

Transformer Blaze Tracking Down and Reporting System

N.J Sangeetha*, M Radha**

Dept. of Information Technology, K.L.N. College of Engineering and Technology, Madurai, Tamil Nadu, India

Dept. of Information Technology, K.L.N. College of Engineering and Technology, Madurai, Tamil Nadu, India

ABSTRACT: In our country the production of transformers is very big issue. Once the transformer gets fired it may cause very big effects on the society. This project is about developing the fire alert system for transformer which is user friendly and automated system. The aim of the system IS designed to alert the distant property-authority efficiently and quickly by sending short messages (SMS) via GSM network. Fire sensor detects the fire in a transformer and smoke sensor MQ2 detects the smoke from the fire hazard. These sensors connected to the Arduino UNO kit. The combination of sensor is used to reduce the false alert. When the smoke and fire sensed by the sensor , immediately the GSM module sends alert SMS to the electricity board and turn on the CO2 fire extinguisher to switch off the fire.

KEYWORDS: Arduino UNO, Flame sensor, smoke sensor MQ2,GSM module,CO2 fire extinguisher.

I. INTRODUCTION

“Internet of Things (IoT)” is a scenario in which objects, animals and people are provided with unique identifiers and the ability to transfer data over a network without requiring human to human (or) human to computer interaction. Fire hazards occurring at power transformer and interconnecting transformer installations are the matter of serious concern. These installations are prone to fire because of several reasons such as internal faults, overheating, high order harmonics, failure of the dielectric, lightening etc. Moreover, such types of incidences may cause fatal or non-fatal accidents to human being or stray animals. A number of occasions, there is a sudden blasting of porcelain bushings. The pieces of porcelain are scattered in the switchyard with a velocity of the bullet and cause damage to the nearby equipment's in the switchyard. In many countries a large percentage of the power transformers in commission contain large quantities of mineral oil. While the probability of an explosive failure is low, it is not insignificant. Therefore, the potential for an oil spill and oil fire is a serious risk all owners and operators of power transformers must consider. To avoid this problem sensors are used to detect the transformer fire and GSM module is used to send the notification message to the corresponding recovery station.

II. EXISTING SYATEM

In the existing system, fire is detected within a building using the temperature detectors. Whenever the temperature crosses the threshold level or the fire is detected, fire extinguishing system will turn on. So the valve of the extinguisher is made to open and the CO2 gas is let out with great pressure to switch off the fire.

DRAWBACK

The fire is detected and switched off. The information about the fire is transmitted using Zigbee method.

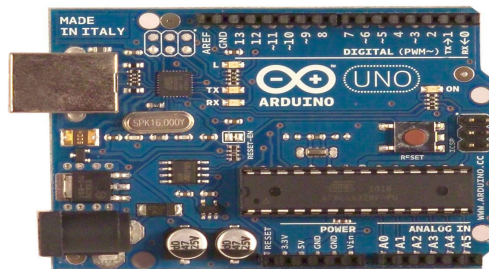
III. PROPOSED SYSTEM

To overcome the disadvantages in the existing, our project involves introducing a degree of computerized or automatic control for the transformer fire. We use GSM transformation technique to transfer the short alert message. GSM stands for Global System for Mobile Communication, it can send the message to any location and it covers a wide range of data. The fire extinguisher is controlled by arduino uno microcontroller and it provide the best production system for the transformer.

Micro controller	ATmega 328
Operating Voltage	5V
Input voltage(recommended)	7-12V
Input Voltage(limits)	6-20V
Digital I/O Pins	14(of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by Bootloader
DRAM	2 KB
EEPROM	1 KB
Clock Speed	16 Hz

IV. MICROCONTROLLER

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.



Fig[1]. Arduino uno board

V. FLAME SENSOR

This module is sensitive to the flame and radiation. It also can detect ordinary light source in the range of a wavelength 760nm-1100 nm. The detection distance is up to 100 cm. The Flame sensor can output digital or analog signal. It can be used as a flame alarm or in firefighting robots.

Description

- Detects a flame or a light source of a wavelength in the range of 760nm-1100 nm
- Detection distance: 20cm (4.8V) ~ 100cm (1V)
- Detection angle about 60 degrees, it is sensitive to the flame spectrum.
- Comparator chip LM393 makes module readings stable.
- Adjustable detection range.
- Operating voltage 3.3V-5V
- Digital and Analog Output

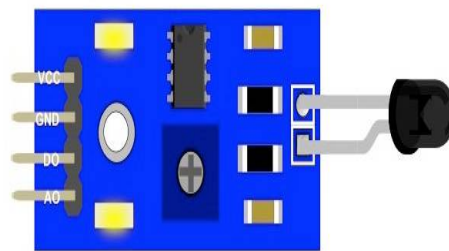
DO digital switch outputs (0 and 1)

AO analog voltage output

- Power indicator and digital switch output indicator

Interface Description (4-wire)

