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Industrial Explosion Control through Webpage

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Abstract: The paper describes the design and implementation of Industrial Explosion Control through Webpage. Fire extinguishers play a crucial role in protecting the environment due to their proven ability to fight fires while they are at their very early stages. The availability of accessible and working fire extinguishers assures that the highest possible percentage of fires will be controlled with the minimal environmental impact possible. Replacing the inefficient and carbon-intensive manual extinguisher inspection methodology with electronically monitored extinguishers will have significant positive impacts on the environment. Hence we propose an SMS based Fire indication system which will be very useful in remote locations where human interaction is limited. Such systems are useful in mines, industrial areas, factories etc. So SMS based Fire indication system helps to monitor locations and alert during fire that occurs in night time. Generally 90% of fire damages occur due to lack of early fire detection. A fire attack is usually silent and people will know about fire only when it has spread across a large area. SMS based Fire indication system gives warning immediately to multiple mobile numbers and hence remedy actions can be taken quickly. This helps to prevent major damages and losses created by a fire accident. After getting the SMS through GSM and the machine can be controlled using the Webpage developed. In this paper we have taken a DC motor as prototype for Industrial machines. Fire detector sensor, Motor driver IC, GSM modules are used in the working prototype.

Keywords: ATMEGA 8, Industrial explosion, Control through Webpage, GSM Module.

I. INTRODUCTION

The sensors connected in the industrial area will detect the fire when occurred. Then the sensors will send information to ATMEGA 8.Then it will intimate to GSM module to send SMS to loaded mobile number. Then the operator can control the machines and can also switch on the fire extinguishers. Here ATMEGA 8 is brain of whole prototype. GSM module is useful for sending SMS and for also receiving signals from webpage database. In this paper, firstly related work is explained followed by hardware design and software design. Experimental results and conclusion is explained in the end of this paper.

II. RELATED WORK

A. Existing Method

Earlier many prototypes were proposed to detect fire in Industrial areas. IN those proposed methods the detection is done by the fire sensors.

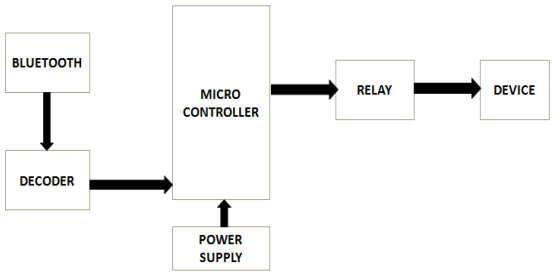

Fig.1. Block diagram of Existing Method

If the fire sensors detect the fire then they only either intimate the water sprinkling system or sound an alarm. The main disadvantages of these kind are if the Industry is in remote area no one will know. Then some advanced alerting systems are introduced they need Internet access. So to overcome those drawbacks we proposed the following method which consists of GSM module to overcome network related issues.

B. Proposed Method

The Automated fire extinguishing system that we made is more realistic in its structure, cost, and activities .This system is more feasible than other system that is being used in present time. Besides it has low production cost than other and it has the capability in extinguishing the fire at root level so that we can reduce the losses. At present, we can see that, the materials that are used as extinguisher are very expensive like carbon-dioxide, vaporizing liquid, wet material etc. Besides we cannot use all materials as an extinguisher. Because it depends on fire what materials should be used in proper place? In this sense, our system is viable and time consuming also.

The fire detector stage uses a thermistor to monitor the room temperature. The thermistor is a solid state device that has its resistance changing with temperature. The resistance change with temperature is nonlinear, and therefore temperature must be calibrated with respect to resistance. The thermistor resistance decrease with

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increase in temperature and this would cause a decrease in the voltage input to the non-inverting input of the comparator thereby causing the voltage reference set at the inverting input to be greater. In this state the comparator outputs a LOW, to indicate high temperature (i.e. fire). But when the temperature in the room is normal, the input voltage at the non-inverting input of the comparator is greater than the voltage at the inverting input and thus, the comparator outputs a HIGH.

Microcontroller can be interfaced with many different input and output devices. Basic codes are provided for the microcontroller which requires programming in an assembly language code

III. HARDWARE IMPLEMENTATION

The hardware implementation of Industrial Explosion control through Webpage consists of ATMEGA 8 micro controller, DC motor M9150728-2, Motor Driver IC L 293D, Relay and GSM Module. The block diagram of proposed method is shown in fig.2.

