

A Simulation for Forest Fire Detection using Lab View with Wireless Sensor Networks based MYRIO

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Abstract— Forest Resources are mainly important because they stabilize climate, regulation of hydrological cycle, and provides plants and animals for living Space to thousands of life. On the other hand, forest resources are deployed due to forest fires. Forest fire is a disaster which happened natural or manmade sources creating fire which destroys a forested area. Affected areas its leads to Deforestation, great danger to people who live in forests as well as wildlife animals. Forest accidents take place all over the world. Major wild fires accidents happen every few years in the forests of the United States and Indonesia, and in the bush in Australia and India. In India April – May 2016 major wild fires happened at Uttarakhand and Himachal Pradesh. Totally 4,048 hectares (10,000 acres) are burned and its affects vegetation, wildlife habitat, soil, water, and air and in turn how these impact humans especially in population centres. Due to this reason environmental Protection and conservation is increased Attention in now a days. In this Paper presents an optimal fire detection using lab view with MYRIO are proposed. The proposed system it contains solar Panel, lab view, Global Positioning System (GPS), GIS (Graphical Information System) and flame sensors are used. Fire affected areas information fetched from GPS and it can Be Transferred to MYRIO Protocol. MYRIO Protocol receives the particular latitude and Attitude, Longitude information from GPS and to be transmitted from lab view Monitoring Section and information Passage through nearest Forest head office Centres. Lab view is mainly used to obtain the cumulative report of annual & monthly forest fire affected areas by each state and district.

Key words: Deforestation, Vegetation, Wildlife Habitat, Solar Panel, LAB View, Global Positioning System (GPS), GIS (Graphical Information System) & Wireless Sensor Nodes

I. INTRODUCTION

Man depends heavily on a larger number of plant and animal products from forests for his daily needs. The chief product that forests supply is wood, which is used as fuel, raw material for various industries as pulp, paper, newsprint, board, timber for furniture items, other uses as in packing articles, matches, sports goods etc. Indian forests also supply minor products like gums, resins, dyes, tannins, fibers, etc. Many of the plants are utilized in preparing medicines and drugs; Total worth of which is estimated to be more than \$300 billion per year. Many forests lands are used for mining, agriculture, grazing, and recreation and for development of dams. The Forest also Provide some ecological uses for biodiversity like Production of Oxygen, Wild life habitat, Regulation of hydrological Cycle, Soil Conservation, Pollution moderators. But due to main reason

of the forest fire our bio diversity deployed every year and its affects our clean environment.

Generally Forest fires happen mainly in the summer and autumn. They are particularly destructive when there is a drought because branches and twigs die and dry out, creating plenty of fuel for the fire. Wind is a major factor. Some fires spread along the dead leaves and branches at the bottom of trees. Also, burning leaves and branches can get blown ahead of the main fire causing smaller fires to start. Wild fires Affects climate, Global warming, Less rainfall, medicinal plants, timber, fuel wood, soil fertility, Soil erosion, Drastic changes in biogeochemical cycles, economy, Loss of fruit production, Loss of root based foods and animals and plants also were burned during wild fires.

II. SURVEY OF FOREST FIRE

Head of Forest Force and Principal Chief Conservator of Forests reported several number of forest fire accidents happened in every year. As per DFO in India 2016 Human-made forest fires in the Himalayan state of Uttarakhand has been a regular and historic feature. Totally 4,048 hectares (10,000 acres) are burned and its affects vegetation, wildlife, soil, water, and air and in turn how these impact humans especially in population centres. Fig.1 Shows the State wise Wild fires affected areas shown below. In Tamilnadu every year 180 incidents of forest fires and ground fires were reported in the State, affecting 8,744 hectares of forest area. Wild fires area affected extended over 12,000 hectares. Previous year, the authorities have so far received about 120 reports of fire incidents across the State and the destruction of forests in the fire. The forest fire results in loss of so many trees, vegetation, animals, etc., amongst all other states Tamilnadu ranks 9 in the forest fire. Therefore to prevent this, we give alert regarding the fire. This will help us from loss in lot of lives and vegetation. The fire will be sensed by flame sensor and the signal is given to MYRIO hardware using this alert is given to the nearby fire station

