Automated Forest Monitoring Techniques Using Multiple Technologies

A.Uthiramoorthy[1*], R. Muralidharan[2]

[1]Department of Computer Science, Rathinam College of Arts And Science, Coimbatore, India.
[2]Department of Computer Science, Rathinam College of Arts And Science, Coimbatore, India.

[*]*Corresponding Author: uthiramoorthy.cs@gmail.com.*

Abstract— In this proposed system forest disaster like forest fireflood will be monitoring through the wireless sensor network. Moreover the climate change will affect forest total area. So, we are analysing climate change effect in forest area. In this proposed system we can detect human illegal activity. Moreover we can monitor animal migration. It will helpful for animal research and animal growth census. So, this proposed system is multiple purpose we can use it. We are fixing the various sensor, actuators, CCTV camera etc into the forest area. So, this sensor operated through the wireless sensor network. There are various information come from forest will be stored into the cloud storage. These cloud data will be analysed using the big data analytics. Based on this analysis we are improving the forest area as well as animal growth. So, we improve the biodiversity in the forest environment. If rainy season there is a flood occurred in the forest. It will analysed and intimate to the plain area people. Moreover if the summer period there is forest fire occurred. So, we detect forest fire and that will destroy. Moreover the forest animal likes elephant, tiger which come from forest area to people living area. So, it will be immediately detect and appropriate action will be taken immediately. So, the proposed System is the multipurpose system. It will applicable to rain forest, mangrove forest etc. This proposed system is operating through the IOT, cloud computing, big data analytics and wireless sensor network.

Keywords: IOT, Sensor, Cloud Computing, Wireless Sensor Network

I. Introduction

Now days IOT (Internet of Things) is a emerging technology which can apply all field. This technology connects objects which are different in nature. IOT connect different kind of objects which may mechanical, electrical, and chemical and any kind of object. The sensors are sense the environment and pass the information through the internet. Here we can access this communication from anywhere in the world. So, in this technology we can operate and control objects from remote places. So, the objects are getting the command from remote place and act according to command passed from user. For Example In Home Management System full house is fixed by sensors. Suppose if the refrigerator is not working, then the sensor which detect refrigerator, and pass the signal to the remote place through the Cloud computing technology. So, we can give the command from anywhere else and clear the refrigerator problem. In a Home Based IOT contain TV in the Room. Suppose if the TV is not switch off after closing the door. Then the sensor immediately TV gives the signal to the user. This signal pass through the cloud computing. Then the user give the command through the Cloud computing and Switch Off the TV. This is the General operating procedure in IOT.

In India the total forest [1] is 708273 Square kilometre. The 21.54% of the total geographic area in the India is forest land. But we need to improve the forest area from 21.54% to 33 percentages. Because international forest law [3] should give the direction of forest. All country should have the forest land 33% of its total area. Because the forest land maintain biodiversity of the any country. So, it will reduce the temperature of the country. So, the proposed system should improve the forest area in any country.

II. Related Work

Sensor and other Components
1. Night Vision Camera: This camera is used to record all objects which are existing in forest at day and night time. So, it captures the animal, human being, Birds etc will be recorded 24 hours. So, if any kind of illegal activity occurs in night time also detected. We can monitor forest activity from the Forest Control Room.
2. Smoke Alarm: There are three types of Smoke Alarm available in Market. These are
a)Ionization b)Photoelectric c) Ionization/Photoelectric
a) Ionization Smoke Alarm: This ionization contains two electrodes, which passes current between them. Moreover it contains as radioactive material itself. If the smoke enter into

this alarm, it absorbed by alpha particles. So, it stops the ionization, and interrupts the current. So, the alarm will be activated.

b) Photoelectric Smoke Alarm: This type of alarm pass the light to smoke and it detect the smoke. Then the alarm will be activated.

c) Ionization/Photoelectric smoke alarm: This alarm is the combination of ionization as well as Photoelectric smoke alarm itself. So, this type of alarm is very useful compare to any other alarm.

3. GPS: The GPS is used to identify the forest location. Suppose if any fire is occurred in the forest it will be easily into identify the location of the fire using the GPS. So, we can easily take the remedies as Soon as possible.

4. Heat Detectors: This sensor sense the heat of the fire. If fire exists in one area, hundred meters around the fire we can detect the heat. So, this type of sensor senses the heat within the 100 meter from its location. The heat detector detects the heat from 200 meter from its location. So, its a very powerful sensor compare to any other sensor.

