

Automatic Air Pollution Control And Alert To Pollution Control Board

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Abstract- Every vehicle has its own emission of gases, but the problem occurs when the emission is beyond the standardized values. The primary reason for this breach of emission level being the incomplete combustion of fuel supplied to the engine which is due to the improper maintenance of vehicles. This emission from vehicles cannot be completely avoided, but it definitely can be controlled. The aim of the paper is to monitor and control the pollutants in the vehicle by using the pollution control circuit. This pollution control circuit consists of various sensors like smoke sensor, temperature sensor and GSM, GPS kind of devices, and all of them are integrated and connected to a Controller. It is a real time work where a demo application has been made in which a Aurdino UNO Microprocessor is used and a controller board is made where all these devices get integrated and work accordingly. The vehicle is controlled by this circuit. When a vehicle attains certain threshold pollution level then the engine gets automatically switched off and an SMS is generated and sent to the pre-defined number stored in the memory through the GSM module. The GPS module is used to locate the vehicle position where it is halted. This paper demonstrates an effective utilization of technology by which we save our environment by controlling the pollution of vehicles. This paper is developed to detect the level of air pollution and control the pollution level in a restricted area by activating an air purifier as the level exceeds a threshold limit. It will show the air quality in PPM on the LCD so that we can monitor it very easily.

Keywords- GSM, Pollution, Aurdino, Pollution control unit, UNO Microprocessor

I. INTRODUCTION

The world is changing. Rising world population, declining resources and changing climate are reshaping where we live and how we live. The damage done to the current environmental condition of our planet is quite noticeable. There is limited availability of freshwater, amount of food which can be produced and other natural resources. There is convincing evidence that the current rate at which the resources are depleting is unsustainable. Major fisheries have been depleted by around 70% or are at their biological limit.

Forest cover has been reduced by around 50% worldwide; 50% of the wetlands and more than 90% of the grassland have been lost. Around 40% of world population is experiencing water shortages.

Currently, the four major environmental concerns in the world are

- Water quality & quantity
- Depletion of fossil fuel
- Climate change resulting from the use of fossil fuel

Population growth eventually exceeding earths holding capacity

The Inclusive Wealth Index (IWI) is an index which looks beyond the traditional index for development of the nations such as Gross Domestic Product (GDP) and Human Development Index (HDI). IWI evaluates countries development by considering use of natural and capital resources over a period. IWI takes a more holistic approach and shows the true state of the nation's wealth and sustainability of its growth. The assessment shows that despite having robust growth in countries like Brazil, China, South Africa and United States in terms of GDP, they have significantly depleted their natural resources. Over the period of 19 years from 1990- 2008, the natural resources per capita declined by 33% in South Africa, by 25% in Brazil, by 20% in United States and by 17% in China. The sharp decline in natural resources can cause major concerns in maintaining long term stability in any country. One of the important challenges which needs immediate concern is climate change and air pollution. Therefore, it is important for any country to establish a development model which is long term sustainable.

Recently, different pollution control systems discussed in literatures. Chi-Man Vong uses a pollution control system consists of RFID which is connected to the lambda sensors. The lambda sensor mounted on exhaust pipe to measure air ratio when air ratio is less than one carbon monoxide and hydrocarbon emission will increased and when air ratio greater than one more nitrogen oxide will be produced. ChunxiaoLI author presents a vehicle's CO2

emission reduction scheme by an ETC- Electronic Toll Collection (ETC) devices is used at each traffic junction and traffic at each junction can be find out. ETC devices communicate with signals at each junction. With the help of this communication traffic at each junction is obtained. Nishigandha Athare, Prof. P.R.Badadapure .Human safety and air pollution detection in vehicles. KwangSooYo demonstrates gas Sensors sensing properties for Monitoring Air Pollution and different gases causing air pollution.

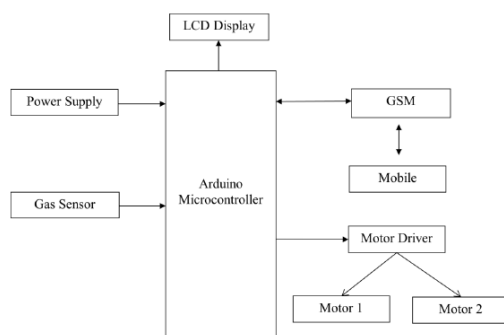
It has three parts: the traffic signal, the vehicle module and the client. Every vehicle has a GSM module installed in it.

