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IOT Based Fire Deduction and Safety Navigation System

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ABSTRACT:Internet of things is an interconnection of physical devices embedded with electronics, software, sensor which is capable of collecting data from the surrounding and sending data over internet is called IOT This enables an instant monitoring of data and appliance control residing from anywhere in the world.Ensuring minimum rights and safety of the workers has become a burning issue nowadays.An automatic fire alarm system based on wireless sensor networks is developed, which is designed for high-rise buildings. To provide early extinguishing of a fire disaster, large numbers of detectors which periodically measure smoke concentration or temperature are deployed in buildings and helps the workers to get out of the building using the navigation system.The workers in factories,shopping malls are facing some labyrinths and broken out of fire is surely one of them. The investors are losing their interest and the prominence of this sector is getting toneless. This system provides a confirmation of the fire suspecting system to avoid any false alarm. The system will immediately send a message along with the image of the affected spot and Arduino's location using GSM module. GSM refers to second-generation wireless telecommunications standard for digital cellular services. It also supports full panel programming using embedded c and network diagnostics.

KEYWORDS: Internet of Things, Arduino controller, GSM, Temperature sensor.

I. INTRODUCTION

In recent years, natural disasters and man-made catastrophic events happen frequently, which have caused tremendous harm to human beings. Effective and efficient emergency management is crucial in ensuring timely rescue and relief operations. Currently, the main studies about emergency management focus on emergency response management, relief distribution and emergency logistics management. The major characteristics of fire are it extends exponentially with time. Hence, timely detection of fire is critical for avoiding a major accident. Hence, the essence of having a sophisticated fire alarm and monitoring system is quite obvious. The early detection of fire can be made with the rise of temperature and the presence of flame. Hence appropriate sensors have to be installed at the vulnerable places to detect the mentioned physical quantities.

The major setback of traditional fire alarm system is the remote location of fire initiation points. It may be machinery inside the industry, unattended home appliances etc. Hence, the information generated by the sensors need to be conveyed a long distance, may be through transmission line followed by instrumental amplifiers. Some places, the deployment of such lines are not feasible. The low cost solution to such problem is to introduce wireless link. The present development of IoT platform would best suit for it. IoT is a complete embedded system where sensors and actuator are being monitored and controlled remotely across existing network infrastructure.It allows sophisticated computer-based control for more efficient and accurate operation. It can sense the rise in temperature, flame and send it to a far-away monitoring station through GSM to generate needful instructions.Some of the IoT applications,

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1. IOT for mobile operator
2. IOT for manufacture of smart devices
3. IOT for Banks and payment solution
4. IOT for Automobile industry
5. IOT for Airlines
6. IOT for Health

Wireless sensor network is a network in which a large number of sensors are deployed and data is collected from them and send to a particular system for processing. In this paper will we present the different techniques we had been already used to detect fire. Some of those techniques include fire detection using sensors. The wireless system performance and price are not good compared with the wired system. Even though the advantages of wireless havemany. Some of them are fast speed of installation, small damages to the buildings, wireless sensor cost drops down, application places are wider and less power consumption. The wireless system are simple, flexible network structure, low cost and short delay. It could meet all the requirements of user. The forecasting ability, warning of fire and improvement in the reliability are also the advantages of the wireless fire alarm system.

II. RELATED WORK

Zanella, N. Bui et al discussed about the Internet of Things for smart cities. S. C. Folea and G. Mois are discussed about the low-power wireless sensor for online ambient monitoring. P. Changhai et al analyzed the design and application of a VOC monitoring system based on a ZigBee wireless sensor network. S. D. T. Kelly et al discussed the towards implementation of IoT for environmental condition monitoring in homes. N. K. Suryadevara et al analyzed the system for wellness determination of elderly. S. Helal et al analyzed about the Gator tech smart house as a programmable pervasive space. L. C. De Silva discussed about the state of the art of smart homes. N. K. Suryadevara discussed about the WSN based smart sensors and actuator for power management in intelligent buildings. J. Byun et al analyzed about an intelligent self-adjusting sensor for smart home services based on ZigBee communications.

