LORA INTEGRATED FOREST FIRE DETECTION USING ARDUINO

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ABSTRACT

This paper presents a fire detection and alert system based on IOT. Here a specific environment is monitored 24x7 and the user is alerted in case of any fatal situation. This can be implemented using a NodeMCU and a number of sensors for detecting different physical parameters that can go high during a fire related accident. Arduino is an IOT based controller board. Here two parameters are being monitored continuously temperature and presence of smoke. For sensing temperature LM35 temperature sensor is used. For sensing presence of smoke a gas sensor called MQ6 is used, this sensor can detect and measure any carbon based gas smoke produces CO_2 this makes it possible to detect smoke using MQ6. Also, a PIR sensor is used for detecting presence of any human. Both gas and temperature sensor are analog so cannot be connected to a digital pin but an analog pin that is input to an ADC (analog to digital converter). Also forest area can be monitored through a camera using this camera fire can be detected using image processing. For this we can run a python program from PC and using OpenCV library fire can be detected. This can be used as a contingency system if the sensors malfunction. If any fire is detected, then a water sprinkler will be turned on to prevent fire also an alert is sent to concerned personal for further action.

Keywords: Internet of things, Arduino, LoRa, Sensors, Wireless etc.

INTRODUCTION

Fire accidents are common incidents all around the world most of the time this ends up in human life loss. These accidents can happen in any environment such as home, industries, cinemas etc. If accident occurs in an industrial environment the fatality of the situation is very high. This can be solved by designing a general system to monitor any type of environment remotely or locally. This system is realised in this paper.

LITERATURE SURVEY AND PROBLEM IDENTIFICATION

A. "Forest Fire Alerting System With GPS Co-ordinates Using IoT"

Jayaram K, Janani K, Jeyaguru R, Kumaresh R, Muralidharan N -2019

In the advancing world, it is very crucial to protect our environment. Many incidents of man-made and natural disasters were happening around the world. Forest fires are one such catastrophe for environment. Once the fire inside deep forest starts, it burns and destroys everything and spreads everywhere within the forest. Fire spreads on hot days destroys trees and grasses due to drought conditions peaks in a forest region. Such forest fires disasters should be curbed in order to protect fauna and flora habitats in the forest.

B. "Forest Fire Detection System Reliability Test Using Wireless Sensor Network and OpenMTC Communication Platform "

Anton Herutomo, Maman Abdurohman, Novian Anggis Suwastika, Sidik Prabowo, Catur Wirawan Wijiutomo -2015

Machine to Machine (M2M) communication system has started gaining its real-world momentum by the introduction of Internet and mobile technology into this system. Several works have come up to use this integrated system into many different vertical solutions and tried to bind one solution platform for many monolithic systems. One recent innovation is to use HTTP REST architecture as communication platform. This work tackles the first step of implementing OpenMTC as M2M and IoT communication platform. Involved sensors are carbon monoxide gas concentration, temperature, and humidity, combined with Zigbee and Arduino microcontroller to make up 2 Device Application components (or DAs, as proposed by ETSI M2M standard) connected to OpenMTC GSCL.

C. "Smart Forests: fire detection service "

Guilherme Borba Neumann, Vitor Pinheiro de Almeida and Markus Endler -2018

Smart Forest is a concept derived from the Internet of Things (IoT) and defines sections of a forest where remote sensing is applied to collect data about environmental conditions. One of the main objectives of Smart Forests is to detect wildfire at early stages. However, the required technology for such monitoring usually demands a complex and expensive sensor and network infrastructure and requires central processing capabilities for analysing data from several thousands of sensors. The goal of this work is to propose a solution focused on Edge Computing, using the concept of Mobile Hubs (M-Hubs).

D. "Detecting and Reporting Forest Fire through Deployment of Three Dimensional Multi-sink Wireless Sensor Network "

Moumita Ghosh, Rama Sushil, Kaushik Ghosh

Forest fires are common in the winter months across the world. An apt forest fire detection technique is required to check the spreading of fire and reduce the degree of loss thereby. In this paper we have proposed an energy efficient forest
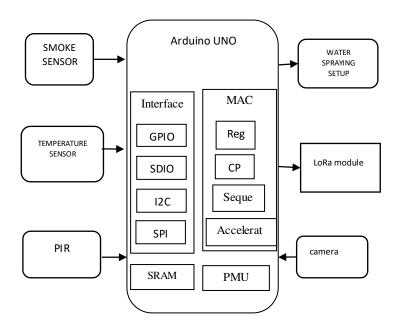
fire detection and reporting technique through three-dimensional deployment of multi-sink wireless sensor network. The scheme may be used in event driven, time driven or a proposed hybrid mode. The results of the proposed scheme have been compared with 3 dimensional versions of some of the very well-known routing protocols for sensor networks.

E. "An IoT based Weather Information Prototype Using WeMos"
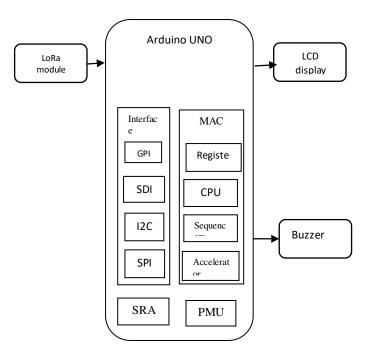
Ravi Kishore Kodali and Archana Sahu

The Internet of Things (IOT) describes the interconnection of devices and people through the traditional internet and social networks for various day-to-day applications like weather monitoring, healthcare systems, smart cities, irrigation field, and smart lifestyle. IOT is the new revolution of today's internet world which monitors live streaming of the entire world's status like temperature, humidity, thunderstorm, earthquake, floods etc. that can stagger an alarm to human life. This paper proposes a low-cost weather monitoring system which retrieves the weather condition of any location from the cloud database management system and shows the output on an OLED display

System Model

Sensor node

Master node

Implementation and result

This device presents a fire detection and alert system based on IOT. Here a specific environment is monitored 24x7 and the user is alerted in case of any fatal situation. This can be implemented using a NodeMCU and a number of sensors for detecting different physical parameters that can go high during a fire related accident. Arduino is an IOT based controller board. Here two parameters are being monitored continuously temperature and presence of smoke. For sensing temperature LM35 temperature sensor is used. For sensing presence of smoke a gas sensor called MQ6 is used, this sensor can detect and measure any carbon based gas smoke produces CO_2 this makes it possible to detect smoke using MQ6. Also, a PIR sensor is used for detecting presence of any human. Both gas and temperature sensor are analog so cannot be connected to a digital pin but an analog pin that is input to an ADC (analog to digital converter). Also forest area can be monitored through a camera using this camera fire can be detected using image processing. For this we can run a python program from PC and using OpenCV library fire can be detected. This can be used as a contingency system if the sensors malfunction. If any fire is detected, then a water sprinkler will be turned on to prevent fire also an alert is sent to concerned personal for further action.

CONCLUSION

This paper presented here a fire monitoring system that can alert the user remotely using IOT. This paper has been designed and implemented successfully. The system has been tested in deliberately created fire accident situation and response is very fast.

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