Wireless Noise Pollution Detection using Low Cost Microphone Sensor in Labview

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Abstract— The majority applications of pollution monitoring systems are in industries. The control of the parameters which causes pollution and deteriorates the industrial and natural environment pattern is a great challenge and has received interest from industries especially in Petro chemical industries, Paper making industries, Water treatment industries and Sugar manufacturing industries. The main objective of our project is to design an efficient and robust system to control the parameters causing pollution and to minimize the effect of these parameters without affecting the plant or natural environment. The proposed methodology is to model a system to read and monitor pollution parameters and to inform pollution control authorities when any of these factors goes higher than industry standards. A mechanism using IOT and LabVIEW is introduced in this proposed methodology, which will automatically monitor when there is a disturbance affecting the system. The system is implemented using LabVIEW software. The system investigates level of Noise. With the design of IOT, the signals can be effectively transferred and the actions in these cases can still be made accurate and effective.

Key words: IoT (internet of things), LabVIEW, Microphone sensor, Microprocessor

I. Introduction

The System uses low cost microphone sensors to sense presence of harmful noise in the atmospheres and constantly transmit this data to microprocessor. the system measuring noise level and reports it to the online server over IOT. The sensors interact with microprocessor which processes this data and transmits it over internet. A mechanism using IOT and LabVIEW is introduced in this proposed methodology, which will automatically monitor when there is a disturbance affecting the system. The system is implemented using LabVIEW software. The system investigates level of Noise. With the design of IOT, the signals can be effectively transferred and the actions in these cases can still be made accurate and effective. The majority applications of pollution monitoring systems are in industries.

The proposed methodology is to model a system to read and monitor pollution parameters and to inform pollution control authorities when any of these factors goes higher than industry standards. This allows authorities to monitor air pollution in different areas and take action against it. Also, authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects are noise issues it alerts authorities so they can take measures to control the issue

II. Motivation

Today, Noise Pollution have increased to great extent and due that People are facing many problems like Global Warming. So, I decided to take this project which will help in monitoring and thus help in reducing Noise Pollution. According to the who there are directly link between noise and health. Also, noise pollution adversely affects the lives of millions of people. Noise pollution can damage physiological and psychological health. High blood pressure, stress, sleep disruption, hearing loss, the problems related to noise pollution.

III. Analysis

We have first of all met the pollution control Dept. of govt. in our area. So, we could understand their problems for the many availability of atmospheres gases, dust, noise. Nowadays there are many noise pollution problems being faced by people of our country.

In our country, main problem is traffic and loud volumes. Some place in our area there are produced noise pollution. The electronic devices are highly costly. That ways we have concentrate on low cost microphone sensor using noise pollution detection system for LabVIEW based.

IV. Methodology

The necessary to monitoring the noise pollution keep it under control for a better future and healthy living for all. Here we propose an as noise pollution monitoring system that allows us to monitor and check live noise pollution in a particular area through IOT. System uses low cost microphone sensors to sense presence of harmful noise in the atmospheres and constantly transmit this data to microprocessor. the system measuring noise level and reports it to the online server over IOT. The sensors interact with microprocessor which processes this data and transmits it over internet. A mechanism using IOT and LabVIEW is introduced in this proposed methodology, which will automatically monitor when there is a disturbance affecting the system. The system is implemented using LabVIEW software. The system investigates level of Noise. With the design of IOT, the signals can be effectively transferred and the actions in these cases can still be made accurate and effetely.

A. *Measurement of Noise:*

Decibel (dB) is the unit used to measure the intensity of noise.

Decibel is considered as a value between two powers rather than a specific unit. It is the logarithmic unit used to describe a ratio.

- Reference level
- Sound pressure measured.

Example:
20 log (P measured / Preference) = 20 log 1 = 0 dB

0 dB does not mean no sound; it means a sound level where the sound pressure is equal to that of the reference level.

Some of the common sound levels in terms of decibel are, reference (Regulation and control rule,2000).

B. Block diagram and description:

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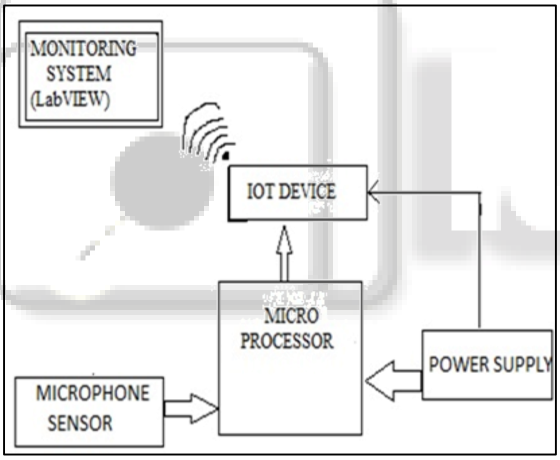

Fig. 1: Noise Pollution Monitoring System LabVIEW Based.