S.R. Vijayalakshmi discussed about the real time monitoring of wireless fire detection node. M. Morin at.el analyzed about the computersupported visualization of rescue operations. Xue-gui Wan at.el analyzed about the novel conceptual fire hazard ranking distribution system based on multisensory Technology. Konstantinous at.el dealt about an automated fire detection and alerting application based on satellite and wireless communications. Fatih Erden at.el discussed about the wavelet based flickering flame detector using differential PIR sensors.

S. Muruganand were discussed about the challenges in integrating Wireless Sensor Network and Internet of Things for Environmental Monitoring. Son. B was discussed about a design and implementation of forestfires surveillance system based on wireless sensor networks for south Korea mountains. Yunus Emre Aslan et al were analyzed about a framework for use of wireless sensor networks in forest fire detection and monitoring. Qiang Liu et al were analyzed about the green data center with IoT sensing and cloud-assisted smart temperature controlling system. Kruger. C.P. and Hancke, G.P. Were analyzed about the implementing the Internet of Things vision in industrial wireless sensor networks.

Jun and Yuan discussed about the internet of things, and WSN. They designed a low power consumption wireless sensor network node. Andrej Kos et al. presented an IoT platform designed to support a number of usage scenarios with special emphasis on e-Health use cases. Jie Li et al. presented a coding scheme called separate coding for collecting all data continuously in wireless sensor networks with a mobile base station. Mir Sajjad Hussain Talpur et al. designed a healthcare monitoring system depends on the use of internet of things (IoT) technologies.

In 2008, P. N. Narendra Reddy discussed critical medical emergency situations, wireless body area network (WBAN) equipped health monitoring systems treat data packets with critical information regarding patients' health in the same way as data packets bearing regular healthcare information. This snag results in a higher average waiting time for the local data processing units (LDPU) transmitting data packets of higher importance. In this paper, we formulate an

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algorithm for Priority-based Allocation of Time Slots (PATS) that considers a fitness parameter characterizing the criticality of health data that a packet carries, energy consumption rate for a transmitting LDPU, and other crucial LDPU properties. Based on this fitness parameter, we design the constant model hawk-dove game that ensures prioritizing the LDPUs based on crucial properties. In comparison with the existing works on priority-based wireless transmission, we measure and take into consideration the urgency, seriousness, and criticality associated with an LDPU and, thus, allocate transmission time slots proportions.

L.R.Patil, Divya Chopda performed the emergency scheduling of forest fires in order to reduce the operational cost and improve the efficiency of extinguishing fire services. A new research issue arises when: 1) decision-makers want to minimize the number of rescue vehicles (or fire-fighting ones) while minimizing the extinguishing time; and 2) decision-makers prefer to complete this task given limited vehicle resources. To do so, this paper presents a novel multiobjective scheduling model to handle forest fires subject to limited rescue vehicle (fire engine) constraints, in which a fire-spread speed model is introduced into this problem to better describe practical forestry fire. Moreover, a Multiobjective Hybrid Differential-Evolution Particle-Swarm-Optimization (MHDP) algorithm is proposed to create a set of Pareto solutions for this problem. This approach is applied to a real-world emergency scheduling problem of the forest fire in Mt. Daxing'anling, China. Its effectiveness is verified by comparing it with a genetic algorithm and particle swarm optimization algorithm. Experimental results show that the proposed approach is able to quickly produce satisfactory Pareto solutions.