5. UV Detectors: This sensor detects UV rays come from flame which occurs in open places. It will detect the fire within 10 seconds. So, it will pass the information to the forest control room.

6. IR Detectors: This sensor sense IR (Infrared) radiation come from fire. It detects 3 to 5 seconds. So, this sensor senses the fire and gives the signal to the control room. This signal will be converted into text and intimate to the human being.

7. Optical Detectors: This type of sensor sense the flame comes from fire. So, it will detect immediately and pass the signal to the control room.

8. Raindrop Detection Sensor: This type of sensor detects the rain and intimate to the control Room when the rain started from beginning. So, we can intimate the plain area to protect the flood based disaster.

The following sensors are called motion sensor. This type of sensor detects the moving object of the forest or any other place. So, we can detect the Moving objects using this sensor.

9. Active Detectors: This type of sensor emits radioactive wave and microwave to all places. If any object hit this wave, it will be reflected. So, sensor detector can identify the object.

10. Passive Detectors: This sensor detects the infrared ray come from any object. But it will not emit any rays from itself.

11. Hybrid Sensor: This sensor work based on the concept of Active as well as passive sensors. So, it's very good sensor compare to any other sensor.

12. Passive Infrared Detectors [3]: It automatically detects the change of infrared rays. So, we can identify the object which is currently in motion state.

The above sensors are fixed in various locations in the forest. These sensors are connected to the cloud computing through the internet. So, the signal will be passed to the control room through the internet. This signal will be converted into the text. Moreover all signal send with location itself. So, we can identify the location as well as problems. So, we can solve the problem at initial state.

III. Methodology
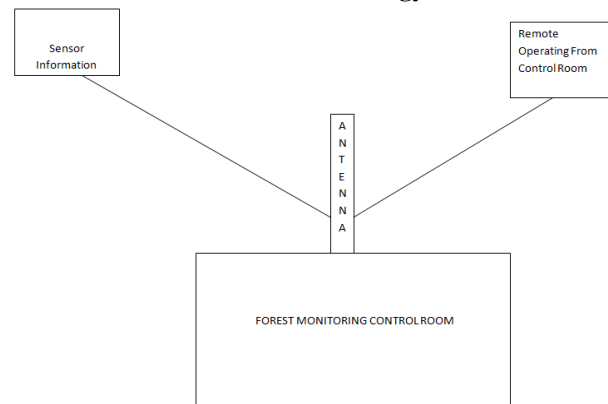
FOREST MONITORING CONTROL ROOM
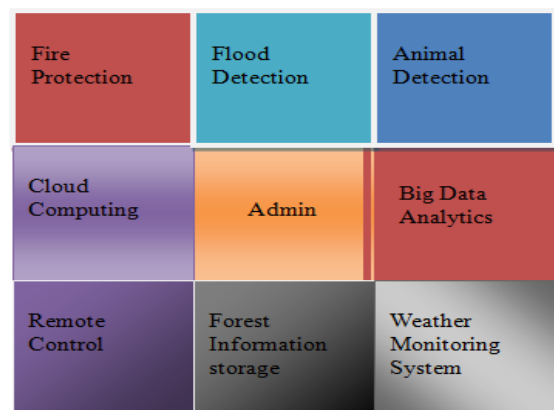
Forest Monitoring Control Room

IV. Results And Discussion

Forest Monitoring Control Room:

This Room is the centralized room it receive all data which are come from sensors and it also used to control the Equipment which are connected with sensors. This room consist of eight components itself. The following are the components:
1.Fire detection 2.Flood detection 3.Animal Detection 4.Cloud Computing 5.Big Data Analytics 6.Remote Control 7.Forest Information Storage 8.Weather monitoring System

1. Fire Detection: This component is especially used to detect the fire occurred in the forest. This component identifies the fire and its location. After the fire detection it will intimate to the fire station. So, it takes remedies for fire accident. So, this component protects the forest fire. So, it saves the forest land. Moreover it takes images and videos using the night vision camera. It will be given to the Press report.

2. Flood Detection: When the rain flow occurred in hill based forest are there will be flood situation happen. So, the forest monitoring control room conduct the weather station. So, if flood occurred in forest area it will be announced to the People who are living in Low lying area. The flood alert will be given to the people who are living in Low lying area.

