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Flue Gas Analyser

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Abstract: ***The flue gas monitoring plays a vital role in thermal power plants as these emissions contribute to the majority of air pollution and global warming. This project proposed to measure concentration method for flue gas of multiple fuels such as natural gas, coal, oil etc based on NDIR & Electrochemical Sensors. Efficiency of power plants becomes more important due to the demand for cost-efficient energy production & tightening environmental regulations. The main objective of the project is to increase the performance of the plant and to protect the environment, thereby giving a pollution free environment for the future generation. The Flue Gas Analyzer measures the amount of Oxygen, combustible gases such as Carbon Monoxide, Carbon Dioxide, Nitrogen Oxides and Sulfoxides in the flue with the help of electrochemical Sensors. The measured values of flue gases that are displayed are then compared with their permissible limits***

Keywords: Flue Gas Analyser, NDIR, Air Pollution, Emission.

I. INTRODUCTION

Effects of air pollution are alarming, and are creating several problems such as respiratory, heart conditions, cancer and other threats to the life, one more direct effect is immediate alterations in the climate that world is witnessing due to global warming. Ozone exists in earth's stratosphere and is responsible for protecting life from harmful ultraviolet (UV) rays.

Flue gases in boiler contain emissions which are not acceptable for environment and health, such as CO, CO2, HC, NOx and SOx etc. Industries produce and discharge their own type of pollutants, resulting in air pollution and noise pollution.

Pollution control board has been paying attention towards controlling the pollution to protect the environment, in terms of reducing industrial emissions and management of risk in chemical use and handling dangerous waste. Nowadays, pollution control boards are very stringent controls over pollution management. Recent practices to control pollution are that to treatment of end pipe.

As the effects from air pollution are becoming very crucial because of burning of fuels in a non- proper way and over usage of fuels to meet the requirements of human and every life on the planet. The burning of fossil fuels became necessary for human in the planet especially in automobiles. The fossil fuel is itself burned to extract fossil fuel from the Earth and decomposed into various by products.

II. PROPOSED SYSTEM

The proposed project is used to measure concentration of flue gas different fuels such as natural gas, coal, oil etc based on NDIR & Electrochemical Sensors. There by understanding the all effects of air pollution, it becomes essential to measure the amounts of pollutants gases released by various sources such as industries, automobiles and to restrict the emission under the stipulated values Main objective of flue gas analyser measures the amount of Oxygen, combustible gases such as Carbon Monoxide, Carbon Dioxide hydrocarbon and etc, in the flue with the help of electrochemical Sensors. The measured values of flue gases that are displayed are then compared with their permissible limits. Power plants efficiency and health becomes more important because of demand in cost-efficient energy production & very strict environmental regulations

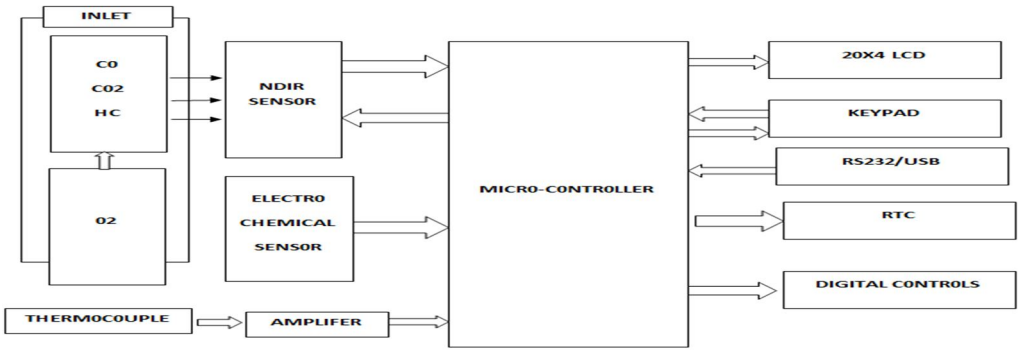


Fig 1: Block diagram of proposed system

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A. NDIR and Eletrochemical Sensors

The NDIR sensor used is capable of measuring CO, CO2 and HC. It has optional USB port and RS232 which are compatible with windows environment.

The electrochemical sensors used in this project is used to measure O2.