III. BLOCK DIAGRAM

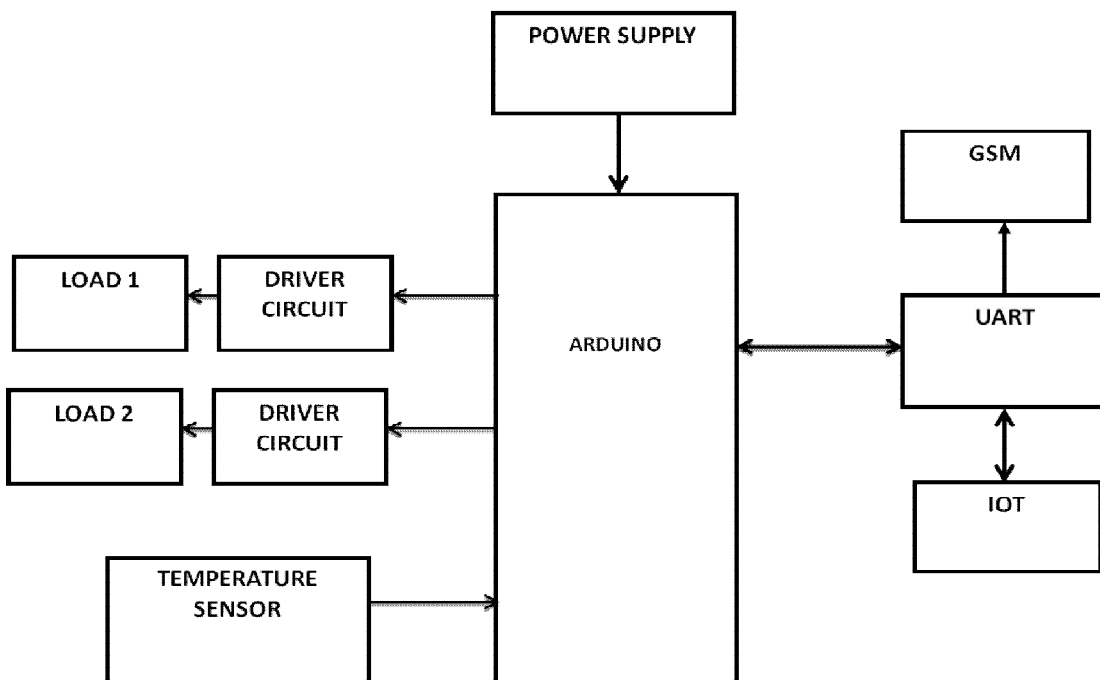


Fig.1. Working method using circuits

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IV. PROPOSED SYSTEM

4.1 TEMPERATURE SENSOR:

In the proposed system we are using temperature sensor. Temperature sensor LM35 is a sensor which will sense the temperature of its surrounding and send these details to the processing unit. In this system our processing system will be the Arduino board which will take the readings of the sensor and update to the server using IOT. The communication happens bi-directional between controller and IOT. One method of communication is for updating temperature sensor values. From IOT, we can route the person from that section to a safety fire exit with the help of IOT by load control technique. A message is also sent to the user denoting the location of the fire occurred place. The temperature values are updated to the server using IOT. From IOT, we can route the person from that section to a safety fire exit with the help of IOT by load control technique. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

4.1.1 FEATURES:

1. Calibrated directly in ° Celsius (Centigrade)
2. Linear + 10.0 mV/°C scale factor
3. 0.5°C accuracy guaranteeable (at +25°C)

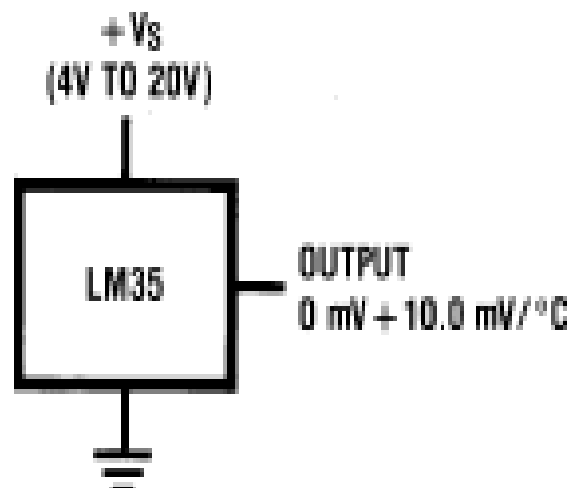


Fig.2. LM35 sensor

4.2 IC voltage regulators

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperes, corresponding to power ratings from milli watts to tens of watts. A fixed three-terminal voltage regulator has an unregulated dc input voltage, V_i , applied to one input terminal, a regulated dc output voltage, V_o , from a second terminal, with the third terminal connected to ground. The series 78 regulators provide fixed positive regulated voltages from 5 to 24 volts. Similarly, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts.

