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Forest Fire Detection Using Optimized Solar Powered Wireless Sensor Networks

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ABSTRACT

Forest Fires are one of the most important and prevalent type of disasters and they can create a great deal of Environmental Impacts due to which their early detection is very vital. The main need for choosing this particular application for the detection of forest fires is to overcome the demerits present in the existing technologies of MODIS and Basic Wireless Sensor Network -based Forest Fire Detection Systems and an advanced system is developed for the detection of forest fires. The two main modules present in the project are the Monitoring Area Module and the Forest Area Module.The outcome of the above implementations reveal that various sensors used in addition to the temperature sensor improves security level for areas located near the forests. It also shows that the Optimized Solar Energy Harvester increases the efficiency to about 85 % and the use of PC based Web Server reduces the bulkiness and cost of the entire system.

I INTRODUCTION

Forests are part of the important and indispensable resources for human survival and social development that protect the balance of the earth ecology. However, because of some uncontrolled anthropogenic activities and abnormal natural conditions, Forest Fires occur frequently. These fires are among the most serious disasters to forest resources and the human environment. In recent years, the frequency of forest fires has increased considerably due to climate changes, human activities and other factors. The prevention and monitoring of Forest Fires has become a global concern in Forest Fire prevention organizations.Currently, Forest Fire prevention methods largely consist of Patrols, Observation from watch towers, Satellite Monitoring and lately Wireless Sensor Networks.Although observation from watch towers is easy and feasible, it has several defects. In the first place, this method requires many financial and material resources and a trained labor force. Second, many problems with fire protection personnel abound, such as carelessness, absence from the post, inability for real-time monitoring and the limited area coverage.

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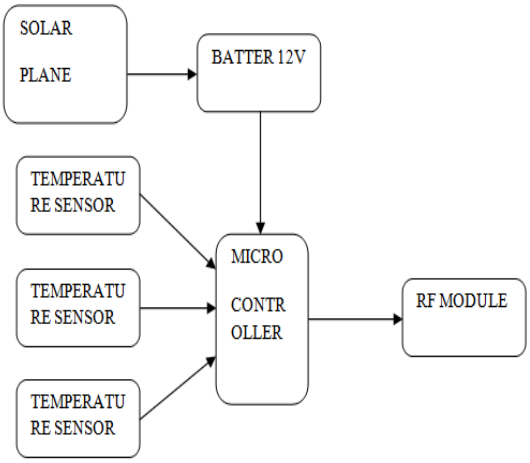
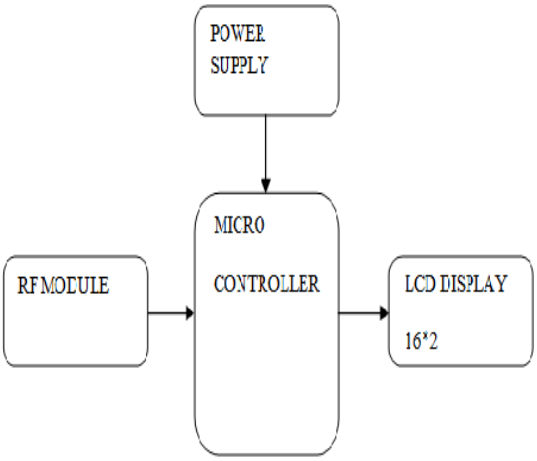
II BLOCK DIAGRAM

2.1 Transmitting Section

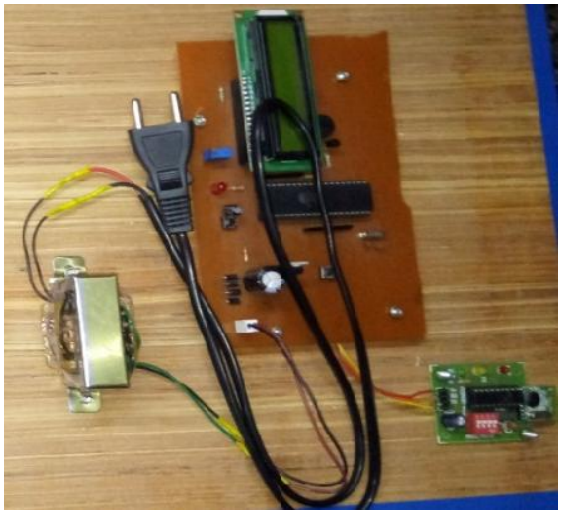


2.2 Base Section



III WORKING

In forest when fire is detected the location information is send to forest department through GPS and fire detector alarm. Through our model the temperature of forest area is also detected so that we can controlled the fire. If any dangerous situation occur. The temperature sensor is used to detect this.