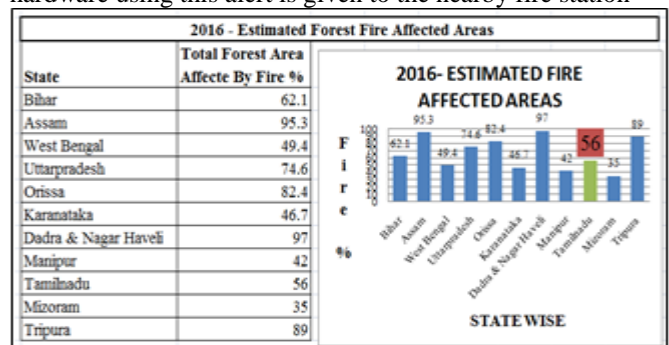


Fig. 1: Total Forest Area Affected By Fire (Percentage)

In tamilnadu State forest areas reserved forest areas are Theni, Kodaikanal, Dindigul, The Nilgiris, Mudumalai, Top Slip in Pollachi and Coimbatore in the Western Ghats;

Sathiyamangalam, Tiruppattur and Vellore in Vellore district, Tiruvannamalai and Hosur in the Eastern Ghats were fire-prone areas identified by the Centre. In tamilnadu 56% Forest areas are affected by the till 2016. Especially Sathiyamangalam and annaikatti forest areas are more affected due to forest accidents happened due to lightening and manmade sources.

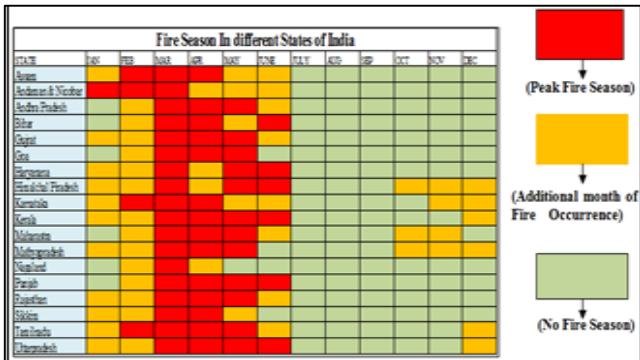


Fig. 2: Fire Season in different Stages in India

Figure.2 Shows Fire Season in different Stages in India. The season of fire varies from state to state based on the topology, climate, geography, etc., Based on this the amount of fire also varies from place to place. The Below figure represents the fire season has three stages red colour represents peak fire season, yellow colour represents additional month of occurrence, green colour represents No fire season.

III. RELATED WORK

There is Several Number of papers that have been published and some author discussed about various techniques to control the fire and Conservation of plants and habitat. There are several techniques to be followed to convey the information for forest head office [1]. The proposed method demonstrates an optimal fire detection using wireless sensor networks using Lab view. We are using MYRIO protocol as a medium to inform through their nearest stations with the help of Global Positioning System and Graphical information System. The proposed method monitoring has to be done in Lab view and information exchange through the transmitter and receiver implemented with MYRIO PROTOCOL. Lab view is mainly used to monitor the total no of areas affected by Forest fire and with the help of lab view software we can take Annual report of forest fire affected areas by each state and district.

IV. BLOCK DIAGRAM OF PROPOSED METHOD

Figure 3 Shows the Block Diagram of Proposed Method. The Block Diagram Consists of two Sections one is Forest Area and another one is monitoring Area. In Forest Area Solar panel, Charge Controller, Battery, MYRIO, GPS, Flame Sensor are connected in transmitter channel. Solar Panel gets Maximum power through Sun using MPPT Algorithm [1][2]. The output of the solar Panel is 12V. The Output voltage is stored using a Battery with the help of charge controller. NI myrio-1900 real time Processor is used to monitor and control applications in various fields. MYRIO processor internally Contains Signal Processor, Signal Splitter, Data Storage, Audio Port, Sensors. Flame sensors and GPS are Manually Connected through MYRIO. GPS (Global Positioning System) is connected through

satellite and used to obtain the values at particular latitude and Longitude of the Forest area. The Forest Area affected by the wild fire is sensed using flame sensors and it also senses the temperature level, values are given to MYRIO Port. In receiver Channel smart Monitoring System (PC with lab view) and alarm is Connected to the Monitoring Area. MYRIO transmits the location of the affected Forest to monitoring section. Monitoring Section immediately gets the Geography of the affected location with the help of Google earth. The lab view monitoring section sends the fire alert message and also sends the location to nearest forest head office which is stored by MYRIO port.

