FOREST FIRE DETECTION USING WIRELESS SENSOR NETWORK AND AVHRR-A SURVEY

R.Malarvizhi #1, Dr. C.Kalaiselvi *2,
Research Scholar (M.Phil,), PG & Research, department of Computer Science,
Tiruppur Kumaran College for Women, Tirupur, TamilNadu, India
1 malarvizhi.rsk@gmail.com
*Associate Professor and Head, PG & Research, department of Computer Applications,
Tiruppur Kumaran College for Women, Tirupur, TamilNadu, India
2 kalaic29@gmail.com

***Abstract*— As we all know, the forest is considered as one of the most important and indispensable resources, the prevention and detection of the forest fire, have been researched hotly 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. A cluster-based wireless sensor network paradigm for forest fire real-time detection was put forward in this paper. Some key questions were discussed emphatically, such as the ad hoc network related technology, the node hardware designing, the forest-fire forecasting model and the propagation characteristic of UHF wireless signal and so on.**

***Keywords*—**Wireless Sensor Network ,AVHRR, NOAA,.

I. INTRODUCTION

Forest fires continually begin by one in all two ways in which - naturally caused or human caused. Natural fires are unit usually started by ignition of dry fuel like wood and leaves. On the opposite hand, human-caused fires will be alternatable to any variety of reasons. Some classifications include smoking, recreation, equipment, and miscellaneous. Human-caused fires represent the greater percentage of forest fires in our forests, however natural fires constitute the great majority of the total area burned. This is because human-caused fires are usually detected early in their duration, and therefore they are usually contained easily. Natural fires, on the other hand, can burn for hours before being detected by firefighting authorities.

Firefighters could fight blazes on the bottom, exploitation hand tools, chainsaws, and water pumps to manage forest fires. Over the years, battling flames with the utilization of helicopters; rappelling and parachuting crews; and water tankers have become more common. Today, the latest in satellite monitoring systems have also made predicting fire patterns and devising a game plan much easier.

II. WIRELESS SENSOR NETWORK

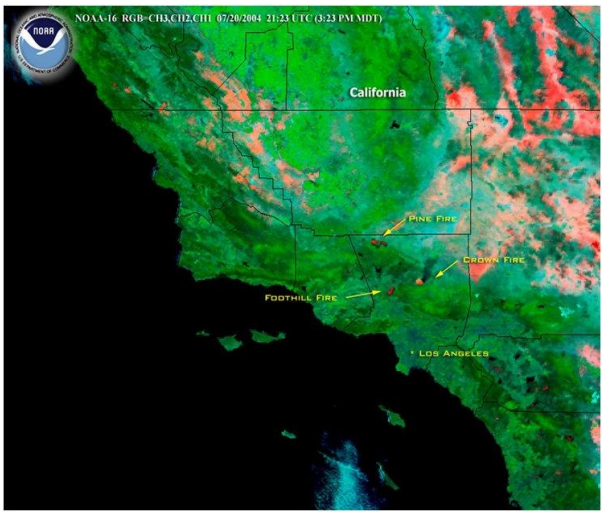
Wireless sensor network (WSN) refers to a bunch of spatially spread and dedicated sensors for watching and recording the physical conditions of the environment and organizing the collected data at a central location. WSNs live atmosphere conditions like temperature, sound, pollution levels, humidity, wind.

These square measure like wireless imprompty networks with in the sense that they trust wireless property and spontaneous formation of networks so that device knowledge will be transported wirelessly. WSNs square measures spatially

distributed autonomous sensors to observe physical or environmental conditions, like temperature, sound, pressure, etc. and to co-operatively pass their knowledge through the network to a main locations. The lot of fashionable networks square measure bi-directional, also enabling control of sensor activity. The event of wireless device networks was driven by military applications such as track surveillance; these days such networks square measure employed in industrial and client applications, like several process watching and management, machine health watching.

