Forest Monitoring System and Wi-Fi Calling During Disaster

[1]Shakunthala N, [2]Dr.R Savitha

[1]Student, [2]Assistant Professor
[1]Departmenet of Master of Computer Applications,
[1]RV College of Engineering, Bengaluru, India

Abstract: It is a difficult task to manually track the forest to avoid illegal activities. This paper provides a solution that are essential in monitoring the forest, namely theft of valuable tree detection, fire detection, illegal trucker's detection and contaminated water detection using vibrator sensor, fire sensor, Passive Infrared Sensor (PIR) and PH sensor respectively. A GSM is used along with microcontroller to communicate to central server from remote place. The sensors collect data and send to microcontroller, microcontroller process the data and sent to GSM to send alerting message to forest officer. IOT plays vital role in forest monitoring application. In addition, this paper uses Wi-Fi router module through which people during disaster can communicate with each other without service provider.

Index Terms - **Vibrator Sensor, Fire Sensor, PIR Sensor, PH Sensor, GSM for Mobile Communication, Wi-Fi router**

I.INTRODUCTION

Forests are extremely significant in our lives; we are completely reliant on them for survival. Forest trees assist us in breathing by releasing oxygen and absorbing carbon dioxide. This paper aim is to protect forest by preventing tree cutting, fire prevention, detecting water contamination in the forest whether it is safe for the animals or not and also detect presence of human in the forest. Set up the vibrator sensor to valuable trees, for example, sandalwood trees present. If unknown people or thief trying to cut the trees, vibrator sensor vibrates, immediately sensed data sent to microcontroller that will send this information to GSM module, and forest officer receives alerting message so that they can take necessary actions. Similarly, if fire happened in the forest is detected by fire sensor and sensed data is processed by microcontroller and send to GSM to send alerting message to forest officer. To detect whether the water is contaminated or not PH sensor is used and PIR sensor is used when illegal truckers enter in to the forest. In addition, using Wi-Fi router facility in proposed system in which suppose if any natural disaster happens or people who went for trucking unable to communicate due to the network problem at that situation, they can use this concept. In this paper set a router between sender and receiver so that they can communicate with each other by calling, sending text message, sending photo and video streaming. Analysis of environmental data from real time forest monitoring used samples consists of temperature, humidity and hydrogen gas [1]. Forest fire monitoring uses wireless sensor network and provided the efficient approach to sensor node for continued monitoring of forest [2]. Wireless sensor network technology and Zigbee used to communicate to central server from remote place to protect forest tree such as sandal wood tree [3]. Forest fire monitoring and fault in the nodes is detected using wireless sensor network [4]. The decrease of forest trees from forest by humans affects animal to survive in forest [5]. Forest monitoring framework requires three parts such as sensor deployment scheme, network architecture and intra-cluster communication protocol [6]. wireless sensor network used novel energy-efficient routing protocol that is maximize unsafe path (MUP) and used IPV6 over low power wireless personal area networks protocol for forest monitoring system [7]. ZigBee used as communication protocol in forest fire monitoring control [8]. ZigBee transmitter, PIC controller and IEEE 802.15.4 standard protocol used to prevent illegal logging of forest trees which defines physical and mac layer [9]. Automatic selection of trees in real time mode within the process of selective cutting during which full automation of operator's functions is formed on the idea of operator's action analysis and revealing stages during which maximum time is taken, thanks to human operator's fault maximum errors occur. Selection of trees in the process of harvesting uses fuzzy logic [10]. most of the problems are solved using ZigBee transmitter and wireless network technology and also use of Wi-Fi router between sender and receiver that is how two devices can communicate if network is disabled. This application is helpful for communication between people during disaster. IOT is a system consists of sensors, actuators and connectivity that allows the objects to connect and exchange data. IOT plays vital role in forest monitoring to send alerting signal.

II.LITERATURE SURVEY

Using a various tools and technologies, the authors have proposed forest monitoring system. They have suggested a various approach to control illegal activities in the forest.

