Forest Fire Alerting System with GPS Co-ordinates Using IoT

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Retraction

Retraction: Forest Fire Alerting System with GPS Co-ordinates Using IoT (*J. Phys.: Conf. Ser.* **1916** 012099)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Forest Fire Alerting System with GPS Co-ordinates Using IoT

Latha Maheshwari[1], J Janet[1], Jeevanandham S[1], Kausic S[1], Manish M[1]
[1]Department of Computer Science and Engineering, Sri Krishna College of Engineering and Technology, Coimbatore.
lathamaheswari@skcet.ac.in

Abstract. 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. Such forest fires disasters should be curbed in order to protect fauna and flora habitats in the forest. The objective of this work is to design and implement an IoT based system which is self-sustaining and would predict and detect the forest fires and sends the exact location to concerned officials which would help firefighting personnel to extinguish the fire in the location where it starts slowly.

Keywords: Iot, Sensors, Arduino, Amica board.

1. Introduction

The name "Internet of Things" was coined by Kevin Ashton of Procter & Gamble, who later became MIT's Auto-ID Center, in 1999, although his favorite phrase was "Internet for things". At the time, he considered radio-frequency identification (RFID) to be important to the Internet of Things, which allowed computers to connect and manage everything.

Internet of Things (IoT) is a network of connected computer devices, computer and digital computers, buildings, animals and people with specific identifiers and the ability to transfer data to a network without personal or person-to-machine communication. Internet of Things refers to a ever-growing network of virtual objects including an IP address for internet connection, as well as connections that take place between these objects and other Internet-enabled devices and applications. Internet of Things (IoT) defines a network of physical objects "objects" embedded in sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and programs via the Internet.

Thanks to the integration of various technologies, real-time statistics, artificial intelligence, device sensors, and embedded devices, things have changed. Integrated fields for embedded systems, wireless network networks, control systems, automation (including home and construction automation), and more all contribute to the Internet of Things. In the consumer market, IoT technology is closely related to products related to the concept of "smart home", including devices and electrical appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other household items) that can support one or more human environment, and can be controlled by devices related to that ecosystem, such as Smartphones and smart speakers. IoT can also be used in health care systems and in this case we use it to detect forest fires in emergencies.

The basic concept of smart device connectivity was discussed in early 1982, with the Coca-Cola sales machine converted at Carnegie Mellon University into the first Internet connection, able to report its list

and whether the freshly loaded drinks were cold or not. Mark Weiser's 1991 paper, which was widely distributed, "The Computer of the 21st Century", and organizations such as Unicomp and PerCom, presented a modern IoT concept. In 1994, Reza Raji described the concept in the IEEE Spectrum as "[moving] small data packets to a large set of nodes, in order to integrate and make everything work from home to all industries". Between 1993 and 1997, several companies proposed solutions such as Microsoft at Work or NEST's Novell. The camp gained momentum when Bill Joy considered device communication as part of his "Six Web Web" framework, which was launched at the World Economic Forum in Davos in 1999.

2. Literature Survey

From [1] we can understand that When human technology advances, the probability of natural and human caused disasters grows exponentially. Fires are one of the most devastating natural hazards. Aside from that, Fires burn forests, posing a serious threat to human life. That provide oxygen to humans is depleted. The danger of a burn has risen as a result of the issue of global warming. In the 1980s, it first emerged. Forest fires are a persistent threat to a community's natural processes, resources, and environmental aspects. As a result, there is a pressing need to track forest fires as soon as possible. This paper emphasizes the value of wireless sensor networks as a possible solution to the problem of early forest fire detection. This data is sent to a nearby central unit, where they are processed and then posted to an internet website that, if necessary, contacts the Civil Defence unit. The specific authorities have access to this website in order to take quick action in the event of an alert. It's worth noting that this device is both effective and environmentally friendly, emphasizing the need for its existence.

Analysing the work of [2] we get that man-made and natural disasters are growing rapidly as human technology progresses. It is important to safeguard our climate and natural resources. In today's world, technologies should be used to create a more liveable ecosystem by avoiding catastrophic loss. Land fires are one such natural occurrence. The aim of this project is to create an IoT-based system with autonomic features that can detect a forest fire as soon as possible and take quick action before it kills and spreads over a wide region. The system's primary goal is to track fires and shield our whole system from firerelated disasters. In addition to this the proposed model is designed to incorporate with the Autonomic features like self- monitoring and self-healing so that the ubiquitous environment that is created for a specific objective can be attained with robust and fault tolerant system, by embedding analytics as a service and, by providing intelligence at the periphery of the network.