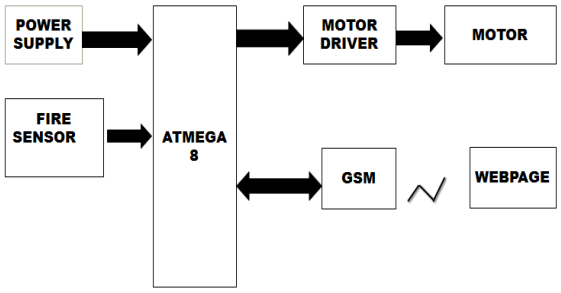

Fig2 Proposed Method Block diagram

A. ATMEGA 8 Micro Controller

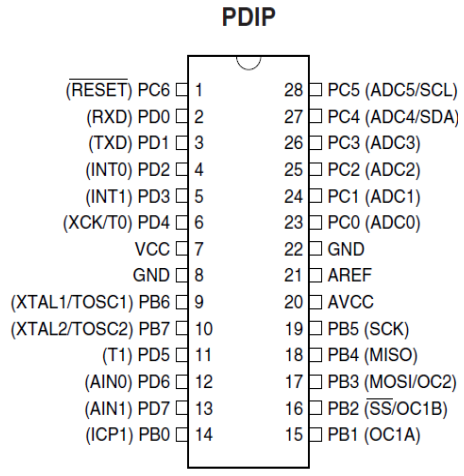

Fig.3. Pin diagram of Atmega8 Microcontroller

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega8 provides the following features: 8K bytes of In-System Programmable Flash with Read-While-Write capabilities, 512 bytes of EEPROM, 1K byte of SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte oriented Two wire Serial Interface, a 6-channelADC (eight channel in TQFP and QFN/MLF packages) with 10-bit accuracy, a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM; Timer/Counters, SPI port, and interrupt system to continue functioning. The Power down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next Interrupt or Hardware Reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption.

B. DC Motor (M9150728-2)

An electric motor is an electromechanical device that converts electrical energy into mechanical energy.

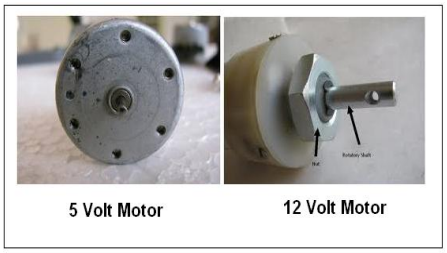

Fig 4 DC motor

Most electric motors operate through the interaction of magnetic fields and current-carrying conductors to generate force. The reverse process, producing electrical energy from mechanical energy, is done by generators such as an alternator or a dynamo; some electric motors can also be used as generators, for example, a traction motor on a vehicle may perform both tasks. Electric motors and generators are commonly referred to as electric machines. Electric motors are found in applications as diverse as industrial fans, blowers and pumps, machine tools, household appliances, power tools, and disk drives.

C. Motor Driver IC (L 293D)

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they

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take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

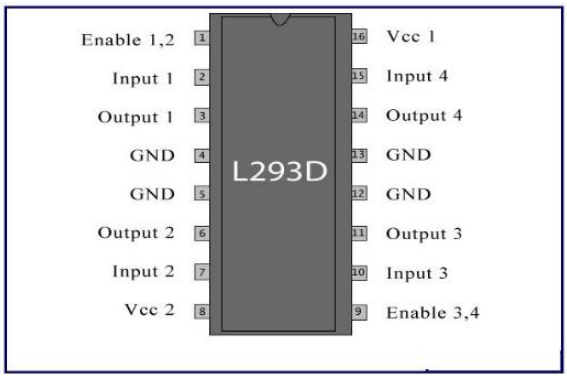

Fig.5. Pin Description of IC L293D

D. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

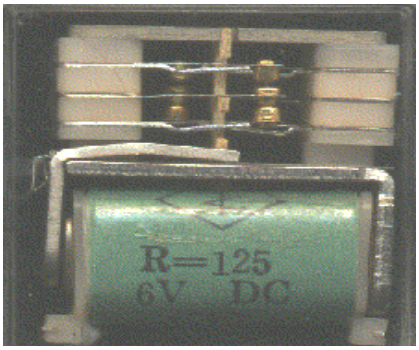

Fig.6. Image of a Relay

E. GSM MODULE

Global System for Mobile communication (GSM) is a standard for digital communication. GSM uses the Time Division Multiple Access (TDMA). The switching system is responsible for performance call processing and subscriber-related functions. The concept of cellular service is the use of low - power transmitters where frequencies can be reused within a geographic area is shown in figure.