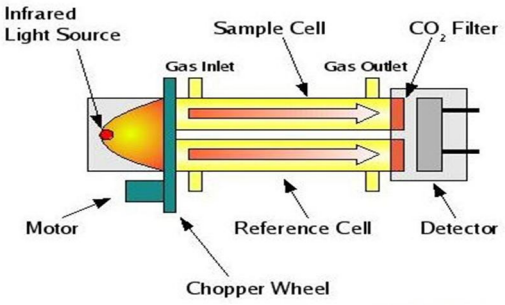


Fig 2: NDIR(Non Dispersive Infra-Red) Sensor

B. Thermocouple

The thermocouple used is the J- Type thermocouple, which has two terminals, as one is positive and the other is reference. Those metal terminals are soldered at one end where it measures the temperature and increases the voltage in terms of microvolts. Based on the voltage output and iterations are made to read the voltage and convert it to temperature using calculations.

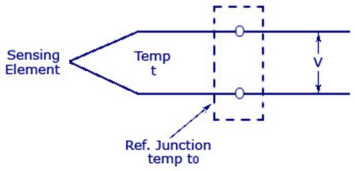


Fig 3: J-type Thermocouple

Temperature Range of J-type Thermocouple is from -210 to 760 C, but has few disadvantages, like the durability is quite less compared k type thermocouple but because of low cost of J type thermocouple and higher temperature range it is in the field of temperature measurement.

III. SOFTWARE REQUIREMENTS

A. Proteus

Proteus is a tool to simulate the circuit, the complete program can be developed and simulated using Proteus software, all microcontrollers, transistors and all types of components are available and they can be rigged up and checked.

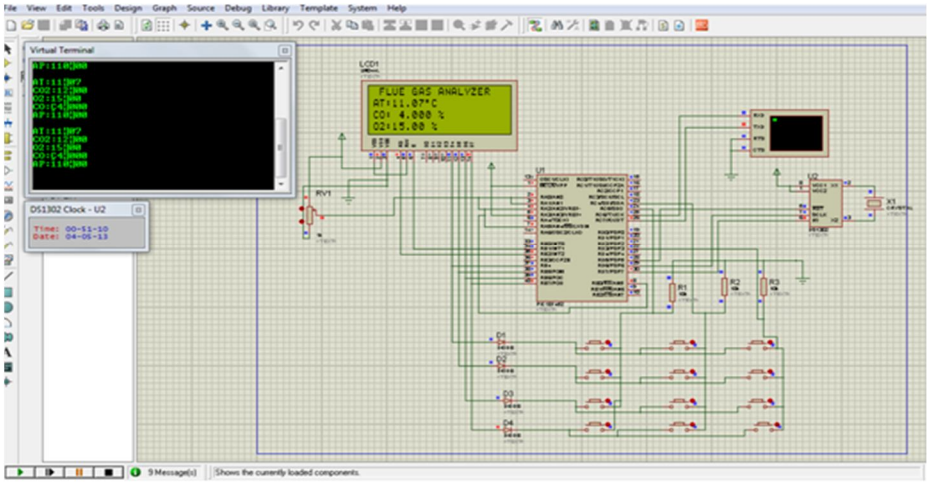


Fig 4: Proteus, a simulated output to verify the program with simulation

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IV. CONCLUSION

The flue gas analyser has been developed to measure the flue gases such as Oxygen, Carbon Monoxide, Carbon dioxide, Nitrogen oxides, Sulphur oxides and Temperature with the reference of oxygen. This instrument will be a ready fruit for the pollution control board to create awareness to the industries with modern technology where the plant health is monitored in a proper manner to save environment from toxic gases.

In the proposed system, we have employed the use of electrochemical sensors to measure the various gases using a PIC Microcontroller. It overcomes the drawback in the existing systems which use NDIR sensors. Measurement of the various flue outputs from the outlets of industries in terms of its concentration helps to limit exhaust of various unwanted gases into the atmosphere and thereby achieve a pollution free environment. Another important use of Flue Gas Analyzer is that it helps the industries to keep track of the combustion rates.

Flue gas analyser monitors properly the health of plant, when it crosses the set limits means it will give alarm and further if the management not taken care means it will shuts off the plant intelligently using program.