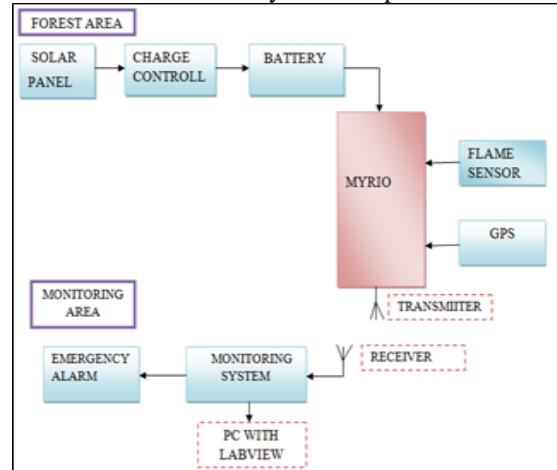


Fig. 3: Block Diagram of Proposed Method

V. SIMULATION RESULTS

A. Solar with Battery

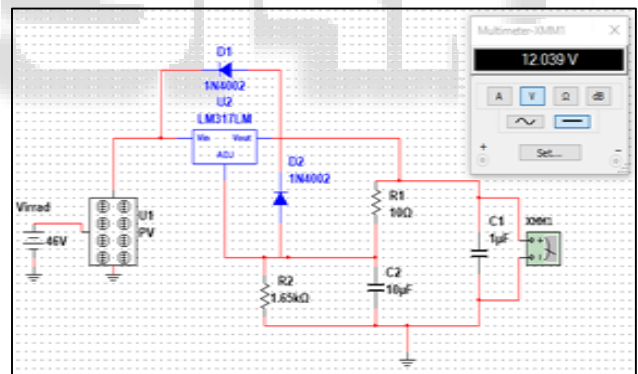


Fig. 4: Simulation Circuit for Solar panel with Battery

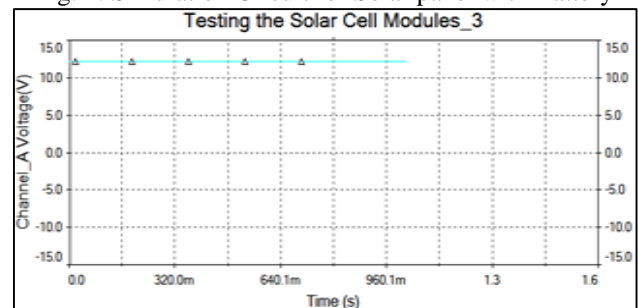


Fig. 5: Simulation results for Solar panel with Battery The figure 4 & 5 shows the Simulation Circuits and output for solar panel with Charge Controller. The Solar Panel with Simulation is validated under Multisim Software. This circuit Contains Solar panel, Voltage regulator, filter circuits which is connected to the load. DC Input voltage of 46V irradiation is given to Solar Panel. Solar panel radiates the

maximum voltage and connected to Charge Controller. Charge Controller regulates the voltage and it stored into battery.

