

# AN ENHANCED METHOD ON FOREST FIRE AND ANIMAL HABITAT MONITORING USING IoT

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**Abstract**— Wireless network consists of small sensor nodes, deployed to capture various events of interest. For example, temperature, oxygen, humidity sensor nodes are deployed in remote, hostile and geographical areas where the presence of human being is infeasible. These nodes are powered by small battery, to communicate with each other for monitoring various environments. These networks have found their applications in various domains such as forest fire monitoring, industrial monitoring, military surveillance, inventory tracking, agriculture monitoring and health care monitoring. Forest fire is the disaster having many negative effects in social, economic and ecological matters. Forest fire cost million dollars in damage and claim many human lives every year.

**Keywords:** *Internet Of Things, Wireless Sensor Networks, Multipoint Control Unit, Short Message Service, Fire weather Index, Universal Serial Bus, In-System Programming, Pulse Width Modulation, Active Current, Direct Current, Heavy Water Board, Defence Advanced Projects Agency, Advanced Research Projects Agency Network, Global Positioning System, Micro electro mechanical system, Radio Frequency Identification, Resistance Temperature Devices*

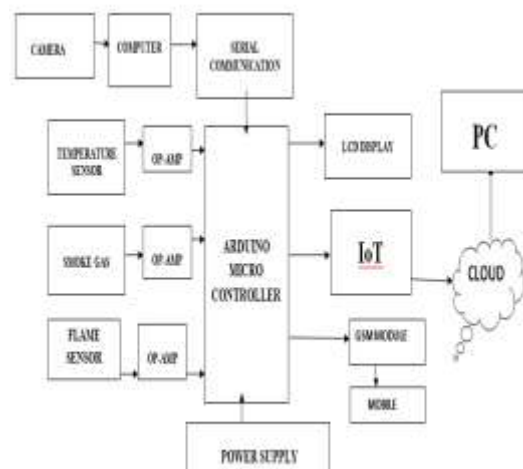
## I. INTRODUCTION:

Forest fire is an uncontrolled fire occurring in nature. Once the fire starts ignited it rapidly spreads all over area in the forest. Forest fire spreads on hot summery day when drought conditions peak, something as small as a spark from a train cars wheel striking the track can ignite a raging wildfire This could result in massive destruction. Forest fire always starts by one of two ways – natural caused or man-made caused. A natural fire are generally started by lightning, with a very small percentage started by spontaneous combustion of dry fuel such as sawdust and leaves on the other hand, human caused fires results from campfires and burning of the waste materials.

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 do not have an automatic system to stop fire 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 Iot module to the nearby fire service station informing them of the incident. The system will inform the location of the fire to the administrator using Iot module.

