Parametric Analysis of Forest Surveillance using IoT

Priya.G.Kapse[1], Laxmikant Shevada[2]

P.G. Student, Department of Electronics and Telecommunication Engineering, Deogiri Institute of Engineering & Management Studies, Aurangabad, Maharashtra, India[1]

Assistant Professor, Department of Electronics and Telecommunication Engineering, Deogiri Institute of Engineering & Management Studies, Aurangabad, Maharashtra, India[2]

ABSTRACT:- Forest play very important role in the nature cycle so it is necessary to protect it in each and possible way. Arduino platform based IoT enabled fire detector and monitoring system is the solution to this problem. In this project, we havebuilt fire detector using Arduino Uno which is interfaced with a ultrasonic sensor, LDR, humidity/ temperature sensor DHT11, a smoke sensor, Accelerometer sensor and buzzer. The temperature sensor senses the heat and smoke sensor senses any smoke generated due to burning or fire. Buzzer connected to Arduino gives us an alarm indication. Whenever fire triggered, it burns objects nearby and produces smoke. A fire alarm can also be triggered due to small smoke from candlelight or oil lamps used in a household. Also, whenever heat intensity is high then also the alarm goes on. Buzzer or alarm is turned off whenever the temperature goes to normal room temperature and smoke level reduces. We have also interfaced LCD display to the Arduino board.with the help of IoT technology , we have tried to make it smarter by connecting the whole monitoring process to the webpage naming created by the PHP tool and controlled by the Arduino programming done in the software- Arduino . Arduino fire monitoring system serves for industrial purpose as well as for household purpose. Whenever it detects fire or smoke then it instantly alerts the user about the fire through the ethernet module. For this purpose, we are using Arduino Uno which is from Arduino family. Also, the Arduino interfacing with LCD display is done to display the status of the system whether the Smoke and Overheat is detected or not. And Arduino interfacing with Ethernet module is done so that user get to know about the prevailing condition message. It intimates the user about the fire detection. This system is really useful whenever the user is not in the proximity of control centre. Whenever a fire occurs, the system automatically senses and alerts the user by sending an alert to an app installed on user's Android mobile or webpage accessible through internet.

I. INTRODUCTION

Owing to a paradigm shift toward Internet of Things (IoT), researches into IoT services have been conducted in a wide range of fields. As a major application field of IoT, Forest fire detection has become one such issue. The havoc due to forest fire has caused serious environmental problems and devastation of flora and fauna . Within the current turbulent global economic, demographic, social and ecologic context, governments, local administrative authorities, researchers and commercial companies or even individuals have to recognize the importance of the resources contained in the forest environment - not only from the perspective of the biodiversity, but also from the point of view of the economic resources which forests enclose. Therefore, any major threat posed to this essential component of the environment should be identified, studied and fought through the most efficient and modern economic policies and technological means. One of the most dangerous phenomena, which jeopardize forests, is represented by forest fires.

II. SURVEY OF FOREST FIRE

Forest fires are a regular phenomenon in our country often observed during the fire season. A number of 37,059 fires were detected in year 2018 using MODIS (Moderate Resolution Imaging Spectro-radiometer) sensor data. Every year large areas of forests are affected by fires of varying intensity and extent. Based on the forest inventory records, 54.40% of forests in India are exposed to occasional fires, 7.49% to moderately frequent fires and 2.405 to high incidence levels while 35.71% of India's forests have not yet been exposed to fires of any real significance. Precious forest resources including carbon locked in the biomass is lost due to forest fires every year, which adversely impact the flow of goods and services from forests. Satellite based remote sensing technology and GIS tools have been effective in better prevention and management of fires through creation of early warning for fire prone areas, monitoring fires on real time basis and estimation of burnt scars. Satellite based remote sensing technology and GIS tools have been effective in better prevention and management of fires throught creation of early warning for fire prone areas, monitoring fires on real time basis and estimation of burnt scars.

Over the past decade there is a massive destruction in forest. The majority of those accidents were caused by forest fire. On May 2016, the fire had damaged around 3500 hectares of land and claimed at least seven human lives apart from loss of fauna and flora in Uttarakhand. In 2015 wildfire that burned across the state of California. In which 8,745 fires burned a total area of 893,362 acres. On August 2014, 2 people died and 20 were seriously injured when fire broke out at the Vastmanland . This incidents shows that forest do not have proper fire prevention and rescue system. Moreover, most of the forest departments d o not have an automatic system to stop fire. And it takes a lot of time for the fire service to reach the disaster spot. In this perspective, a system to detect fire and alert the forest department before it breaks out. In this paper, we designed an IOT Infrastructure for forest fire detection and alerting system to help detect fire as soon as possible and save precious human lives. The system will use several sensors to detect any symptoms of fire. The sensors will be placed on proper places after doing surveys. After choosing the best places for placing the sensors, the sensor will be activated. The data collected by sensors will be sent to Arduino microcontrollers placed on various places. The microcontroller will then process the data. At the same time the system will send SMS using Wi Fi module to the nearby fire service station informing them of the incident.

III. WORKING

1)Hardware Components used forworking.