POWER SUPPLY

The power supply is the first part of the project. The basic block diagram of the power supply that is used in the project is shown in figure 1.2 below:

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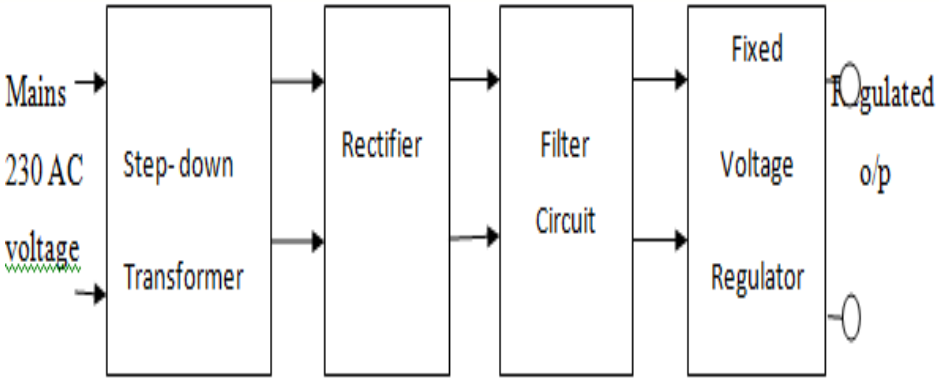


The AC voltage from the mains supply is converted in to 12V ac using step down transformer. This step down voltage is then given to full wave bridge rectifier circuit which converts the ac voltage into a pulsating dc voltage. Since the output of rectifier is not completely a dc voltage, we use a filter circuit to remove the ripples from the rectified output. As we require 5 V dc supply for AVR processor, we use a voltage regulator circuit to convert the 12V dc output of filter circuit to 5 V dc.

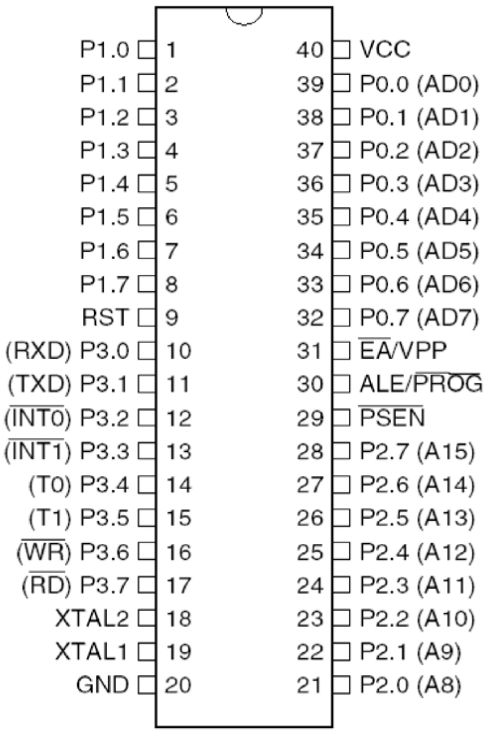
HEATSINK

Waste heat is produced in transistors due to the current flowing through them. If a transistor is becoming too hot to touch, it certainly needs a heat sink.

The heat sink helps to dissipate (remove) the heat by transferring it to the surrounding air. Hence a heat sink is required in IC7805 voltage regulators.

MICROCONTROLLER

Microcontrollers have only been with us for a few decades but their impact (direct or indirect) on our lives is profound. Usually these are supposed to be just data processors performing exhaustive numeric operations. Microcontroller is a single chip micro-computer that has everything inbuilt i.e. circuitry of microcontroller has built in RAM, ROM, input output devices, timer, counter, interrupts etc.



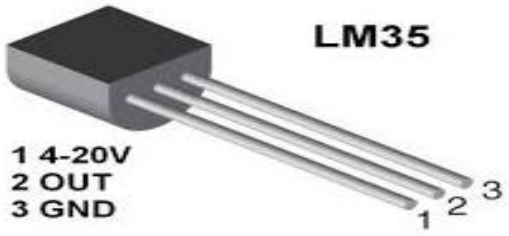
The 89c series is a low-power, high-performance CMOS 8-bit microcomputer with Flash programmable and erasable read only memory (PEROM).