The sensors interact with microprocessor which processes this data and transmits it over internet. A mechanism using IOT and LabVIEW is introduced in this proposed methodology, which will automatically monitor when there is a disturbance affecting the system. The system is implemented Using LabVIEW software. The system investigates level of Air and Noise. With the design of IOT, the signals can be effectively transferred and the actions in these cases can still be made accurate and effective. The majority applications of pollution monitoring systems

V. HARDWARE DESCRIPTION

A. Microphone Sensor:

Introduction:
A Using sound sensor, we detect ambient sound. This board along with the microphone, has a small built-in amplifier (integrated circuit LM393), because only the microphone would be able to send signal. Sound module is sensitive to the environment, generally to be used to detect the intensity of the ambient sound. If the module cannot reach to the threshold set in the environment of sound, OUT output high level. When the ambient sound level exceeds the set threshold, the module OUT output low level; The digital output OUT on the small plates can be directly connected to the microcontroller, detecting the sound environment via the microcontroller detecting high and low level. The digital output OUT on the small plates can directly drive relay module, which works as a voice activated switch.

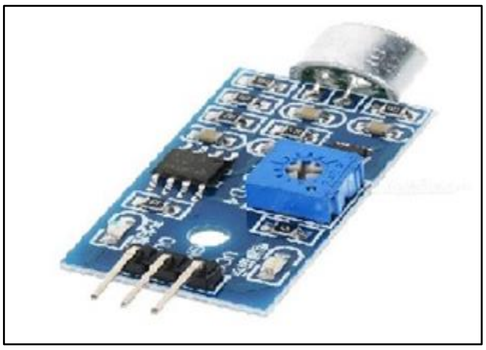

Fig. 2:

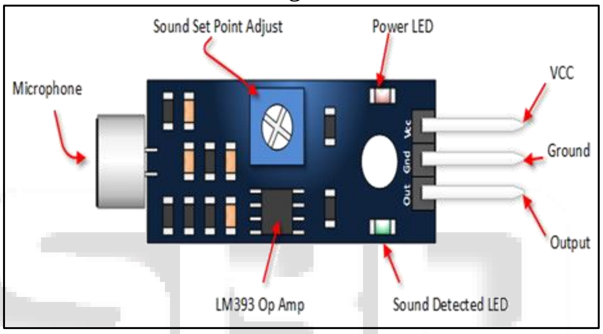

Fig. 3: sound module sensor

Specifications:

1) It's to be used for detecting the sound intensity of ambient.
2) Adjustable sensitivity (adjusted by the blue digital potentiometers).
3) Operating voltage 3.3V-5V.
4) Range of sensor 10 ft.
5) Output form: Digital switching outputs (0 and 1 high and low Level)
6) Easy installation with bolt hole.
7) Small PCB Size: 3.2cm * 1.7cm.

NOTE: This sensor can identify the presence or absence of sound (according to the vibration principle), but cannot recognize the volume of the sound and the frequency of sound.

B. ESP8266 Wi-Fi Module:

ESP8266 is an impressive, low cost Wi-Fi module suitable for adding Wi-Fi functionality to an existing microcontroller project via a UART serial connection. The module can even be reprogrammed to act as a standalone Wi-Fi connected device–just add power.
The feature list is impressive and includes:

- 802.11 b/g/n protocol.
- Wi-Fi Direct (P2P), soft-AP.
- Integrated TCP/IP protocol stack.

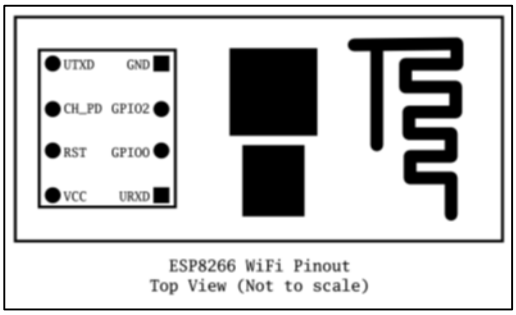

Fig. 4:

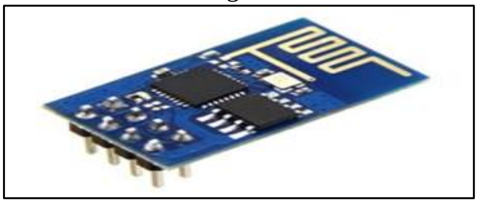

Fig. 5: ESP8266 Wi-Fi Module.