- ARDUINO UNO MICROCONTROLLER
- Wi-Fi MODULE
- HUMIDITY ANDTEMPRATURE SENSOR
- LCD(16*2)
- BUZZER
- LDR
- ULTRASONIC RANGE SENSOR
- SOIL MOISTURISER SENSOR
- SMOKE SENSOR
- ACCELEROMETER SENSOR

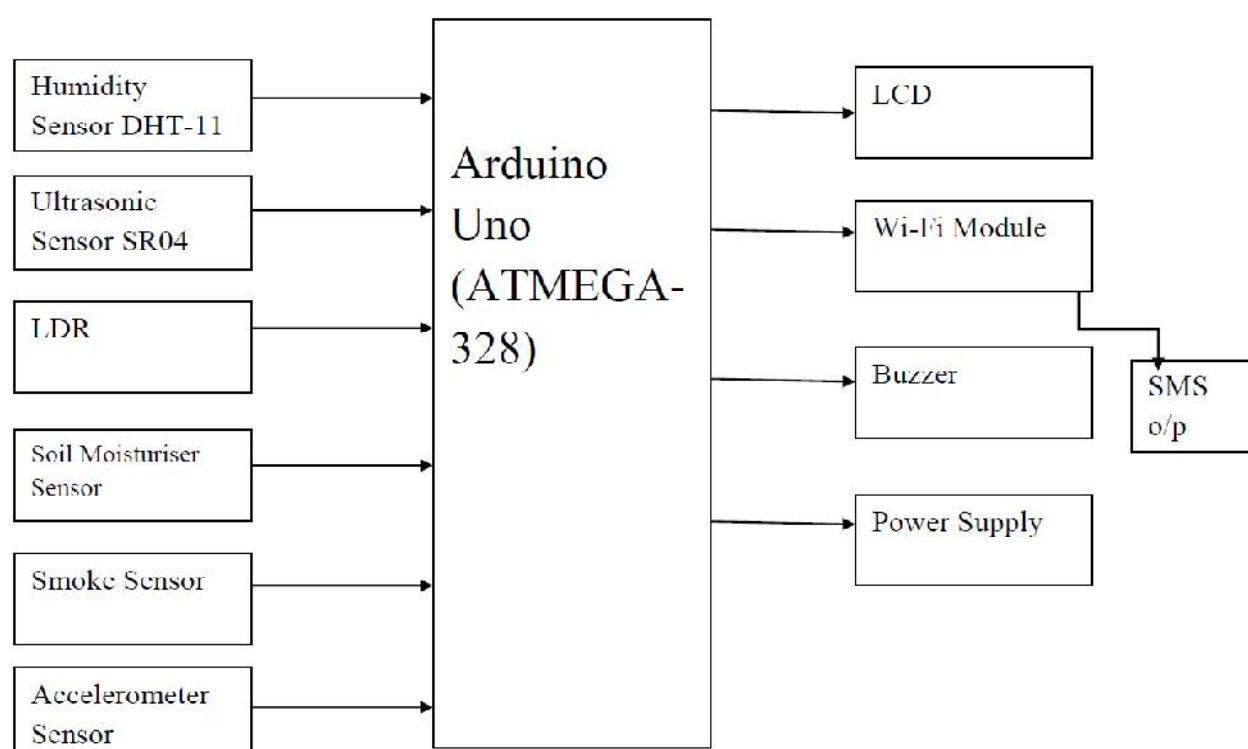**2)Working of it can be explained in following steps.**

Fig.1 Block Diagram of Proposed System.

i) Sensors serving as Data acquisition centre:-

Sensors used in system such as temperature sensor and smoke sensor are employed that need to be placed at certain distances so that a look can be kept on the entire forest area in order to detect the ignition alarming temperature and the level of carbon di oxide or carbon mono oxide gas. These sensors will send the signal or the information to the microcontroller. These will all sense changes in the environment and react automatically in the event of an emergency. New innovations in automatic initiating devices use cameras and computer algorithms to analyse visible effects of fire and movement in ways that other detection devices can't. Number of fire sensors are to be employed in practical situation that are needed to be placed at certain distances so that a look can be kept on the entire forest area.

2) IC and Arduino interfacing:-
The IC ATMega 328(microcontroller) embedded in arduino platform present in thetransmitter circuit receive the data sensed and collected by the temperature sensor and gas sensor and other given sensors.Then, the controller performs the programmed action to it and pass them to the transmitter for transmitting the data to the receiving station.

3) Display of output on SMS and webpage:-

Data regarding the activity happened in the forest survillence project is sent by sms and simultaneously on webpage through ESP8366 wifi module which is programmed with different library functions of the Ethernet shield interfacing

making it possible to create a webpage . The Wi fi module allows an arduino board to connect to the internet. It is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to ur wi fi network. Just plug this module onto your arduino Board, connect it to your network.

Apart from the above, an alarm circuit has been made just to facilitate the Fire security team to locate the vulnerable part as soon as possible. This fire alarm circuit will give alarm when any activity happens corresponding to the given sensors.

REFERENCES

[1] Çelik T.,Demirel H., 2009. Fire detection in video sequences using a generic color model, Fire Safety Journal,Volume 44, Issue 2, pp. 147-158
[2] www.fsi.nic.in
[3] Cetin A.E., A khan M.B., Toreyin B.U., and Aksay A., 2014. Characterization of motion of moving objects in video, US Patent-20040223652.
[4] Akyildiz IF, Melodia T, Chowdhury KR (2007) A survey on wireless multimedia sensor.
[5] Fernández-Berni J, Carmona-Galán R, Carranza-González L (2008) A vision-based mon system for very early automatic detection of forest fires. In _First Int. Conf. on Modelling, Monitoring and Management of Forest Fires
[6] IJCTER Volume 03,Issue05,May-2017 [Online ISSN 2455-1392]