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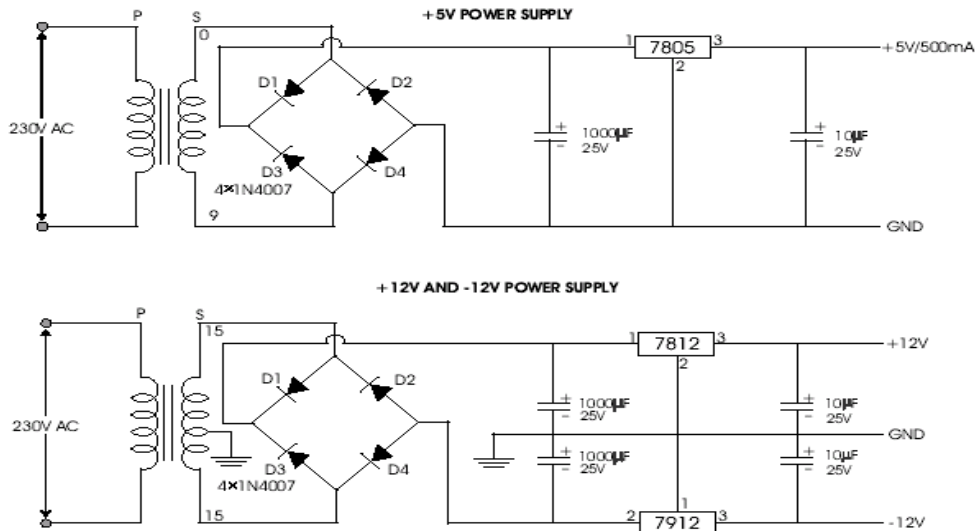


fig.3. Power supply conversion

4.3 TRANSFORMER:

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op-amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.

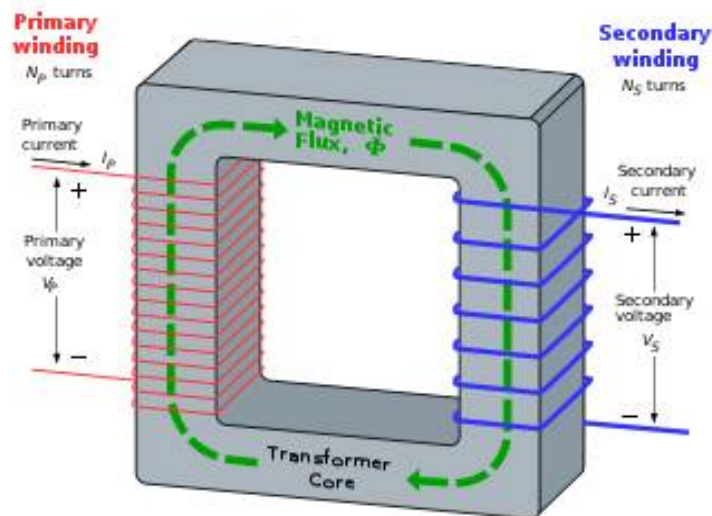


Fig.4. Transformer

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4.3 GSM MODULE:

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates. There are various cell sizes in a GSM system such as macro, micro, pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment. TDMA technique relies on assigning different time slots to each user on the same frequency. It can easily adapt to data transmission and voice communication and can carry 64kbps to 120Mbps of data rate.



Fig.5. GSM Circuit module

4.4 WORKING OF GSM MODULE:

GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone send that data to the MC through serial communication. While the program is executed, the GSM modem receives command 'STOP' to develop an output at the MC, the contact point of which are used to disable the ignition switch. The command so sent by the user is based on an intimation received by him through the GSM modem 'ALERT' a programmed message only if the input is driven low. The complete operation is displayed over 16x2 LCD display.