B. Simulation for temperature Monitoring

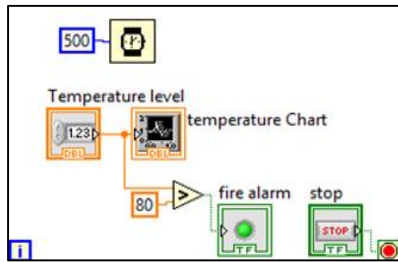


Fig. 6: Simulation Circuit for temperature Monitoring

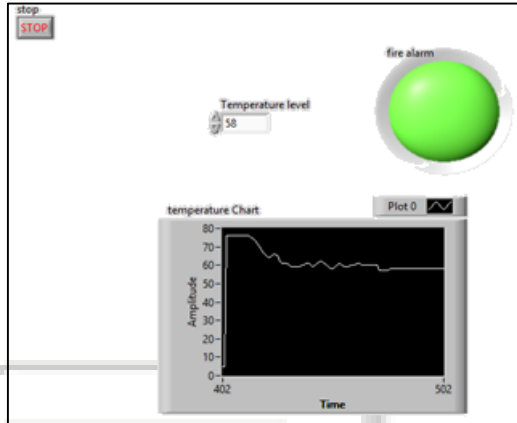


Fig. 7: Simulation Results for Temp <60°C

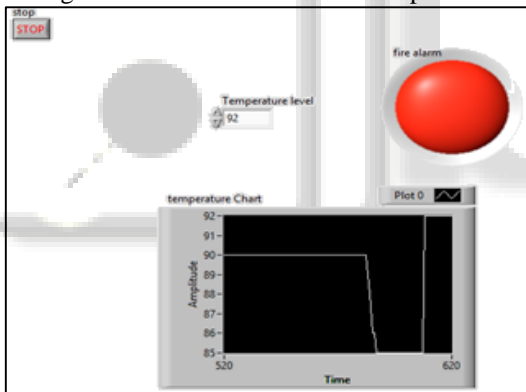


Fig. 8: Simulation Results for Temp > 80°C

Figure 6 Shows the Simulation Circuit for temperature monitoring in lab view. Lab view simulation contains two sections. One is block diagram and another one if front panel. The block diagram Circuit Contains Fire alarm, relational operator, for loop, Delay, Temperature Sensing Unit. In that For loop is used for continuous operation or looping. Block Diagram consists of delay circuit which is used for identifying accuracy of the temperature chart. Relational operator which is used for comparing reference value with the nominal temperature value. If the nominal temperature value exceeds beyond 80°C. The Fire alarm gives alert when this happens to complete one revolution stop button is used.

The above figure 7 & Figure 8 represents the simulation results for temperature monitoring. Lab view output can be obtained in Front Panel. Even when the temperature is less than 80°C the looping remains normal and when it exceeds 80°C the Alarm buzzers. The figure also represents the variation of graphs at different

temperature level. Here we are assuming the temperature level.

C. Simulation for Location and Geography Monitoring

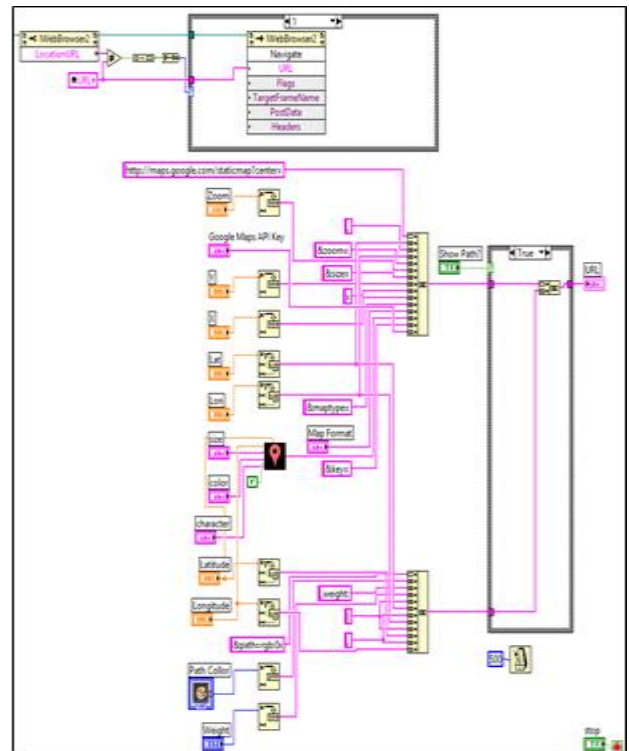


Fig. 8: Simulation Circuit for Location and Geography Monitoring



Fig. 9: Simulation Circuit for Location and Geography Monitoring

The above Figure 8 shows the Simulation block for Location and Geography Monitoring in lab view. The Proposed Block Contains GPS Interface, Location, URL, and Google Map API Interface. The above Figure 9 shows the output of the fire affected area of sathyamangalam latitude, Attitude, longitude and graphical picture information is provided in the Front Panel.

VI. CONCLUSION

A development of forest fire detection using lab view with wireless sensor networks based MYRIO is simulated by using lab view. This method is better optimization for comparing the other forest fire detection techniques. In simulation part solar panel is simulated by using multisim software. The solar panel 12V output is stored by battery. Temperature monitoring and GPS based location monitoring

is validated using lab view. In the proposed method temperature monitoring in the front panel is less than 80°C the looping remains normal and when it exceeds 80°C the Alarm buzzers and. Geographical information of the affected location with the help of Google earth. The lab view monitoring section sends the fire alert message and also sends the location to nearest forest head office which is stored by MYRIO port.

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