## II. BLOCK DIAGRAM



**FIG BLOCK DIAGRAM OF PROPOSED SYSTEM CIRCUIT DIAGRAM**

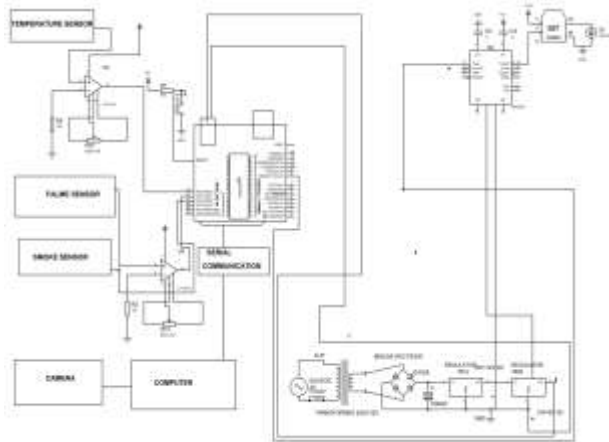


FIG CIRCUIT DIAGRAM OF PROPOSED SYSTEM

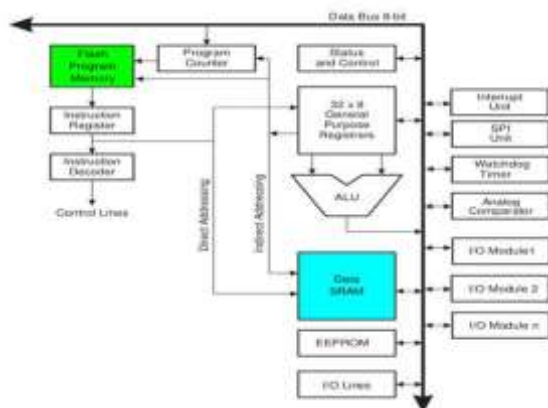
## II. PIN DIAGRAM

**ATmega168/328 Pin Mapping**

Arduino function	Pin	Microcontroller Pin	Arduino function
reset	1	PC5 (ADC5/SCL/PCINT13)	analog input 5
digital pin 0 (RX)	2	PC4 (ADC4/SDA/PCINT12)	analog input 4
digital pin 1 (TX)	3	PC3 (ADC3/PCINT11)	analog input 3
digital pin 2	4	PC2 (ADC2/PCINT10)	analog input 2
digital pin 3 (PWM)	5	PC1 (ADC1/PCINT9)	analog input 1
digital pin 4	6	PC0 (ADC0/PCINT8)	analog input 0
VCC	7	GND	GND
GND	8	AREF	analog reference
crystal	9	AVCC	VCC
crystal	10	PB5 (SCK/PCINT5)	digital pin 13
digital pin 5 (PWM)	11	PB4 (MISO/PCINT4)	digital pin 12
digital pin 6 (PWM)	12	PB3 (MOSI/OC2A/PCINT3)	digital pin 11 (PWM)
digital pin 7	13	PB2 (SS/OC1B/PCINT2)	digital pin 10 (PWM)
digital pin 8	14	PB1 (OC1A/PCINT1)	digital pin 9 (PWM)

Digital Pins 11, 12 & 13 are used by the ICSP header for MOSI, MISO, SCK connections (Atmega168 pins 17, 18 & 19). Avoid low-impedance loads on these pins when using the ICSP header.

## III. ARCHITECTURE

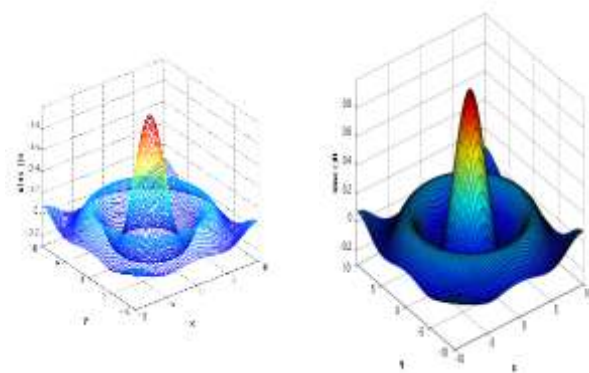
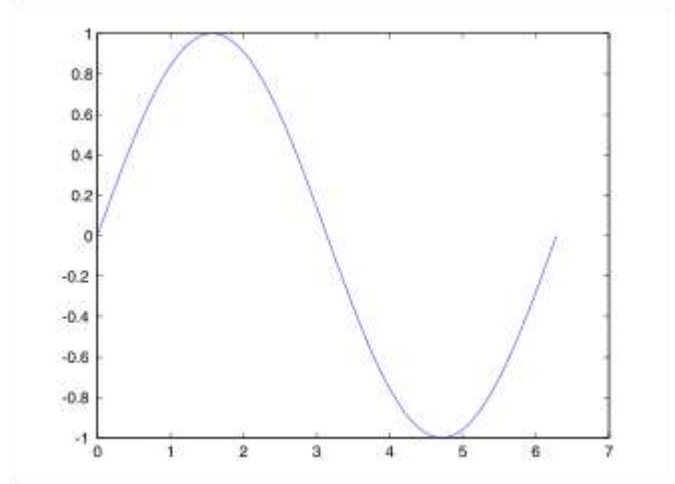


## Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

## Graphics and graphical user interface programming

MATLAB supports developing applications with graphical user interface (GUI) features. MATLAB includes GUIDE<sup>[23]</sup> (GUI development environment) for graphically designing GUIs. It also has tightly integrated graph-plotting features. For example, the function plot can be used to produce a graph from two vectors x and y. The code:



In MATLAB, graphical user interfaces can be programmed with the GUI design environment (GUIDE) tool.

#### IV. INTERFACING WITH OTHER LANGUAGES

MATLAB can call functions and subroutines written in the programming languages C or Fortran. A wrapper function is created allowing MATLAB data types to be passed and returned. MEX files (MATLAB executables) are the dynamically loadable object files created by compiling such functions. Since 2014 increasing two-way interfacing with Python was being added.

