LITERATURE SURVEY

EMERGING METHODS FOR EARLY DETECTION OF FOREST FIRES

TECHNOLOGY DOMAIN:

ARTIFICAL INTELLIGENCE

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OPTIMUM SENSORS ALLOCATION FOR A FOREST FIRES MONITORING SYSTEM

(Author : David E Calkin and Matthew P. Thompson)
(Published : 9 April 2021)

Forest fire is a huge issue to tackle this issue we've developed a project that can monitor forest fire. Modules of wireless sensor will be spread in the forest to collect data about humidity, temperature through sensors. optimum position is allocated to each sensor. Wireless sensor network capable of monitoring large areas. The sensor measures physical parameters, such as changes in barometric pressure, solar radiation, and chemical parameters, such as carbon dioxide. Two data mining methods Random forest and SVM, were used to produce forest fire maps. The data is mostly collected by sensors. The position of these sensors can determine the quality of the data and the accuracy of the system. Thus, defining the optimal position of each sensor by optimisation tools can provide substantial improvements to the system. The sensors do face drawbacks like available sensors, fire hazard, and the forest density. The fire is categorized by a scale 0 to 5. The forest density is scaled from 0 to 100. Values are obtained from european satellite . If some region is important and valued it'll have a higher fire hazardous value. A sensor is capable of retrieving information from 360 degree. Sometimes the sensor fail to detect the forest fire due to high density of the forest adding few more sensors can work well. The fire is distinguished by red and blue colors. 4 cases are used to detect a forest fire these cases consist of parameters from coordinates and fire range by using mathematical formulas we derive if the forest on observation is in fact on fire. We use LoraWan technology since it doesn't have monthly costs and they have batteries that can last upto 6 months. Stochastic method is executed more than once which then give the value. A general analysis is done and a graph is produced which determines the rate of forest fire acceleration. A alert is then issued when fire is detected . The goal is making sure that forest fire crisis is reset to 0 soon. Since this model focuses on sensors which work on range from 0 to 100m.We won't be able to allocate that number of sensors in such forest regions . In the future , we will explore possibilities of multi-objective optimized solution.

EARLY DETECTION OF FOREST FIRE USING MIXED LEARNING TECHNIQUES AND UAV

(Author : Muhammad Ahmad)
(Published : 9 July 2022)

This model doesn't need any human observation and monitoring, It uses satellite images to monitor to observe forest locations. Wireless sensor networks are implemented to observe fire events WSN are deployed this makes sovereignty which cost less to deploy. They are autonomous and they use UAVs to detect fire and manage them , it also observes fire in the lower region.

Detections are done through remote sensing methods like satellite, high resolution camera on ground and aerial observation, the images received are not often clear sometimes the forest is put through heavy weather conditions. Optical and thermal cameras are deployed in addition with sensors that can detect smoke, temperature and humidity. Aerial observation is done using UAV, the recognition rate is up to 83 %, it uses datasets that classifies images as forests that are on fire and that are not. In this model is trained using ML, it uses CNN.

This model also analyses temperature and wind speed of the area in observation.

Detection of forest fire using UAVs are much better compared to any other methods, it can detect fires from above and the range of fire. We can easily develop a 3D model for the scene in capture, if the UAV fails to detect fire because of fog / smoke. Ground surveillance cameras and sensors are put to use to detect fire and analyses is made. In future we will explore more possibilities that doesn’t stop or interfere the detection system.

FOREST 4.0: DIGITALIZATION OF FOREST USING THE INTERNET OF THINGS

(Author : Rajesh Singh, Vseem Akram Shaik)
(Published : 19 February 2021)

Forest is very important for the thriving of the earth. Forest helps with carbon emission and climate change. A survey of wildlife and the forest is presented. The significance of the internet for wildlife monitoring is addressed with recent trends. A detailed suggestion was presented for enhancement of connectivity, implementation of realtime sensing.

With the help of IOT and components we established multiple communications with devices through IP. With the use of classical sensors, we measure environmental variables. We use sensors to gather signals and transform them into digital information's and further work on them. There are 4 cases in digitizing, human to forest interaction, big data and cloud computing. To handle the huge data receiving, and cloud computing platform is used for affordable services, the data and then analysed then we use AI to observe and learn and make autonomous choices.

We use internet based modules to communicate, monitor and track with the help of IP. We use Lora and edge gateway for monitoring, Lora has low power consumption, it's capable of performing analysis. Forest is spatially mapped using GIS and remote sensing tech. It uses RF long range for communication.

It uses IR sensor to detect temperature humidity. It uses parameters from Environmental sensors and communicates with nearby IOT devices, It uses RF ID reader and Lora communication and internet connectivity. The information is then digitally stored in cloud server's.

Cloud server enables data sharing and real-time remote location sharing, GSM is implemented for transmission of sensory data. We can also use instant detect monitoring system for observation of fauna. The integration of IOT in wildlife & forest, to protect and conserve them by real-time sensing CV node, DL, ML and sustainable deployment of sensors.

IOT ENABLED ADVANCED FOREST FIRE DETECTING AND MONITORING ON UBIDOTS PLATFORM

(Author : Syam Sundar Pillalamarri)
(Published : 10 February 2021)

The use of IoT devices to ensure the forest doesn't burn to nothing. We integrate the Smoke detection is the most important aspect of forest fire detection the smoke sensor will detect and the day-to-day value will be updated in IOT dashboard we are setting a threshold level for the smoke detection the alert will be on only when the level of smoke exceeds the given threshold value. PIR sensor for measuring the fall in humidity and temperature we can also detect movements with this sensor. Wireless Sensor Networks for Forest Fire Detection. We use different types of sensors like rain sensor which detects rainfall in the forest, sound sensor which detects any type of noise, Dht11 sensor which detects the temperature and humidity of the surroundings in the forest and we use PIR sensor which detects the motion of the bodies in the forest. Along with these we also use which is used to monitor the situation or to take images of the surroundings. If the area has increased flora and fauna activity it is most likely carnivorous animals tend to attack the nearby vicinities, we can warn them about predators. By using UBI dotsIoT (platform) it reads the data from sensors and filters the message and then it converts the data and validate it. If the data is valid, it uploads the data to UBI dots IoT dashboard and alerts it is repeated process.

The data is made readable and the result is displayed on the screen real time on an LCD Screen for better analysis of the data and interpreting the information. If the sensor detects a hike in temperature and PIR sensor detects lot of movements from the surroundings a fire alert is issued immediately. This also doesn't just stop at detection of forest fires this works on preventing and monitoring wildlife as well.