- 1) VCC -- 3.3V-5V voltage
- 2) GND -- GND
- 3) DO -- board digital output interface (0 and 1)
- 4) AO -- board analog output interface



Fig[2]. Flame Sensor

VI. MQ2 SMOKE SENSOR

The MQ-2 smoke sensor reports smoke by the voltage level that it outputs. The more smoke there is, the greater the voltage that it outputs. Conversely, the less smoke that it is exposed to, the less voltage it outputs. The MQ-2 also has a built-in potentiometer to adjust the sensitivity to smoke. By adjusting the potentiometer, you can change how sensitive it is to smoke, so it's a form of calibrating it to adjust how much voltage it will put out in relation to the smoke it is exposed to. The MQ-2 will be wired to an Arduino so that the Arduino can read the amount of voltage output by the sensor. This way, we will know that the sensor is detecting smoke.



- 1 = Output
- 2 = Vcc (positive voltage)
- 3 = Gnd

Fig[3]. MQ2 Smoke Sensor

VII. GSM SHIELD USING SIMCOMM (SIM900A)

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/1800MHz. The Modem is coming with RS232 interface, which allows you to connect PC as well as microcontroller with RS232 Chip(MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect

wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet act through simple AT commands.

Features

- Dual band GSM/GPRS 900/1800MHz.
- Configurable baud rate.
- SIM card holder.
- Built in network status LED.
- Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS.

POWER REQUIREMENTS

The board should be powered with an external power supply that can provide current between 700mA and 1000mA. Powering an Arduino and the GSM shield from a USB connection is not recommended, as USB cannot provide the required current when the modem is in heavy use. So instead of that use 12V adapter.

WIRE CONNECTIONS

- 9th pin of Arduino is connected to TX pin in GSM module.
- 10th Pin of Arduino is connected to RX pin of GSM Module.



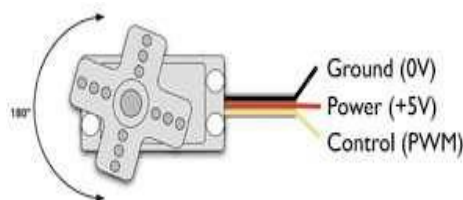
Fig[4].GSM Module

IX. SERVO MOTOR

Servo motors are used to change the position of the motor shaft at a specific position (angle) using control signal. The motor shaft will hold in this position as long as the control signal not changed. This is very useful for controlling robot arms, unmanned airplanes control surface or any object that you want it to move at certain angle and stay at its new position. Servo motors may be classified according to size or torque that it can with stand into mini, standard and giant servos. Usually mini and standard size servo motors can be powered by Arduino directly with no need to external power supply or driver. Usually servo motors comes with arms (metals or plastic) that is connected to the object required to move (see figure below to the right).

Wire connecting direct as following:

- Black wire: GND (ground)
- RED wire: +5v
- Colored wire: control signal



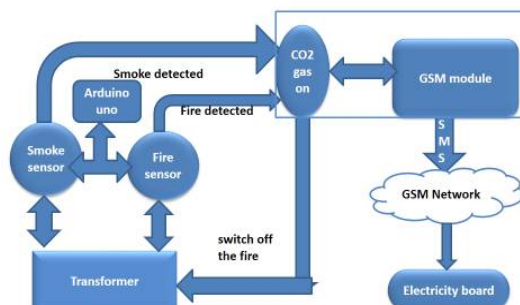
Fig[5].Servo Motor

X. ARCHITECTURE

The Architecture of Transformer blaze tracking down and reporting system is shown below in fig[6]. There are 2 sensors are used in this project to reduce the false alert. The flame sensor sense the fire and the MQ2 smoke sensor

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sense the smoke from the transformer. These two sensors are controlled by arduino uno module. Arduino is connected to the flame sensor by connecting GND to sensor GND, 5V power into VCC and analog input 4th pin into flame sensor's D0 pin with wires. Simultaneously the smoke sensor's A0 pin is connected to the analog A0 pin in Arduino. The communication technology used here is GSM. The connections to GSM can be made by connecting ground pin, RX pin to TX pin of the arduino and vice versa. The servo motor is used to switch on the CO2 fire extinguisher. The servo motor control pin is connected to the arduino's 8th analog input pin.



Fig[6].Architecture

XI. CONCLUSION

In this paper the designed system has wide area of application, especially in developing countries. Using this system, quick and reliable alert response is send to initiate preventive measures to avert danger of fire hazards and minimize losses of life and property. Once the system gets installed, no additional charges applied to the user other than the extinguishing CO2 gas that has to be refilled after use. By following this method, the electrical equipment damaging is reduced and also cost to replace the damaged equipment is also minimized. This process will be done without any human interaction.

XII.FUTURE SCOPE

This project can be further developed by integrating it with the internet to monitor every transformer. A unique ID is provided to each transformer which is also stored in cloud. By doing this, one can keep an eye on the transformer through on internet connected to the authorities mobile phone or PC or laptop. So, the authority can see the current status of the transformer.

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