Libraries written in Perl, Java, ActiveX or .NET can be directly called from MATLAB, and many MATLAB libraries (for example XML or SQL support) are implemented as wrappers around Java or ActiveX libraries. Calling MATLAB from Java is more complicated, but can be done with a MATLAB toolbox[33] which is sold separately by MathWorks, or using an undocumented mechanism called JMI (Java-to-MATLAB Interface),[34][35] (which should not be confused with the unrelated Java Metadata Interface that is also called JMI). Official MATLAB API for Java was added in 2016.

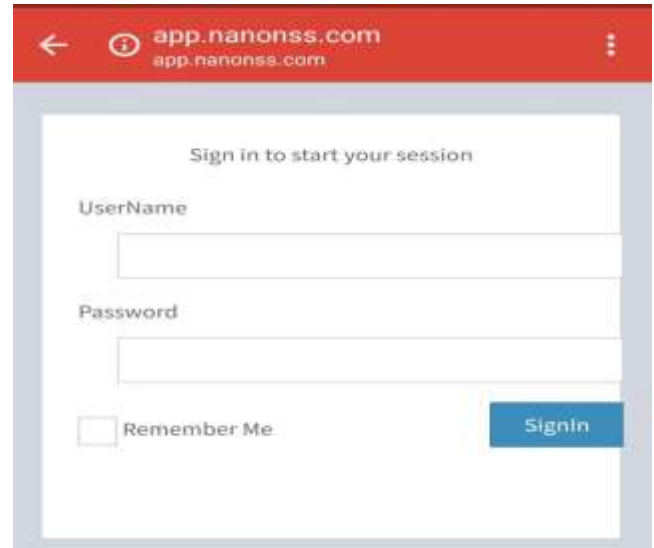
As alternatives to the MuPAD based Symbolic Math Toolbox available from MathWorks, MATLAB can be connected to Maple or Mathematica.

Libraries also exist to import and export MathML.

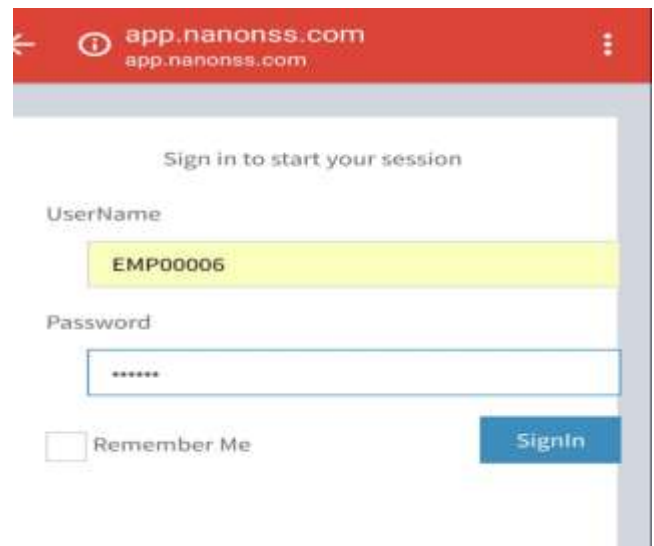
MATLAB CAPE-OPEN Unit Operation Model File (AmsterCHEM)



**Fig6.1OUTPUT OF THE SYSTEM WHEN NO FIRE DETECTED**



**FIG 6.2 DISPLAY OF WEB PAGE**



**Fig.DISPLAY OF WEB PAGE ENTRY**



**Fig.DISPALY OF ANIMAL DETECTION**

## V. CONCLUSION

In this paper an internet based fire and animal habitat monitoring system is proposed and implemented. The android based forest fire and animal monitoring communicates through internet. Any android supported device can be used to install this application, Control and monitor the forest environment. It is a low cost system and protects nature from forest fire and villagers from animal attack. Forest fire is an uncontrolled fire occurring in nature. Once the fire starts ignited it rapidly spreads all over area in the forest. Forest fire spreads on hot summery day when drought conditions peak, something as small as a spark from a train cars wheel striking the track can ignite a raging wildfire This could result in massive destruction. Forest fire always starts by one of two ways – natural caused or man-made caused. A natural fire are generally started by lightning, with a very small percentage started by spontaneous combustion of dry fuel such as sawdust and leaves on the other hand, human caused fires results from campfires and burning of the waste materials. Over the past decade there is a massive destruction in forest.

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