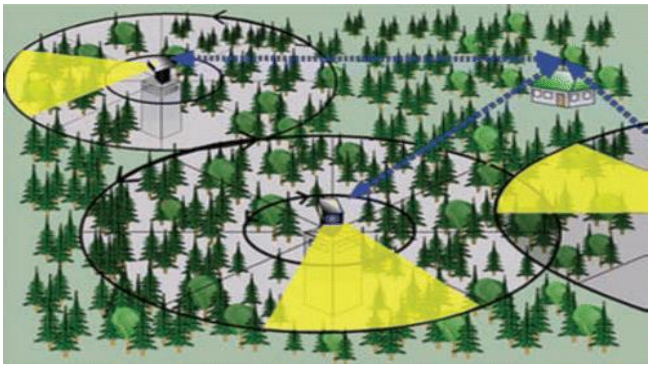
III. ADVANCED VERY HIGH RESOLUTION RADIOMETER

The Advanced Very High Resolution Radiometer (AVHRR) could be a multi-spectral device flying on NOAA's Polar Orbiting Environmental Satellites (POES). The high resolution refers to its quick temporal ability. At any given time AVHRR is active on two satellites orbiting the world in opposite directions, giving total international coverage twice daily. A device on several satellites over the years, AVHRR data has been regularly collected since 1981 and remains presently operational. AVHRR applications encompass meterological, climatological, and land use. Its broad fast field of read of 1.1 km lends itself to observing surface conditions on a regional or continental scale and has been used to monitor food crops, wildfires, desert encroachment, and vegetation changes.



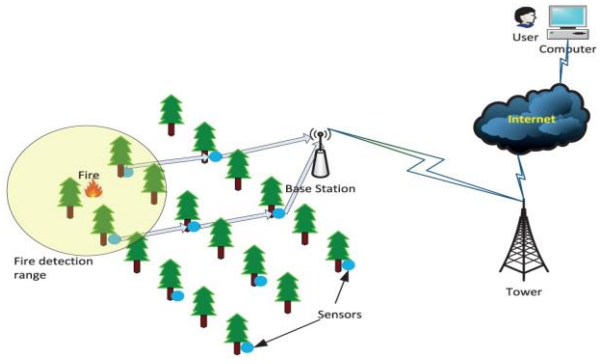
IV. CAMERA

A thermal imaging camera could be a style of thermo graphic camera employed in firefighting. By rendering infrared radiation as visible radiation, such cameras enable firefighters to see areas of warmth through smoke, darkness, or heat-permeable barriers. Thermal imaging cameras are usually handheld, however is also helmet-mounted. They are constructed using heat and water-resistant housings, and ruggedized to with stand the hazards of fire place ground operations.



V. FIRE ALARM SYSTEMS

A fire alarm contains a variety of devices working together to find and warn individuals through visual and audio appliances once smoke, fire, carbon monoxide or alternative emergencies are present. These alarms is also activated automatically from smoke detectors, and heat detectors or can also be activated via manual fire alarm activation devices such as manual decision points or pull stations. Alarms can be either motorized bells or wall mountable sounders or horns. They can also be speaker strobes which sound an alarm, followed by a voice evacuation message which warns individuals inside the building not to use the elevators. Fire alarm sounders can be set to bound frequencies and different tones including low, medium and high, looking on the country and manufacturer of the device.



VI. TYPES OF FIRE DETECTORS

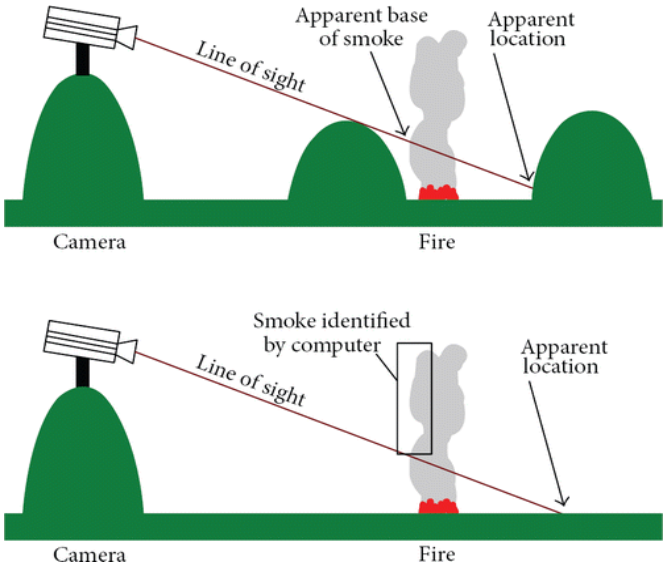
A. HEAT DETECTOR

A heat detector may be a hearth alarm device designed to retort once the convected thermal

energy of a fireplace will increase the temperature of a heat sensitive part. The thermal mass and conduction of the part regulate the speed flow of warmth into the part. All heat detectors have this thermal lag. Heat detectors have two main classifications of operation, "rate-of-rise" and "fixed temperature". The warmth detector is employed to assist within the reduction of broken property. It's triggered once temperature will increase.

