UNIQUE INSTRUMENTATION SYSTEM EARTHQUAKE PREDECTION

Dr. Dinesh V Kala
Dept. of Physics, G.N.Khalsa College Autonomous
Mumbai-19
kaladc10964@ gmail.com

Abstract: **Variations in the physical parameters of nature such as temperature, pressure, relative humidity, E-flux of ionosphere, earth's magnetic field, gravitational field etc. either natural or man-made has led to natural calamities. An extensive study based on these parameters is now possible in a very simplified way using the interfacing technique. The research work presented hereis based on such an electronic instrumentation developed for precise detection of physical parameters and to send an alarm in the form of audio/visual forms when the parameters exceed critical thresholds. Microcontroller based instrumentation is a cost effective hardware-cum-software frame work for monitoring the output of the eight sensors. The kit consists of 89C51 microcontroller and is reprogrammable. The instrumentation setup is intended to work on the basic principles of physics and electronics. This is the first time that such instrumentation has been interfaced with the circuitry developed for monitoring the output parameters of the sensors / transducer. Almost all natural calamities send their signature well before they do destruction. Our aim is to pick up these signatures as and when they occur and send an appropriate warning signal to the people so that a lot of lives can be saved. However it is observed that variation in few physical parameters is common to many natural calamities. So it is necessary to study which appropriate (best eight) parameters change predominantly and in case; any five of them exceeds a certain threshold then the alarm should be activated. Monitoring many parameters at a time would avoid false alarming, for example the nature of the wave generated in the earth's interior during an earthquake and a nuclear explosion is almost the same, the sensor should not alarm for earthquake when there is nuclear explosion and so on. Similarly the sudden change in the temperature of water in the interior of the earth can be caused by the seismic waves or may occur due to some natural hot spring. Therefore an alarm should not be sent if water gets** heated **up because of some other reasons. The variation of ionization of ionosphere and hence the variation in humidity takes**

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place before earthquake as well as during thunder, again the false alarm of earthquake should not be given when it simply thunders. To summarize, if eight dominating parameters are finalized and if any five of them cross the threshold; there should be a strong alarm.

Keywords-microcontroller, signal conditioning circuit, sensors, seismic waves, environmental energy parameters.

Introduction: This is the first time that such instrumentation has been interfaced with the circuitry developed for monitoring the output parameters of the sensors / transducer. Incidentally these are the very parameters which are understood to develop weeks before the advent of an earthquake. **Almost all natural calamities send their signature well before they do destruction**. Our aim is to pick up these signatures as and when they occur ; analyze them and if the value exceed a certain predetermined threshold; send an appropriate warning signal to the people so that a lot of lives can be saved. However it is observed that variation in few physical parameters is common to many natural calamities. **So it is necessary to study which appropriate (best eight) parameters change predominantly and in case; any five of them exceeds a certain threshold then the alarm should be activated.**

Monitoring many parameters at a time would avoid false alarming, for example the nature of the wave generated in the earth's interior during an earthquake and a nuclear explosion is almost the same, **the sensor should not alarm for earthquake when there is nuclear explosion.** Similarly the sudden change in the temperature of water in the interior of the earth can be caused by the seismic waves or may occur due to some natural hot spring. **Therefore an alarm should not be sent if water gets heated up because of some other reasons.** The variation of ionization of ionosphere and hence the variation in humidity takes place before earthquake as well as during thunder, again **the false alarm of earthquake should not be given when it simply thunders.** To summarize, if eight dominating parameters are finalized and if any five of them cross the threshold; there should be a strong alarm. [3] [4]

Experimental technique: This is possible by putting the microcontroller its optimum functionalities. As one eight bit port of the microcontroller can be dedicated for the eight channel ADC, thus many sensors can be responding at the same time and the thresholds of all the sensors can be monitored and a strong alarm can be sent as and when the predefined conditions are satisfied. **This is the first time that such an Instrumentation system using equipment based on Microcontroller has**

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been interfaced with the circuitry developed for monitoring the output parameters of the eight sensors/transducers. The 89C51 is a low-power, high- performance CMOS 8-bit microcomputer with 4 Kbytes of Flash Programmable and Erasable Read Only Memory (PEROM). Once the interfacing hardware and software are in place we can connect the Sensor elements to it and take the measurements. Voltages must be maintained within 0-5 volts. [5] [6]

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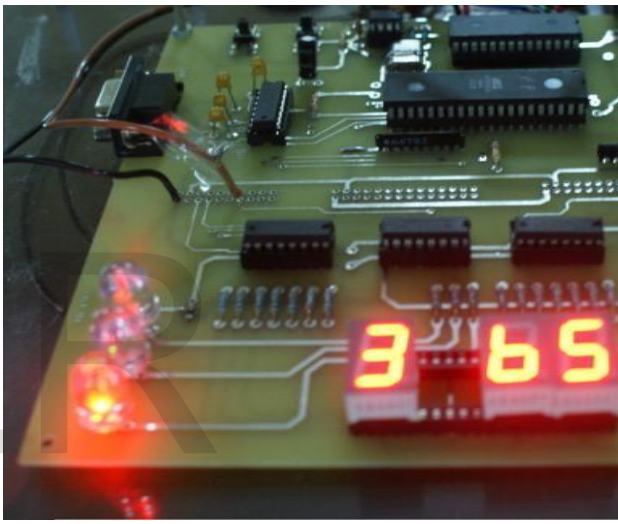
Experimental setup: The instrumentation can monitor eight channels (Sensors) at a time. **An arrangement is made to display the channel (Sensor) number and the equivalent number corresponding to the voltage available at the channel.** Maximum display of 99 is divided into three parts namely 33, 66 and 99. **The GREEN LED glows till the voltage at the sensor do not exceed the corresponding value of 33 on the display. While the display is between 33 and 66 the ORANGE LED glows and the RED LED comes ON and glows when the corresponding voltage reaches the voltage corresponding to 66 to 99.** Glowing of Red LED indicates that the physical parameter has exceeded certain predefined critical value and is basically connected to a warning system. This monitoring is possible for all the eight channels. The channel selection is made possible in a rotating manner. All the channels are monitored almost simultaneously (actually sequentially) but one channel at a time can be displayed depending on the parameter to be monitored. **However the most interesting part of the software is the continuous monitoring of all the eight signals (channels) and the moment any five of these eight signals exceed the value corresponding to the display of 66 (i.e five signals exceed the critical threshold simultaneously) the sound alarm is activated. The sounding of alarm is an indication of the gravity of the real dangerous situation and hence the preventive measures can then be taken and the people should be advised to evacuate the place to save their life and loss of movable property. These variations appear as FINGER PRINTS AT LEAST 10-15 days before the occurrence of earthquake). [6] [7] [8]**



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