different data sources and destinations.
A simple way to conceive of an IoT Gateway is to compare it to your home or office network router or gateway. Such a gateway facilitates communication between your devices, maintains security and provides an admin interface where you can perform basic functions. An IoT Gateway does this and much more.

What functions does an IoT gateway perform?

IoT Gateways have evolved to perform many tasks, from simple data filtering to enabling visualization and complex analytics. These smart devices are helping power the current wave of IoT expansion.

[1] IoT Gateway feature set

A versatile IoT Gateway may perform any of the following :

- Facilitating communication with legacy or non-internet connected devices
- Data caching, buffering and streaming
- Data pre-processing, cleansing, filtering and optimization
- Some data aggregation
- Device to Device communications/M2M
- Networking features and hosting live data
- Data visualization and basic data analytics via IoT Gateway applications
- Short term data historian features
- Security – manage user access and network security features
- Device configuration management
- System diagnostics

V. IOT GATEWAYS AND EDGE COMPUTING

In edge computing, critical data processing occurs at the data source rather than in a centralized cloud-based location. A versatile IoT Gateway is the essential link in delivering edge computing power to technicians in the field or at the plant floor. IoT Gateways that come equipped with these capabilities are referred to as 'Smart' Gateways.

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The OAS Platform and Universal Data Connector is an example of such a robust and versatile IoT Gateway. With its ability to operate at the data source as well as in the cloud to perform data aggregation and networking functions, the OAS Platform is also a flexible solution for most IoT and IIoT implementations.

VI. HARDWARE QUALIFICATION TESTING

For a socio-oriented project like the earthquake detection, flood prediction, fire detection, it is very much mandatory to run a hardware verification test, also known as qualification test to ensure the following key points.
Testing hardware under conditions simulating expected real-lifeconditions, including storage,
transportation, operation and maintenance environments.

- Ensuring the hardware conforms with local environmental requirements, including shelter, space, furnishings and fittings, electrical power supply and relevant extremes of temperature, humidity and pollution.
- Ensuring appropriate documentation is adequate and complete.
- Verifying that hardware is capable of performing under expected normal conditions and possible abnormal conditions.
- Ensuring appropriate security measures are in place and that they conform to appropriate standards.

Ensuring that appropriate quality assurance measures are in place

VII. RESULT

Fig.5.Gas Detecting Frequency

This chapter focuses only on the output of our forest fire prediction system and its accuracy. As we have implemented result prediction i.e., from the IOT system ,we made the system with fullest efficiency we can.

Based on the readings of the environmental factors like humidity, temperature, air pressure and the calculated humidity using the u sensor, our IOT system predicts the forest fire scenario.
The smoke sensor senses if smoke is present or not and gives the following output:

1 Normal state
0 Fire accours

Sample output from smoke sensor

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VIII.CONCLUSION

Technology has paved ways for human race even to reach Mars, but the essence of technology can only be tasted during the calamities during . Flood is one of the scenarios when a our resources get affected and it also affect the living beings in the forest . We wish in the upcoming years, through implementing our forest fire prediction system, we can proudly say that all the difficulties we faced belong to the past time-line and the impacts are reduced to a quite considerable amount as we have built a system of 96.34% accuracy, which includes the process of collecting data, processing and predicting. So, as Engineers we must further more focus on various other socio-oriental issues and build a solution, so that we can say that we have used the technology in a wise and significant way

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