3. Animal Detection: In 2017 Elephant ratio decreases by 10% [4]. There is a man animal conflict occurred in all over India. We lost crop, human being death etc. So, we should monitor the animal movement as well as animal count. If it is the animal like elephant ratio decreases it will affect the Biodiversity of the forest. So, we should protect animal as well as human being. If the animal come from forest are to human living area it will be detected using the sensors. So, we give the general alert to the person who lives in near forest area. Moreover the animal like elephant will be catch and released into the forest area.

4. Cloud Computing: In the Proposed system all the information about forest is stored into the cloud computing. So, we can access anywhere in the world. The cloud computing technologies is used to operate the sensor in remote places.

5. Big Data Analytics: The forest data stored into the cloud storage. Based on the information we analyses the data. For example if the forest area is consist of grassland forest means, throughout the year there is water in river. Moreover we analyze the bird, animal, plant etc. So, the big data analytics will helpful to analyses the overall information about the forest.

6. Remote Control: if fire is occurred in anywhere in the forest can be monitored. If fire occurred, immediately it will be capture using the camera. This camera record image day and night time. Moreover the information will pass to the fire

station. The will destroy the fire. So, the forest monitoring control room is used for working in the form of Remote control method.

7. Forest Information Storage: The forest information is stored into the Forest monitoring control room. This information is used to analyse the forest. For example we are taking the elephant count every year. If the elephant count is reduced from one year to another year, we take to grow the elephant count. Likewise we analyse bird, flower, plant etc. The information is keep into secret.

8. Weather Monitoring System: We continuously monitor the weather of the forest. If the weather is very hot, there is a possibility to occur fire. If the weather is rainy situation, there is flood situation occurred in the river which born in the forest. So, we continuously monitor weather of the forest. Based on the forest weather report we are taking the remedies to protect the disaster.

Finally the admin are the centralized person who is currently contacting many persons. This forest monitoring system room has the ability to contact any one person. It has consisted of wifi, Internet and telephone connection. This room consist of multiple technologies itself. So, it will reduce the many disasters compare to any other system.

Advantage of the Proposed System

The forest fire increases from 24450 to 33664. That is Total number of forest fire is increase 38% [5] every year. So, we want to protect the forest. The proposed System is giving the early warning to Forest Control Room. So, we can take appropriate take to solve the problem. In India every year 1000 people are died due to flood. Moreover 30 million people effected and 300000 hectare crop damaged due to Flood [6]. So, the flood is the national disaster for all states. So, we want protect the people life, crop and damages. Mostly the flood stated from forest. So, the proposed system is act as early warning system of flood in the forest. If flood is origin in forest it will be intimate to the forest control room. So, the forest control room intimate to the press and television. It gives the alert to the people who are living bank of any river which is originated from the forest. An average of 11 tiger died in every month [7] due to the trade of tiger parts in illegal [7]. So, the proposed system counts the total number wild animals. So, we can maintain the Biodiversity of the forest. Moreover this system can used to monitor the illegal activities of human being. So, this system is the multipurpose system using the multiple technologies.

V. Conclusion and Future Scope

Already Existing systems are not using the multiple technologies itself. But proposed system is the combination

of multiple technologies. So, if we implement the system, we can create a high sophisticated system compare to any other system. Yifan Bo[8] article is used only IOT technologies and wireless sensor network. That theory applicable to agriculture and forest environment. But the proposed used is only monitor the forest field. It's not applicable to any field. That's why this system is very useful compare to any other system.

VI. ACKNOWLEDGMENT

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Authors Profile

Mr.A.Uthiramoorthy MCA M.Phil Completed Master of Computer Applications at KSR College of Arts and Science, Tiruchengode. He did M.Phil at Madurai Kamaraj university. He is currently pursuing Ph.D. and currently working as Assistant Professor in Department of Computer Science, Rathinam College of Arts and Science since 2008. He has published 4 research papers in reputed National and International journals. His main research work focuses on Datamining, Big Data Analytics and IoT. He has 11 years of teaching experience and 2 years of Research Experience.

Dr R.Muralidaran pursed Master of Science from Bharathidasan University of Thiruchirappalli, Tamilnadu,India in year 2002. He completed Ph.D. and currently working as Assistant Professor in Department of Computer Science. He has published more than 10 research papers in reputed National and International journals including Thomson Reuters (SCI & Web of Science) and conferences including IEEE and it's also available online. His main research work focuses on Data Mining, IoT and Bigdata Analytics. He has 17 years of teaching experience and 10 years of Research Experience.