The traffic signal has the RF transmitter to activate the vehicle module. Once activated the vehicle module will check for the pollution level and displayed in the LCD. Also an alert message is sent to the vehicle owner.

Speed of the system using PWM is reduced until corrective action is taken. PID and PWM technique is used in MAT Lab to control the speed of a system.

II. PROPOSED SYSTEM

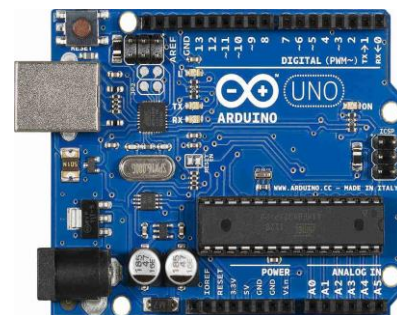
The MQ2 sensor can sense smoke, some other air pollution, so it is perfect gas sensor for our Air Monitoring System . When we will connect it to Arduino UNO microcontroller then it will sense the gases, and we will get the Pollution level in PPM (parts per million). So for converting the output in PPM. Same for others gases also detect the pollution in the air in percentage and we know that the value should be in PPM. It is based on wireless that is operating parameter used is the android phone.



For that we have to require some programming concepts to run the hardware so that we have to create a code using Aurdino1.6.10. Software. In this software the code should be written in simple C language with all descriptions of sensors , and other operating system in which the code explains how sensor, GSM module, LCD display, and so on

should be connected . Whole program is dumped into the microcontroller Arduino UNO. With this GSM module is used for trans receiving the data to mobile device. And it useful for detecting the quantity of polluted gases in the air with that the alert messages are display on mobile.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. In addition to the specific functions listed below, the analog input pins support 10-bit analog-to-digital conversion using the analog read function. Most of the analog inputs can also be used as digital pins: analog input 0 as digital pin 14 through analog input 5 as digital pin 19. Analog inputs 6 and 7 (present on the Mini and BT) cannot be used as digital pins.



III. DESIGN

Proteus is software for microprocessor simulation, schematic capture, and printed circuit board (PCB) design. It is developed by Lab center Electronics.

Proteus is a simulation and design software tool developed by Lab center Electronics for Electrical and Electronic circuit design. It also possess 2D CAD drawing feature. It deserves to bear the tagline “From concept to completion”.

System Components

ISIS Schematic Capture - a tool for entering designs. ISIS is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation. PROSPICE Mixed mode SPICE simulation - industry standard SPICE3F5 simulator combined with a digital simulator.

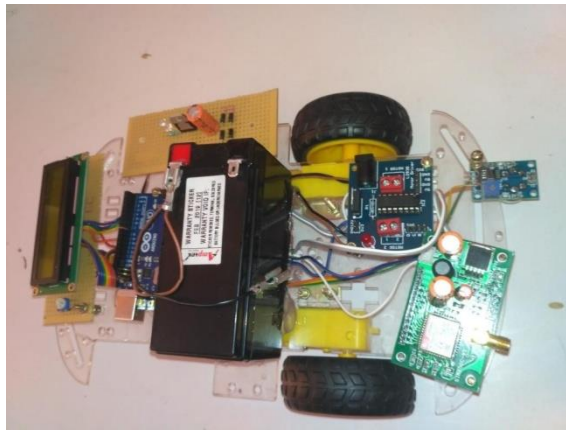


Fig. 5.1 Air Pollution Hardware setup top view

ARES PCB Layout - PCB design system with automatic component placer, rip-up and retry auto-router and interactive design rule checking. ARES is used for PCB designing. It has the feature of viewing output in 3D view of the designed PCB along with components. The designer can also develop 2D drawings for the product.

Starting New Design

Step 1: Open ISIS software and select new design in File menu

Step 2: A dialogue box appears to save the current design. However, we are creating a new design file so you can click Yes or No depending on the content of the present file. Then a Pop-Up appears asking to select the template. It is similar to selecting the paper size while printing. For now select default or according to the layout size of the circuit.