[3] says that as we all know, the forest is one of the most valuable and necessary tools, and forest fire reduction and identification have been hotly researched in worldwide Forest Fire Prevention Departments. Based on the deficiencies of conventional forest fire detection on real time and monitoring accuracy, the wireless sensor network technique for forest fire detection was introduced, together with satellite monitoring, aerial patrolling and manual watching, an omni bearing and stereoscopic air and ground forest-fire detection pattern was found so that the decision for fire-extinguishing or fire prevention can be made rightly and real-timely by related government departments.

[4] states that Forest fires are now one of the most significant sources of environmental destruction. Current forest fire surveillance systems are incapable of providing continuous real-time tracking of any point in an area and early warning of fire threats. Wireless sensor networks, on the other hand, will constantly collect sensory data values such as temperature and humidity from two points in an area, day and night, and provide fresh and precise data to the fire-fighting centre. In the proposed system they have contemplated a robust system for the identification and tracking of forest fires using wireless sensor networks The wireless sensor network architecture, sensor distribution scheme, clustering and communication protocols are all proposed in our design. The framework's goal is to identify a fire hazard

as soon as possible while taking into account the energy demand of sensor nodes and environmental factors that may impact the network's necessary operation level. [5] To test and review our proposed system, we created a simulator. We demonstrate that our system can respond quickly to forest fires while still consuming energy efficiently through comprehensive simulation experiments.

3. Proposed System

To summarize the goal of the proposed project it's main objective is to detect the fire in the forest and also to alert the forest officer about the fire in the forest. Trying to understand what causes these forest fires, based on the research done it is concluded that almost 85% of the forest fires are caused by human and the other by natural causes like lightning, Lightning is described as having two components—leaders and strokes. The leader is the probing feeler sent from the cloud. [6] The return streaks of light are a series of strokes that produce the actual lightning bolt or flash that we see. There are two types of lightning, cold lightning and hot lightning. Cold lightning is a return stroke with intense electrical current but of relatively short duration. Hot lightning has currents with less voltage, but these occur for a longer period of time. Fires are usually started by unusually long-lasting hot lightning bolts. Here our advanced IOT processor is used to control the system activities, some sensors are used to detect the fire in the forest, the sensors include temperature sensor, smoke sensor and fire sensor, with detecting the fire the exact location of the fire is detected and located to the nearby forest officer, to do this the model contains a GSM module and Bluetooth module. When a fire catches, the sensors will detect unusual occurings, when it happens the code in the Arduino will be executed and the gsm modules will alert the respective personnel. In addition to this, the system is completely IoT based and the activities of the system are continuously monitored and the monitoring details are stored in online pages which can be viewed by office personnel regularly. The details are stored as a data and this data can be viewed at any time [7]. Figure 1 shows the Proposed system architecture

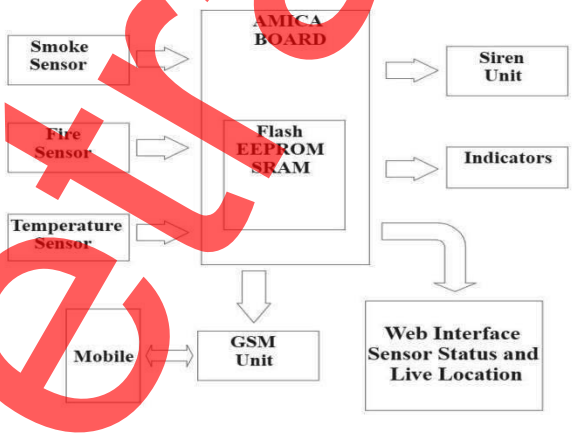

Figure 1. Proposed system architecture

The proposed solution recommends stand-alone boxes which are to be deployed throughout a forest. Each box contains different types of sensors. These units communicate wirelessly and send the data collected from all the sensors to a base station that contains systems that the office personnel use to monitor the data. Figures 2-5 shows the components.

These standalone boxes contain the following components, ⋆ Amica board:

Figure 2. Amica board

NodeMCU Amica is a ESP8266 Wi-Fi Module based development board. It has got Micro USB slot that can be directly connected to the computer or other USB host devices. It has got appearance as shown in above image. It has got 15X2 Header pins and a Micro USB slot, the headers can be mounted on breadboard and the micro USB slot is for connection to USB host device that may be a computer. It has got CP2102 USB to serial converter.