The author proposed, Remote Sensor Networks are an emerging technology with wide potential to be used in many applications. One such application is the identification and avoidance of calamities in situations like forest fire, floods and quakes. In these disaster situations, the events being monitored to destroy the sensing devices, for example, they can be burnt in a fire, sunk in a flood, melted in volcano lava, short-circuited in harmful chemicals, etc. In this novel energy-efficient routing protocol called Maximize Unsafe Path (MUP) Routing using IPv6 over Low power Wireless Personal Area Networks (6LoWPAN) is presented. [7]   The author explains theft of valuable trees such as sandal wood in forests, causes a serious threat to forest resources and ultimately has quite a devastating effect on the environment all over the world. They propose anti-poaching system using wireless sensor network technology, which is capable of detecting smuggling or theft by monitoring the vibrations produced by the cutting of trees using a 3 axis MEMS accelerometer. ZigBee standards used along with microcontroller to communicate to a central server from a remote place. Architecture of embedded system and the hardware/software designs are described in detail. [3]

In this paper, Forest fire can affect the people, wild animals, forest resources and hence a disastrous loss to the environment. Forest fire detection is one of the most useful application. In certain condition, Due to some faults in sensor node it may give incorrect data due to some faults in it. Since the network is not know the fault, it might lead to a serious problem. So, their main aim is to identify the faulty nodes as well as the probability of fire to reduce the disastrous loss. [4]

The author explains Many forest departments are facing the problem of movement of animals from forest area to residential area. The number of trees has drastically reduced from the forest that creates an unhealthy environment for animals to survive in the forest. They propose a system called GATA for tracking and alarming for the protection of Wildlife Animals. GATA used Wireless Sensor Network (WSN) and Global Positioning System (GPS) technologies to solve the above mentioned problem. Movement tracking and location has been implemented using GPS with the accelerometer and the Wi-Fi shield. [5]

In this paper, Forests are considered as one of the most significant and essential resources on earth. the wireless sensor network used for forest fire detection was introduced. In this paper, they have proposed a system for forest fire detection and monitoring using wireless sensor networks. From every points of forest, system receives temperature and transmit it to control center speedily. It also receives the consumption of energy by the sensor nodes and the physical conditions that may affect the activity of the network. When energy from nature is consumed then it provides fast reaction to forest fires. This system can provide fast reaction to forest fires together with efficient energy consumption. In this paper they have used an algorithm for controlling fire in the forest and a sleep-awake cycle to increase lifetime of sensor network.[6]

III.System Design

Detail description of forest monitoring system which is based on IOT technology is provided by hardware design. Hardware design describes detailed description about component. The forest monitoring system mainly contains the components like SST89E516RD2 Microcontroller, PIR Sensor, PH Sensor, Vibrator Sensor and Fire Sensor.
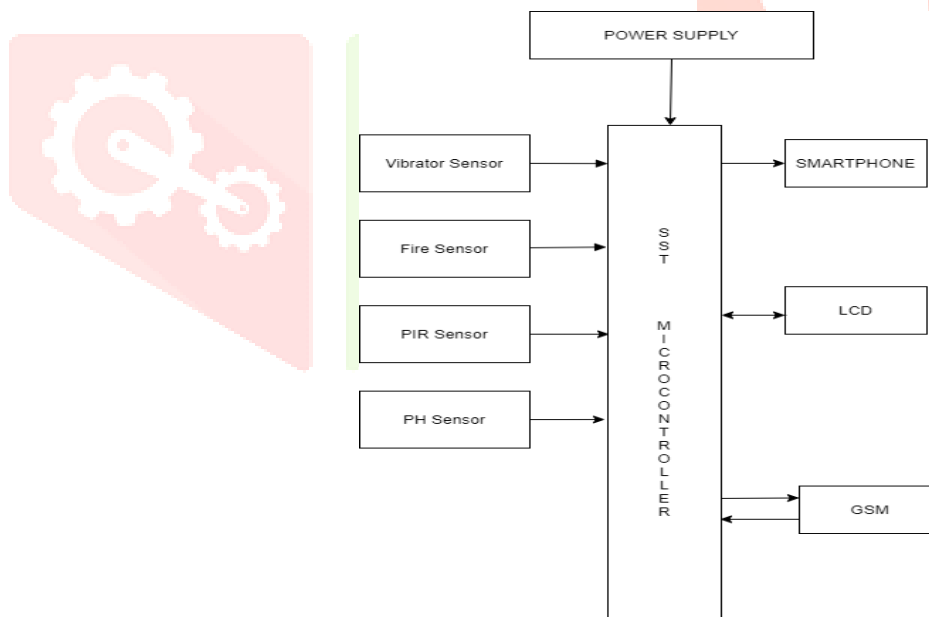