B. SMOKE DETECTOR

A smoke detector could be a device that senses smoke, generally as an indicator of fireplace. business security devices issue a symptom to a fireplace alarm electrical device as a part of a fireplace alarm system, whereas house smoke detectors, conjointly referred to as smoke alarms, typically issue an area sonic or visual alarm from the detector itself.



C. FLAME DETECTOR

A flame notice or could be a device designed to detect and answer the presence of a flame or fireplace, permitting flame detection. Responses to a detected flame rely on the installation, however will embrace sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a hearth suppression system. Once utilized in applications like industrial furnaces, their role is to produce confirmation that the chamber is properly; in these cases they take no dissent on the far side notifying the operator or control system. A flame notice or will typically respond quicker and additional accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.

D.FIRE GAS DETECTOR

Carbon monoxide detector or CO detector may be a device that detects the presence of the carbon monoxide (CO) gas as to stop carbon monoxide poisoning. within the late 1990s Underwriters Laboratories changed their definition of a single station CO detector with a sound device in it to a carbon monoxide (CO) alarm. Elevated levels of CO can be dangerous to humans betting on the quantity gift and length of exposure. Smaller concentrations is harmful over longer periods of your time whereas increasing concentrations need decreasing exposure times to be harmful.

CO detectors square measure designed to live CO levels over time and sound an alarm before dangerous levels of CO accumulate in an setting, giving folks adequate warning to soundly ventilate the realm or evacuate. Some system-connected detectors additionally alert a observation service that may dispatch emergency services if necessary.

VII.FUTURE SCOPE

Mobile Sensor Nodes:
The research work takes into consideration only static sensor nodes like WSN. However, the same can be extended to mobile sensor nodes. Issues and challenges related to mobility of motes account for the future scope of this work.

VIII.CONCLUSION

When a fire is detected by a wireless sensor network, the sensor alarm is sent through the wireless network to a central server. The central server runs a software application that selects the closest wireless sensor network cameras to the sensor and sends them a message in order to receive real-time images from the affected zone. It lets the fire fighter corroborate the fire by means of a real time visualization of the place where the fire has taken place. In the simulation we can conclude that when deploying network equipment is set correctly selected all measures and generates alarms when the temperature exceeds the threshold.

REFERENCES

[1] G. Padmavathi and D. Shanmugapriya, "A survey of attacks, security mechanisms and challenges in wireless sensor networks," *International Journal of Computer Science and Information Security*, vol. 4, 2009.

[2] J. P. Walters, Z. Liang, W. Shi, and V. Chaudhary, "Wireless sensor network security: A survey," Security in Distributed, Grid, and Pervasive Computing, 2006.

[3] Dirk Westhoff, Joao Girao and Amardeo Sarma, "Security Solutionsfor Wireless Sensor Networks", *NEC Technical Journal*, vol. 1, no. 3,2006.

[4] Yingshu Li,My T. Thai,Weili Wu , *Wireless Sensor Networks and Applications,* Springer, 2008,ISBN 978-0-387-49591-0

[5] Holger Karl and Andreas Willig: *Protocols and Architectures for Wireless Sensor Networks,* John Wiley & Sons Ltd., 2005, ISBN: 0-470- 09510-5

[6] Wang, Qinghua; Balasingham, Ilangko,"Wireless Sensor Networks – An Introduction", Volume 39, Issue 2, pp. 1779-1783.

[7] Taruna, S.; Jain, Kusum and Purohit, G.N,"Application Domain of WSN: - A Paradigmin Developed and Developing Countries",IJCSI International Journal of ComputerScience Issues, Vol.8, Issue 4, No.2, July2011, pp. 611-617.

[8] Smaranika Mohapatra, Jharana Paikaray, and Neelamani Samal, "Future Trends in Cloud Computing and Big Data." Journal of Computer Sciences and Applications, *vol. 3, no. 6 (2015): 137-142. doi: 10.12691/jcsa-3-6-6.*

[9] Shivaram Venkataraman , Zongheng Yang, Davies Liu , Eric Liang, Hossein Falaki, Xiangrui Meng , Reynold Xin, Ali Ghodsi , Michael Franklin , Ion Stoica , Matei Zaharia,AMPLab UC Berkeley, Databricks Inc., MIT CSAIL *."Scaling R Programs with wsn"*