⋆ Smoke sensor:

Figure 3. Smoke sensor

MQ2 gas sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide. MQ2 gas sensor is also known as chemiresistor. It contains a sensing material whose resistance changes when it comes in contact with the gas.

- Temperature sensor:

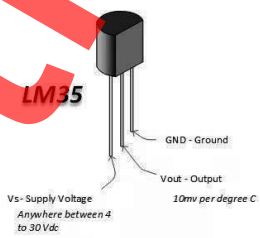

Figure 4. Temperature sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy).

- Bluetooth module:

Figure 5. Bluetooth module

HC-05 Bluetooth Module is a really user friendly Bluetooth SPP (Serial Port Protocol) module, developed for transparent wireless serial connection setup. The communication taking place in the HC-05 Bluetooth module happens via serial communication which makes it easy to connect the interface with controller or PC. This Bluetooth module can help change either from master mode or slave mode, which means that it can either be used to send or receive data.

The data from the sensors is sent to the amica board which is a ESP8266 Wi-Fi module based development board which has micro USB slot that can be directly connected to the computer or other USB host devices. The data from this is monitored regularly by office personnel, when the data becomes abnormal or when a fire is detected the GSM module in it will be instructed to make an alert to the provided phone numbers in the program. The GSM module will alert the personnel on the detected issue.

4. Execution and Result

The sensors that sends the data are connected to the AMICA board that is further connected to the systems which would be under regular surveillance. The setup of the sensors and the AMICA board are connected and setup and covered in a box and fitted into the forest every certain distances between them. Figures 6-8 shows the results.

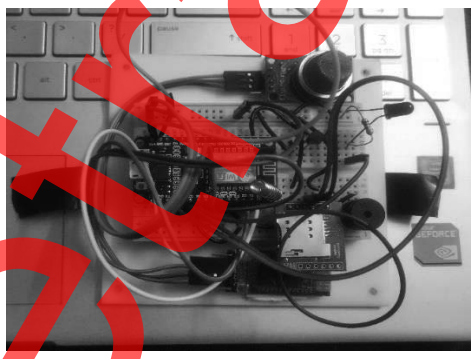

Figure 6. sensors connected to amica board and setup on a bread board

The sensors when the parameters go abnormal will be reporting it to the amica board where the data will be analyzed and if it is found to be abnormal it will send instructions to the GSM module to send an emergency SMS to mentioned personnel and then make an emergency alert call alerting the respective people about the forest fire or the abnormality.

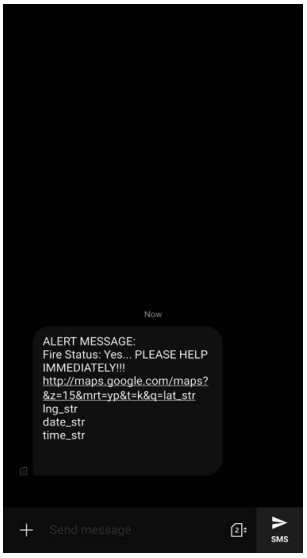

Figure 7. emergency SMS alert

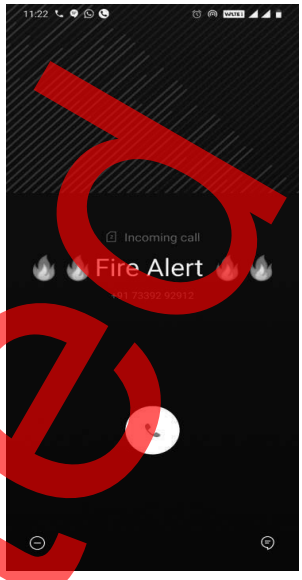

Figure 8. Emergency phone call alert

5. Conclusion and Future Works

Realizing the importance of existence of forests as it helps regenerate nature in the midst of all the destructive happenings in this world. The importance of forests cannot be underestimated. We depend on forests for our survival, from the air we breathe to the wood we use. Besides providing habitats for animals and livelihoods for humans, forests also offer watershed protection, prevent soil erosion and mitigate climate change.

This model of forest fire detection will be very helpful in case of emergencies to alert officers. Taking into account the future scope of this model will be a really big one because with the raise of artificial intelligence the data from the sensors can be fed as input to further analyse it to find the frequencies and other useful factors that determine a forest fire happening and obtain patterns from it and avoid further future forest fires and make the world a better place to live for humans by conserving forests.

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