Fig.1. Block diagram of forest monitoring module

In the above Fig.1 block diagram consists of microcontroller used to process the data and output of microcontroller is in two forms, an alert message is displayed on Liquid Crystal Display (LCD) and at the same time alert message is sent to the forest officer about illegal activities using GSM module. The microcontroller is used along with GSM to send alerting message to registered phone and all activities of sensor nodes can be controlled by microcontroller. Working of microcontroller, PIR sensor, vibrator sensor, fire sensor, PH sensor is explained in these sections.

IV.PROPOSED SYSTEM

The proposed framework is divided into two modules.

Forest Monitoring Module

The monitoring of forest module mainly consists of components such as microcontroller which acts as main controller and GSM, LCD, Sensors are connected to it. The GSM plays a vital role in forest monitoring module by sending alert messages notification to forest officer. Suppose if tree cutting happens in the forest, vibration sensor detects that tree cutting happened send this data to

microcontroller. The data is processed by microcontroller and transmits this data to GSM. And it will send alert message notification to forest officer to take necessary action.

Wi-Fi Router Module
Two devices can exchange data through Wi-Fi in case of network is disabled in the range of radio frequency 3 GHz and 30 GHz. As shown in Fig6 router module is use between two devices through the wireless network access point.
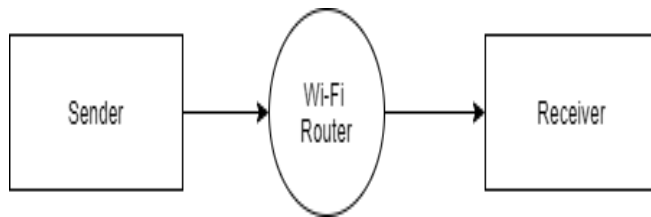

Fig.2. Block diagram of Wi-Fi router module

In this proposed paper concept used is how people can communicate with each other through a router in case network is disabled during disaster, if in case if people went for trucking and they are facing any problems related to natural disaster in the forest. First sender has to register the IP address of router, now sender can send photo of incident place, can do video streaming, can call and can do the text message receiver.

V.EVALUATION RESULTS AND DISCUSSION
   The Fig 3 shows the microcontroller interfaced with sensors and GSM in which that has been developed by researchers to detect the forest fire, theft of valuable tree and presence of human in the forest.
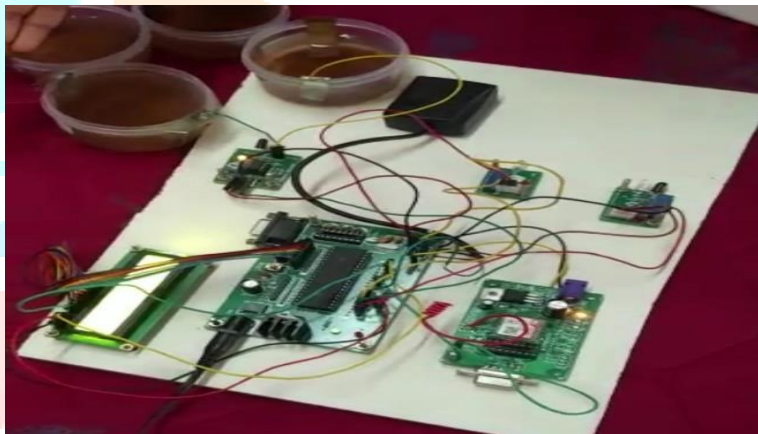

Fig.3. Microcontroller interfaced with sensors and GSM module.