Step 3: An untitled design sheet will be opened, save it according to your wish, it is better to create a new folder for every layout as it generates other files supporting your design. However, it is not mandatory.

Step 4: To Select components, Click on the component mode button.

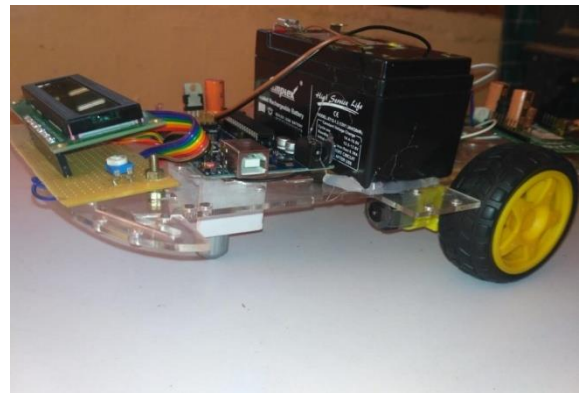
Step 5: Click On Pick from Libraries. It shows the categories of components available and a search option to enter the part name.

IV. BENEFITS OF USING ARDUINO

Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and even the pre-assembled Arduino modules cost less than \$50.

Cross-platform - The Arduino software runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.

Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money. microcontrollers.



language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want

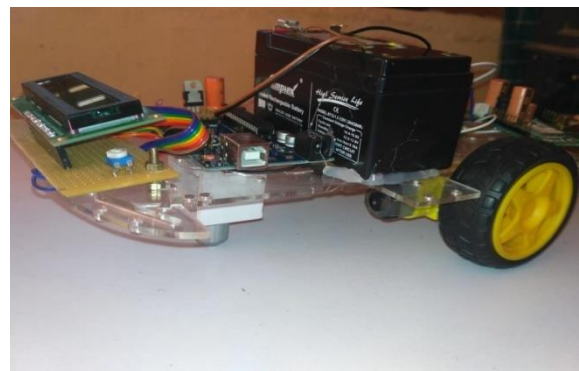


Fig: Airpollution Hardware sideview

Step 1: Selecting the board: Choose the option **Board** and select your correct Arduino board. I have chosen Arduino Uno.

Step 2: Select the right port: The port number is assigned while installing the hardware driver of board. You can find the port number by accessing device manager on Windows. See the section Port (COM & LPT) and look for an open port named Arduino Uno (COMxx). If using a different board, you will find a name accordingly. What matters is the xx in

COMxx part. In my case, it's COM5. So my port number is 5. To select the right port, go to Tools-> Serial Port and select the port number.

Step 3: Compiling: This is the process of converting the code you have just written in Arduino IDE to another form which is only understood by the micro controller in your Arduino board. In our example, we use Arduino Uno board. It is made using Avr micro controller (Atmega328). In the Arduino IDE, compiling is called as **verify**. So hit the verify button in your IDE (see the button with tick mark just below menu bar). Refer the screenshot given below as well. When you hit the verify button, the program you have written in Arduino IDE will be compiled for any errors and then converted to another form that Avr Atmega328 understands. You may refer our article on the **Arduino Software and Hardware** to know in detail about the language used in Arduino.

Step 4: Burning: Embedded designers use the word **burning** to refer to uploading a program to any micro controller. So in this step, we are going to upload the verified program in Arduino IDE to the Arduino board. To do this, press the **upload** button (see the button with right arrow mark). A click on the upload button will begin the process of burning the compiled program to Avr micro controller on your Arduino board. Depending on the size of your program, this will take a little time. If you look on your Arduino board, you can see the 2 LED's near **Tx** and **Rx** blinking. This is an indication of successful communication between your PC and Arduino board. If the program has been uploaded successfully, you will see a message like **Done Uploading**. If the uploading process was not successful, you will see an error message accordingly. Refer the screenshot given below.

V. CONCLUSION

Thus, the system to monitor the air of environment using Arduino microcontroller. With the use of GSM technology enhances the process of monitoring various aspects of environment such as air quality monitoring. Arduino is the heart of this paper which controls the entire process. The Automatic Air pollution monitoring system is a step forward to contribute a solution to the biggest threat. The air pollution monitoring system overcomes the problem of the highly-polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life.

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