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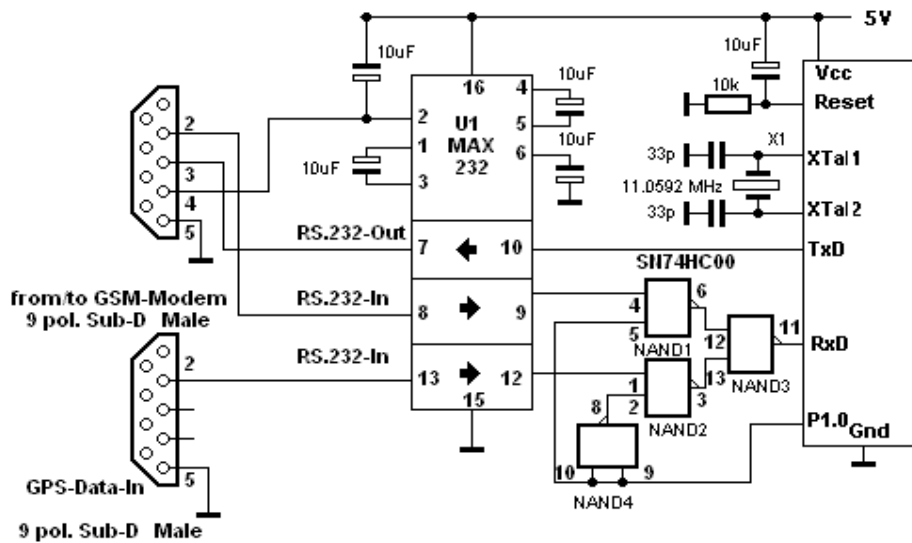


Fig.6. Working module of GSM

4.5 IoT MODULE:

IoT has evolved from the convergence of wireless technologies, micro electro mechanical systems (MEMS) and the Internet. The concept may also be referred to as the Internet of Everything. The internet of things(IoT) is the internet working of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low --or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network

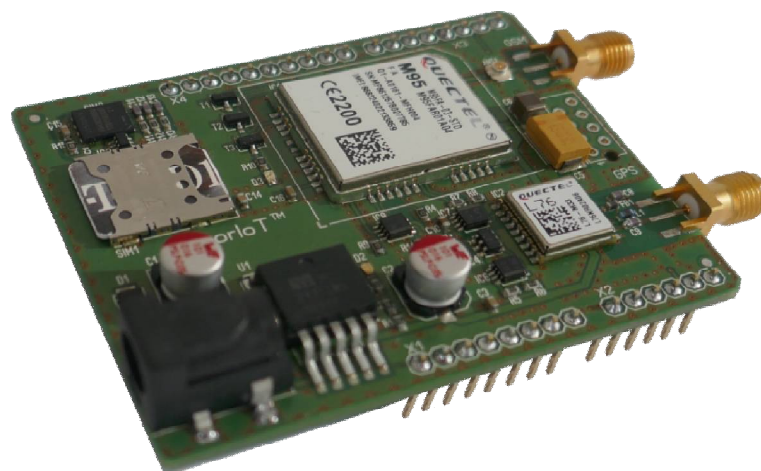


Fig.7. IoT Circuit

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4.6 FEATURES:

- Power Supply: DC +12v 1Amp.
- Auto data updating: 30sec
- Digital Output port Pins: +5V DC
- Message Format: *message or Data # (Start with * and End with #)
- Provided with 3 links
- Data updating to a specific web site
- Data updating to a social network

4.7 EMBEDDED C:

High-level language programming has long been in use for embedded-systems development. However, assembly programming still prevails, particularly for digital-signal processor (DSP) based systems. DSPs are often programmed in assembly language by programmers who know the processor architecture inside out. The key motivation for this practice is performance, despite the disadvantages of assembly programming when compared to high-level language programming. The most important, common arithmetic extension to DSP architectures is the handling of saturated fixed-point operations by the arithmetic unit. Fixed-point arithmetic can be implemented with little additional cost over integer arithmetic. Automatic saturation (or clipping) significantly reduces the number of control-flow instructions needed for checking overflow explicitly in the program. Changes in technological and economic requirements make it more expensive to continue programming DSPs in assembly. Staying with the mobile phone as an example, the signal-processing algorithms required become increasingly complex. Features such as stronger error correction and encryption must be added. Communication protocols become more sophisticated and require much more code to implement.

