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Development of Electronic Smoke Detector for Health Care

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Abstract: In this paper electronic smoke detecting for activation of alarm is proposed. Analysis and calibration of MQ2 smoke sensor is done using visual warnings through LED to indicate smoke detection and audio warnings or buzzer to indicate the presence of smoke. This work is effectively useful in research and development area as well as it can be used in army band civil areas. It can be replaced too many costly types of equipment. Proposed circuit is eco-friendly because it does not harm the environment.

Keywords: Health Monitoring; Electronic Smoke Detector; Mq2g; Datamining

I. INTRODUCTION

Home fire detection is a matter of great concern, and thus many efforts are devoted in most developed countries to the design of automatic detection systems [1-2]. A fire alarm system should reliably and in a timely way notify building occupants about the presence of fire indicators, such as smoke or high temperatures. A fire detector is usually implemented as a smoke sensor [3–5] due to its early fire detection capability, fast response time and relatively low cost. Other options for the fire detection are based on gas sensors [6-7] or temperature sensors. A smoke alarm is a device that senses smoke, typically as an indicator of fire. It may issue a signal to a fire alarm control panel as part of fire alarm system, especially in commercial security devices or may issue a local audible or visual alarm in the household. Fire detection has become a crucial aspect in design of buildings, both commercial and domestic, as opposed to about 70 years ago when automatic detection was rarely provided in buildings. Before introduction of smoke and fire alarms, fires resulted in the loss of human lives and damage of property and it was mainly attributed to lack of a mechanism for early detection of fire [8-10].

II. PROPOSED ARCHITECTURE

Smoke detectors are amazing devices as they are small, cheap yet very useful. In this project, we implemented a simple smoke detector circuit with adjustable sensitivity. A smoke sensor MQ-2 as the main sensory device.LM358 acts as comparator in the circuit. The inverting terminal of LM358 is connected to POT so that the sensitivity of the circuit can be adjusted. The output of LM358 is given to an LED as an indicator although a buzzer can be used as an alarm. The non inverting terminal of LM358 is connected with output of smoke sensor. Initially, when the air is clean, the conductivity between the electrodes is less, as the resistance is in the order of 50kΩ. The inverting terminal input of comparator is higher than the non inverting terminal output. The indicator LED is off. In the event of fire, when the sensor is filled with smoke, the resistance of the sensor falls to 50kΩ and the conductivity between the electrodes increases. This provides a higher input at the non inverting terminal of comparator than the inverting terminal and the output of comparator is high. The alarming BUZZER is turned ON as an indication of the presence of smoke.

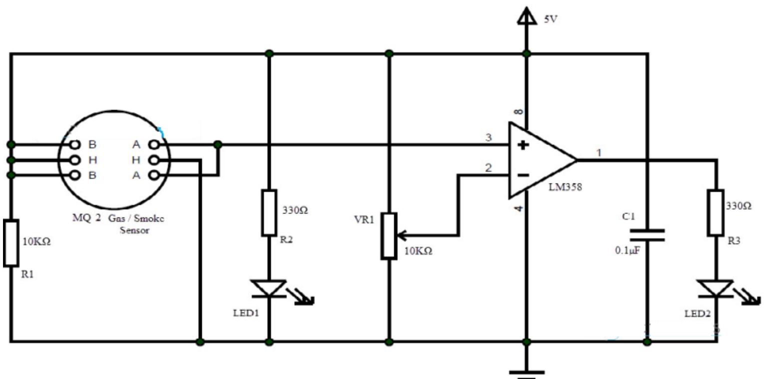

Fig 1: Proposed Electronic Smoke Detector

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Fig shows the layout of the silicon on the chip in case of CPU and GPU. It can be seen that most of the silicon area in GPU is devoted for ALU, shown as small green boxes, while in CPU most of this area is devoted for control and cache. We can see that a GPU provides an economical supercomputing platform for masses! Though there are certain problems such as cache coherence problem. But various solutions have been proposed to solve it [5].

Obviously our algorithm should have parallelism to exploit such computational power. This can be understood from the Algorithm-Hardware Matching perspective as shown in Fig 2.

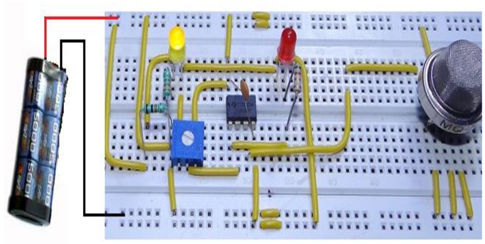

Fig 2: Experimental Electronic Smoke Detector

It can be seen that in 2(B) and 2(C), the algorithm's pattern and hardware layout is not matching perfectly; therefore we cannot expect much performance gain. But in 2(A) both are matching 100%. This situation is the most favorable from performance point of view. The situation in 2(B) is worst because algorithm and hardware are orthogonal to each other. In simple words we can say, for example, that in the algorithms, when an addition is about to be done, the adder unit is not available in hardware; instead a floating point unit is free. But when in algorithm a floating point calculation is required, the floating point unit is not available (or occupied), instead the adder is available. This is an orthogonal situation we mentioned earlier. The Algorithm presented below discusses more on such issue and data flow.

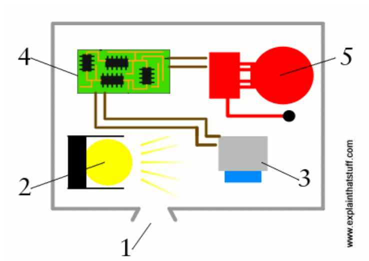

Fig 3: electronic smoke detector

Table:- Description of LM358 used in Smoke Detector

Pin Number	Pin Name	Description
1	OUTPUT1	Output of Op-Amp 1
2	INPUT1-	Inverting Input of Op-Amp 1
3	INPUT1+	Non-Inverting Input of Op-Amp 1
4	V_{EE}, GND	Ground or Negative Supply Voltage
5	INPUT2+	Non-Inverting Input of Op-Amp 2
6	INPUT2-	Inverting Input of Op-Amp 2
7	OUTPUT2	Output of Op-Amp 2
8	V_{CC}	Positive Supply Voltage

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III. CONCLUSION

This work is effectively useful in research and development area as well as it can be used in army band civil areas. It can be replaced too many costly types of equipment. Proposed circuit is eco-friendly because it does not harm the environment. It is less complicated than others, so analysis and replacement of components is easy.

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