Assume if fire happens that information send to microcontroller and it send this data to GSM to send an alerting message to forest officer. Similarly, tree cutting detection, human detection and detection of contaminated water alerting messages are send to forest officer.
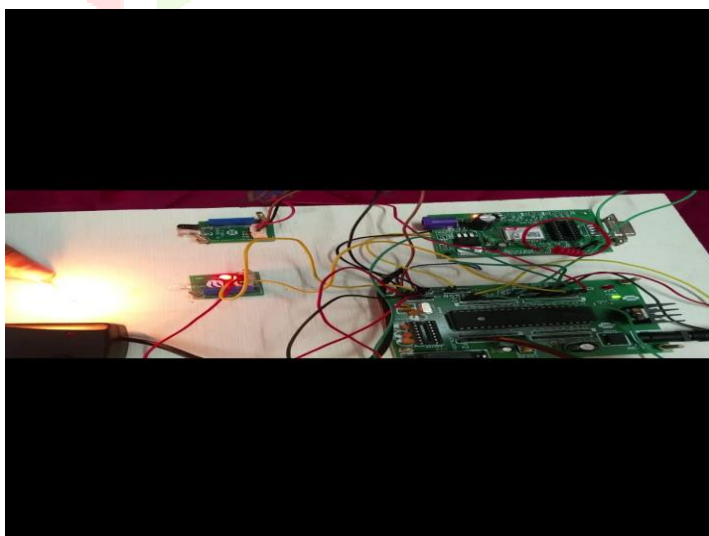

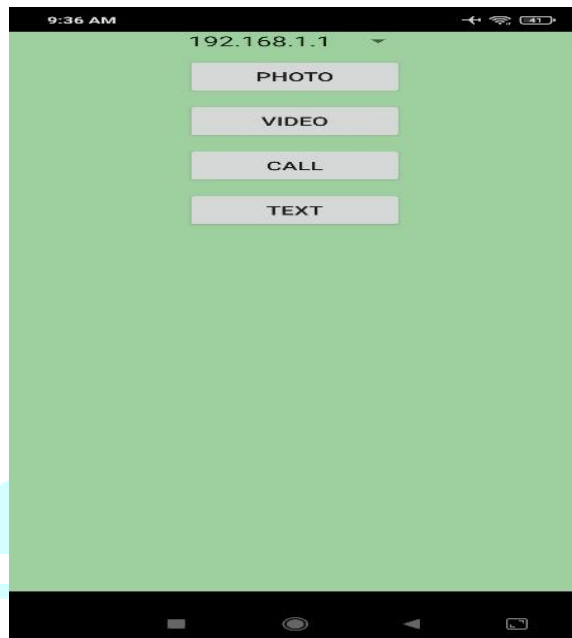Fig.4. Fire detection happens in the forest.

