AIR QUALITY MONITORING SYSTEM USING FPGA

(BACK END)

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ABSTRACT

This paper is about the development of Air Quality Monitoring System using FPGA. This system is developed in order to monitor air pollution at our country. This system consists of software and hardware part. For the software part, the Graphical User Interface (GUI) is developed using JAVA tools as a medium to activate the sensor through the Field Programmable Gate Array (FPGA) Quartus II Board and the output data from the sensors will be displayed at PC. For the hardware part, a circuit consists temperature and humidity sensors are activated and processed by the program written in VHDL and implemented in Altera Cyclone II FPGA. The GUI menu, the FPGA and the sensors circuit are connected together to develop the complete system of the air quality monitoring system.

KEYWORDS: Graphical User Interface, JAVA, Field Programmable Gate Array (FPGA), Air Quality Monitoring System.

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CHAPTER1

INTRODUCTION

1.1 Project Overview

Human health and environment can be harmed by air pollution in any country. The pollutants can be gases such carbon monoxide (CO), nitrogen dioxide (NiO_2), sulphur dioxide (SO_2) , lead (Pb), and nitrogen monoxide (NOx) which are emitted into the atmosphere from industrial emissions, transportation, mining operations, thermal power generation plants and waste incinerators. It impairs respiratory functions and can also reduce atmospheric visibility. Pb from fuel burning affects the circulatory, nervous and reproductive systems, and reduces the learning ability of children. CO is emitted into the atmosphere through fuel burning and affects people with circulatory and anaemic problems. SO2 is emitted into the atmosphere by oil and gas industries, energy production, coal burning, industrial combustion and industrial processes. High levels of SO2, not only causes acid rain, it also exacerbates asthma and bronchitis and impairs the lungs. NOx emission is a result of transport, power generation and industrial combustion. It causes lung damage and raises the incidence of many respiratory diseases.

Any significant changes in the ambient air quality status have to be monitored continuously and manually as implemented by the Department of Environmental in our country. The Department of Environment (DOE) monitors the country's ambient air quality through a network of 51 stations that are strategically located in residential, traffic and industrial [1]. However, the system, that they have, does not provide an instant analysis where the measurement obtained now is manually collected and delivered to a laboratory for analysis and it is obtained monthly from Alam Sekitar Malaysia Sdn Bhd (ASMA)[2]. Furthermore, people are not aware of the changes in air quality unless they have been informed about it. They just know about the air pollution and API index but they do not know the composition of gases in the air. People who have severe allergy