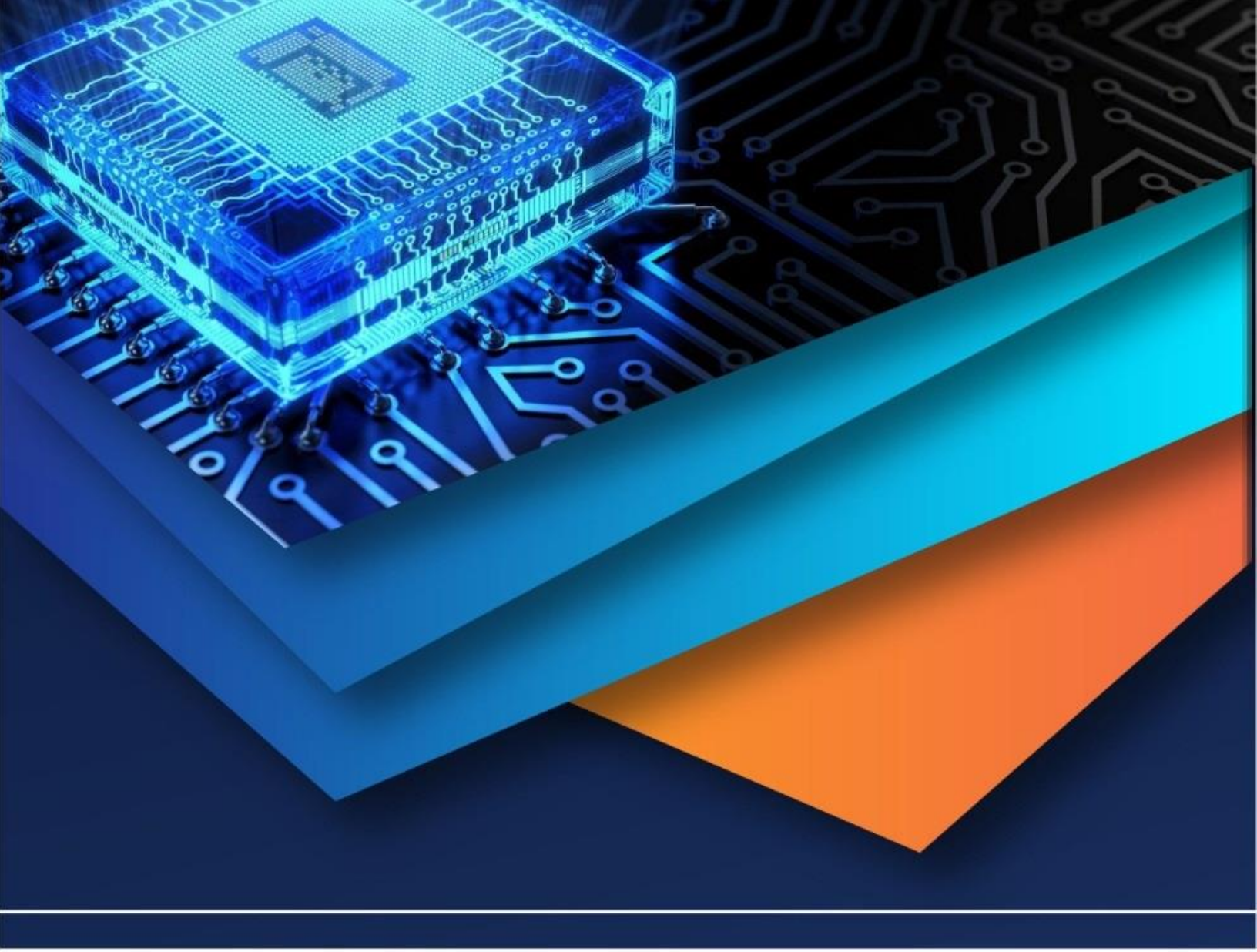
V. FUTURE SCOPE

The designed module is a prototype of a flue gas analyser, which can be further advanced to detect a large number of gases using a better set of sensors. The design can also be enhanced to simultaneously detect the emission of gases from automobiles and research engines. The flue gas analyser now can be see the readings over the world but we cannot communicate to the analyser. But in future using internet on things we can communicate in two ways using a set of encryptions proper.

REFERENCE

[1] Nikula, R.-P. Juuso, E. Leiviska, Desulphurization Plant Monitoring and Fault Detection Using Principal Component Analysis, IEEE, 2013
[2] Chikere, A.O. Alkayiem, H.H. ; Karim, Z.A.A, Thermal field study and analysis in hybrid solar flue gas chimney power plant, IEEE, 2011
[3] Larichkin, J.S. Luchinkin, N. Gorev, Methods of increasing efficiency of flue gas cleaning at thermal power stations equipped with ventury scrubbers, IEEE, 2007.
[4] W. Tsujita, S. Kaneko, T. Ueda, H. Ishida, and T. Moriizumi, Sensor-based air-pollution measurement system for environmental monitoring network, IEEE, 2003.

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