V. RESULTS

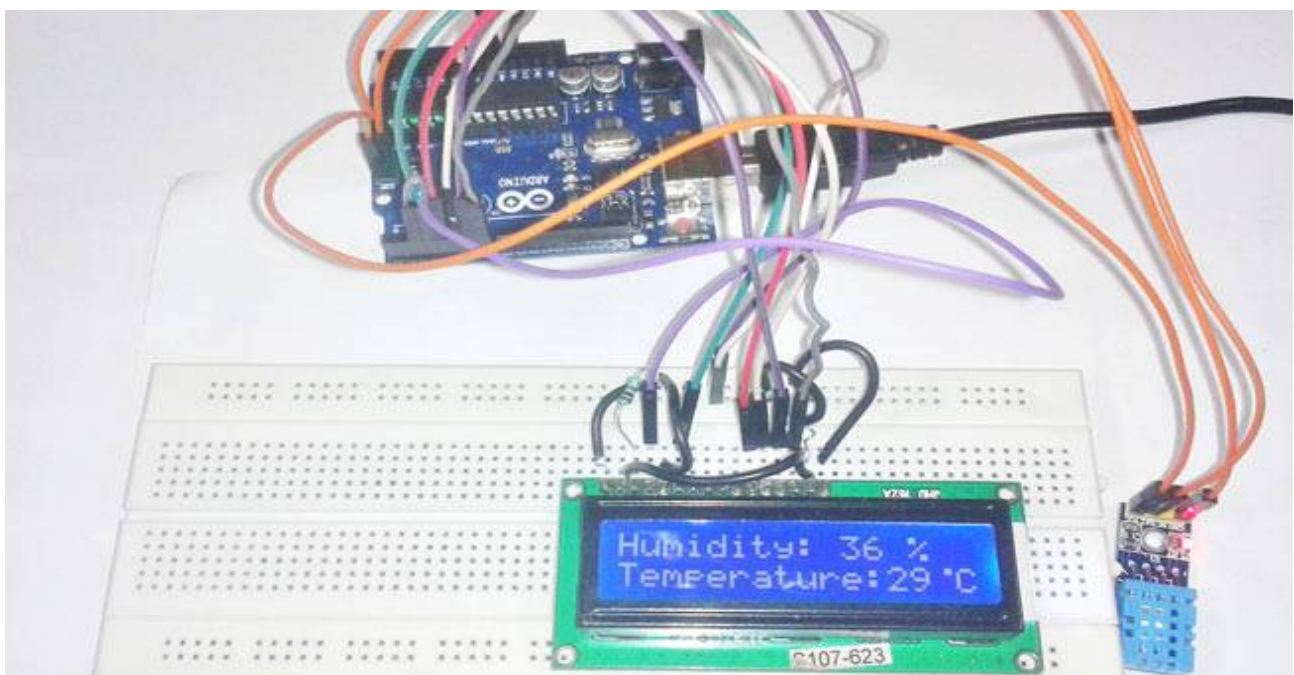


Fig.7. Temperature monitoring

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Temperature value will be displayed in the LCD monitor.