Here We are using ATMELS AT89c/s52 microcontroller. The controller executes instructions as per the clock cycles; this clock is generated using a crystal which is connected to the XTAL1 & XTAL2 pin of the microcontroller, the two capacitors C1 &C2 are connected between the two XTAL pins &the ground. They are required for the crystal to oscillate.

A Power ON reset circuit is connected to the RESET pin of the microcontroller, the controller must be reseted properly whenever is power is turned on, which is done by applying a Vcc to the reset pin & for normal operation of the controller the pin should be pulled low. So an RC (R1, C3) circuit is connected to the RST (9) pin of the microcontroller. Whenever the power is turned ON the Capacitor is fully charged & the RST pin gets 5 v. Then the capacitor slowly discharges through the resistor & is then pulled to ground. Microcontrollers Port 0 does not have an Internal Pull Up resistor so we need external Pull Up resistors on port 0. For which we use 9-Pin SIP resistor which are basically eight resistors with one end common.

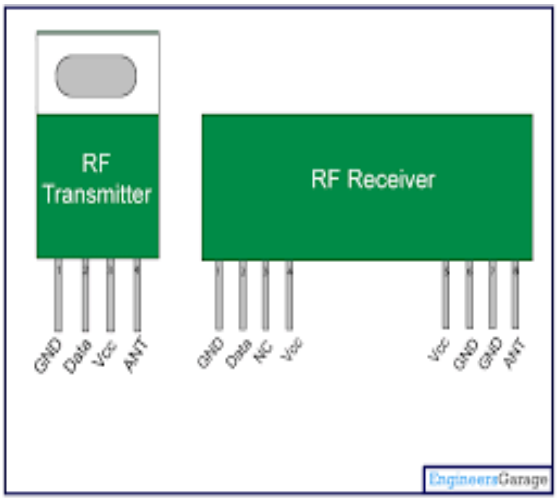
TEMPERATURE SENSOR LM35

LM35 is a precision IC temperature sensor with its output proportional to the temperature(in ^{0}C). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. with LM35, temperature can be measured more accurately than with a thermistor. It alsoposses low self heating and does not cause more than 0.1 ^{0}C temperature rise in still air.



RF MODULE

In generally, the wireless systems designer has two overriding constraints:it must operate over a certain distance and transfer a certain amount of information within a data rate. The RF modules are very small in dimension and have a wide operating voltage i.e 3V to 12V.



III BENEFITS

The arrangement is fire-proof and can withstand high temperature, rugged, reliable, cost-effective and easy to install. It is also easy to decode the data from satellite at the ground station and no experts are required to understand or decode the data from the satellite. All the components like temperature sensor a are easy to interface. The approximate value of temperature is obtained. Since we are using wireless sensing networks, the attenuation during the transmission of the signal or the data is minimized.

IV APPLICATION

1.Buses, Trains
2.Forests
3.Industries
4.Residential
5.Commercial Arias

V FUTURE SCOPE

1. Fire accidents can be controlled to a great extent in a places such as forests, homes, colleges industries,trains and some other public places.
2. Fire accidents leads to death of excess of people, by using this technique we can save those life's easily.
3. To detect the chain smokers(which are hazardous to health)

VI CONCLUSION

An advanced system for Forest Fire Detection was developed which overcomes the demerits of the Existing technologies of Forest Fire Detection. It can be ensured that the system developed can be implemented on a large scale due to its promising results. Mechanical modeling for accessible and inaccessible areas helps in the easy implementation of the Forest Area modules. The system can also be upgraded with low-power elements.

REFERENCES

1. N. Han, J. Kan, W. Li and J. Zhang, (2008) "Forest Fire Detection System Based on a Zigbee Wireless Sensor Network".
2.S.J. Hook and G.C. Hulley, (2011) "Generating Consistent Land Surface Temperature and Emissivity Products Between ASTER and MODIS Data for arth
Science Research", Geoscience and Remote Sensing .
3.D. Grimaldi, R. Rak and L. Skrzypczak, (2009) "Basic Characteristics of Zigbee and SimpliciTI Modules to use in measurement systems".
4. M. Fukuda, H. Hayasaka, K. Kimura, K. Kushida, K. Nakau and H. Tani, (2006) "Forest fire detection based on MODIS satellite imagery, and comparison of NOAA satellite imagery with fire fighters' information" .