Fig.5. Multimedia data transfer using Wi-Fi router

The Fig5 shows the multimedia data transfer using Wi-Fi router at sender (employee). The sender and receiver first need to connect to Wi-Fi router through which they can send photo of illegal activities. And can-do video streaming, voice message and text message re respectively.
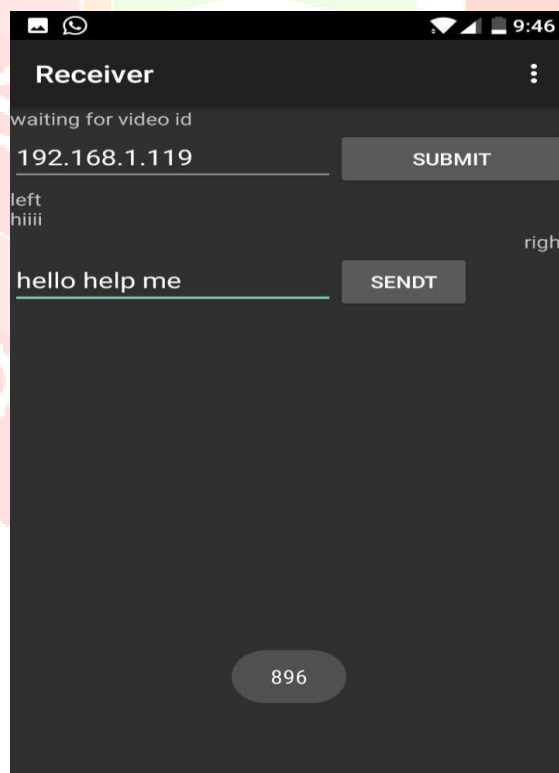

Fig.6. Text message between people during disaster using Wi-Fi router.

The Fig6 shows the Wi-Fi router between sender and receiver in which both can communicate if network is disabled. This concept is useful for people during disaster so that sender can call, send photo, can do video streaming and can also do the text messages to forest officer. In fig6 both sender and receiver can communicate with each other by sending and receiving text messages.

VI.CONCLUSION

The objective of proposed system is to control erosion by attempting to detect four illegal activities using IOT technology compared to past research and observed good results for all types of detection carried out in this paper. The proposed system presents another novel idea by introducing Wi-Fi router that provides communication between employee and forest officer in case network is disabled.

REFERENCES

[1] Amri Yusoff, Shahrizuan Shafiril, Che Zalina Zulkifli, "The Application of Environmental Data from a Realtime Forest Monitoring System to Develop Games asan Engineering Course Teaching Aid", IEEE 8th International Conference on Engineering Education (ICEED)-2016.

[2] Stanislav Masar, "A Wireless Sensor Network for Early Forest Fire Detection and Monitoring as a Decision Factor in the Context of a Integrated Emergency Response System", IEEE -2017.

[3] Gaikwad, S., Patil, R., Khandare, A., & Rai, A. (2016)," Design WSN node for protection of forest trees against poaching based on ZigBee", 2015 IEEE International Conference on Electronics, Computing and Communication Technologies.

[4] Gor M, Vora J, Tanwar S,Obaidat M. S., Ieee F, Scs F, & Sadoun B," GATA : GPS-Arduino Based Tracking and Alarm System for Protection of Wildlife Animals",IEE-2017

[5] Jain, A. K., Khare, A., & Pandey, K. K. (2012)," Developing an Efficient Framework for Real Time Monitoring of Forest Fire Using Wireless Sensor Network". 811–815.

[6] Ankit Kumar Jain, Ankit Khare, Kaushlendra Kumar Pandey," Developing an Efficient Framework for Real Time Monitoring of Forest Fire Using Wireless Sensor Network" ,2012 2nd IEEE International Conference on Parallel, Distributed and Grid Computing 2012 IEEE.

[7] Jamil, A., Parish, D. J., Phan, R. C., Phillips, I., Whitley, J., & Oikonomou, G. (2012). "Maximize Unsafe Path routing Protocol for Forest Fire Monitoring System using Wireless Sensor Networks".

[8] Guangxue Yang, Zheng Liu" The Design of Forest Fire Monitoring System Based on Wireless Sensor Network" 2011 The 6th International Forum on Strategic Technology-2011.

[9] L.K. Hema, Dr. D. Murugan, R. MohanaPriya,"Wireless Sensor Network based Conservation of Illegal logging of Forest Trees", 20 14 IEEE.

[10] Igor Petukhov, Ilya Tanryverdiev, Luydmila Steshina "Remote sensing of forest stand parameters for automated selection of trees in real-time mode in the process of selective cutting" 2014 IEEE International Conference on Ubiquitous Intelligence and Computing.2014 IEEE.