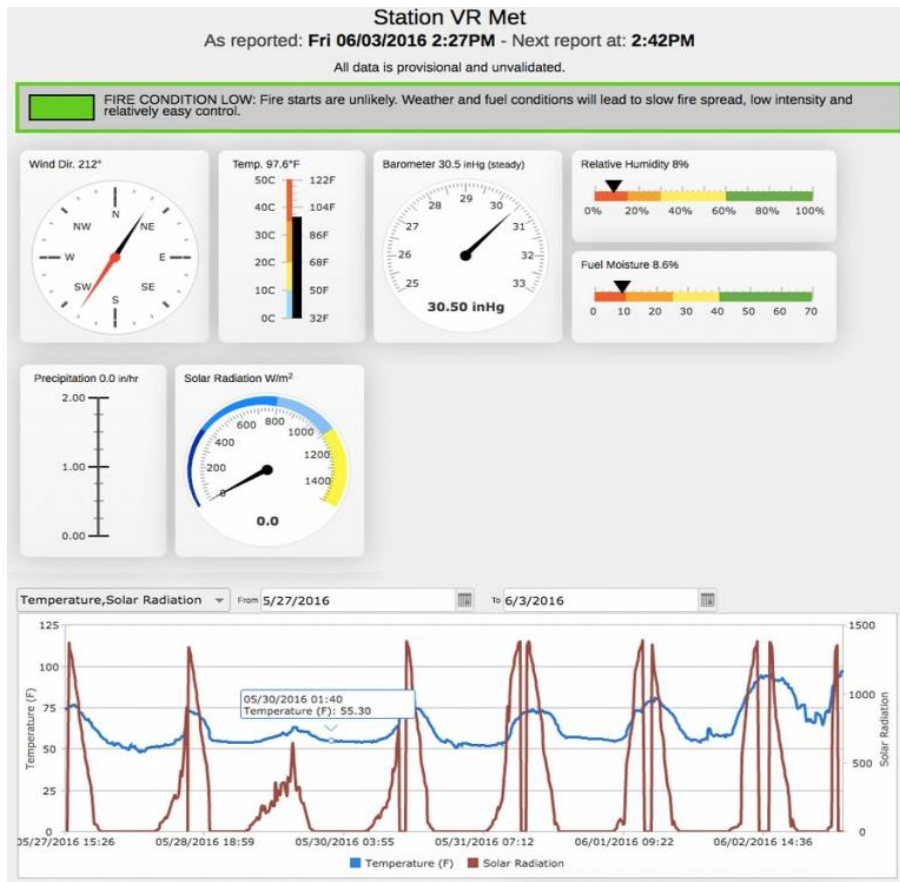


Fig.8. data updating system

Each and every minute the temperature value will be updated in the webserver.

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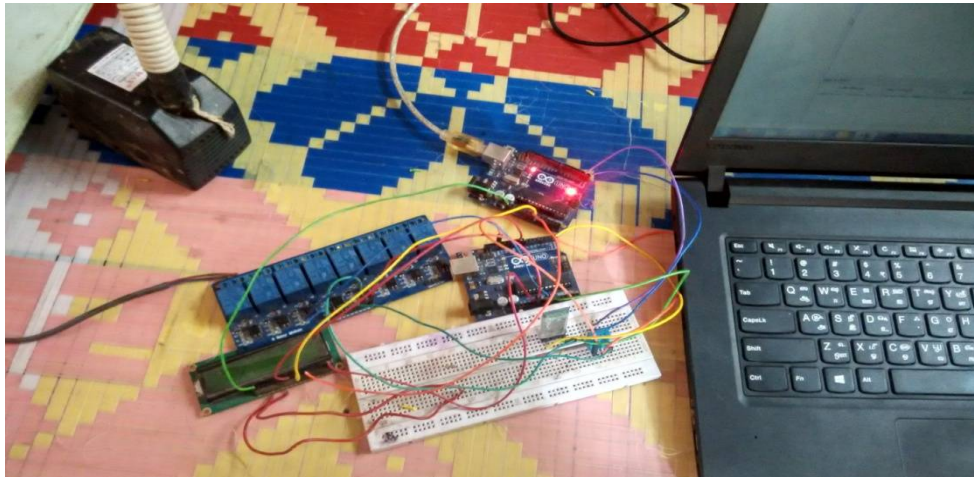


Fig.9. Activation of Alarm

When the temperature value is higher than room temperature then the alarm will be activated at first.



Fig.10.GSM Module

When temperature is high then the text message will be sent to fire station and police station.

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VI. CONCLUSION

Early warning and immediate response to a fire breakout are the only ways to avoid great losses and environmental and cultural heritage damages. The status of the fire safety system and other building systems can be monitored at any time and from anywhere via the Internet or wireless network. The fire safety systems located in many buildings will be controlled from one central facility office. This will increase the efficiency and reduce costs for building management operations, more efficiently discriminate between fire and non-fire threats and increase the time available for property and life protection. Hence, the most important goals in fire surveillance are quick and reliable detection and localization of the fire. It is much easier to suppress a fire when the starting location is known, and while it is in its early stages. Information about the progress of fire is also highly valuable for managing the fire during all its stages. Based on this information, the fire fighting staff can be guided on target to block the fire before it reaches cultural heritage sites and to suppress it quickly by utilizing the required fire fighting equipment and vehicles.

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