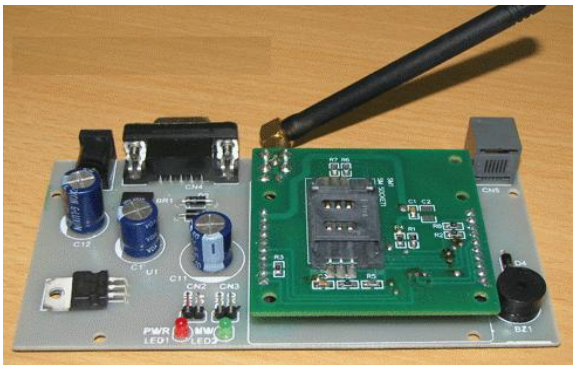

Fig.7. GSM Network Module

IV. SOFTWARE IMPLEMENTATION

A. Webpage

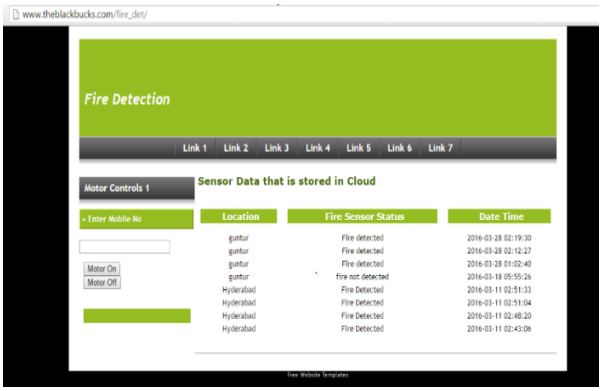

Fig.8. Webpage

B. AVR Studio

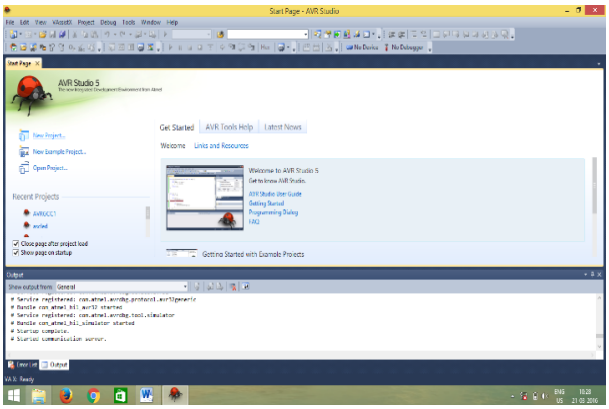

Fig.9. AVR studio

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C. PROGISP

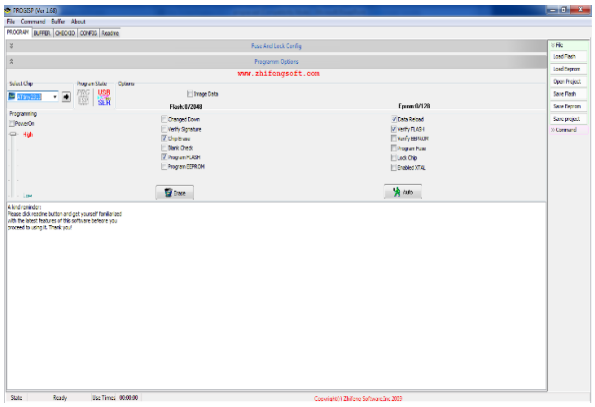
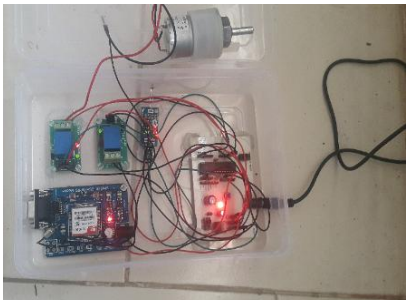


Fig.10.PROGISP

V. EXPERIMENTAL RESULTS



The responses of different modules when any fire explosion is detected i.e. the sensor output enables and sends the alert to the GSM module through micro controller. Fire detected is received when fire is sensed and then controlling of motor ON/OFF is handled as? MOON$ and? MOOF$ respectively.
Similarly the operation of motor is also accessible through the webpage we developed. So the owner can handle the webpage by entering the specified mobile number through the appropriate URL and can ON/OFF the motor.

VI. CONCLUSION

We know fire accidents results in both human loss and property loss. Although smoke detectors and fire alarms alert people of danger, they often have few choices other than escaping from a building and calling the fire department. Using modern fire extinguisher is not so easy and only a professional user can use it. So using a fire extinguisher is not at all suitable at every time. Even a major damage can occur at factories and mines. For this purpose automated fire-fighting system will be the best choice through which handling of fatal accidents can be improved

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