The hardware connections required to connect to the ESP8266 module are fairly straight-forward but there are a couple of important items to note related to power:

The ESP8266 requires 3.3V power–do not power it with 5 volts.

The ESP8266 needs to communicate via serial at 3.3V and does not have 5V tolerant inputs.

so, you need level conversion to communicate with a 5V microcontroller like most Arduino use.

VI. Software

LabVIEW PROGRAMMING TOOL

A. *Introduction to Labview:*

Programmers develop software applications every day in order to increase efficiency and productivity in various situations. LabVIEW, as a programming language, is a powerful tool that can be used to help achieve these goals. LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a graphically-based programming language developed by National Instruments. Its graphical nature makes it ideal for test and measurement (T&M), automation, instrument control, data acquisition, and data analysis applications. This results in significant productivity improvements over conventional programming languages. National Instruments focuses on products for T&M, giving them a good insight into developing LabVIEW.

Fig. 6: Screen Shot of LabVIEW Screen

B. *Virtual Instruments:*

Simply put, a Virtual Instrument (VI) is a LabVIEW programming element. A VI consists of a front panel, block diagram, and an icon that represents the program. The front panel is used to display controls and indicators for the user, and the block diagram contains the code for the VI. The icon, which is a visual representation of the VI, has connectors for program inputs and outputs. Programming languages such as C and BASIC use functions and subroutines as programming elements. LabVIEW uses the VI. The front panel of a VI handles the function inputs and outputs, and the code diagram performs the work of the VI. Multiple VIs can be used to create large scale applications; in fact, large scale applications may have several hundred VIs. A VI may be used as the user interface or as a subroutine in an application. User interface elements such as graphs are easily accessed, as drag-and-drop units in LabVIEW. LabVIEW programs are called virtual instruments (VIs). LabVIEW programs are saved with the .vi extension

Front panel:

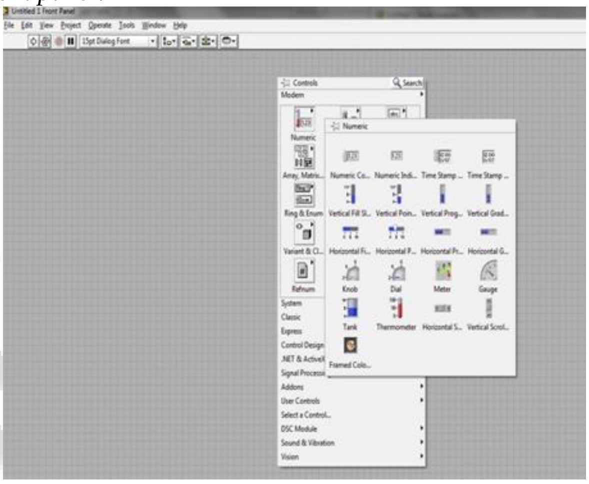

Fig. 7: Screen Short LabVIEW Front panel

VII. Test and Results

A. *LabVIEW Programming of Implementation for System:*

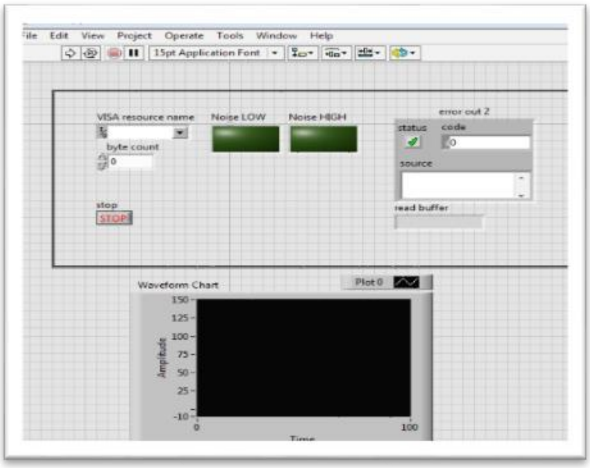

Fig. 8: Screen Shot of Front Panel

B. *LabVIEW Tools used for Programming:*

Formula Express VI - Displays the formula as you enter it. You can enter variables and operations into this text box by using the Input buttons or by directly entering a formula.

Math script Node-Executes LabVIEW Math Scripts and your other text-based scripts using the Math Script RT Module engine. You can use the Math Script Node to evaluate scripts that you create in the LabVIEW Math Script Window.

C. Block Diagram for Noise Pollution Monitoring System:

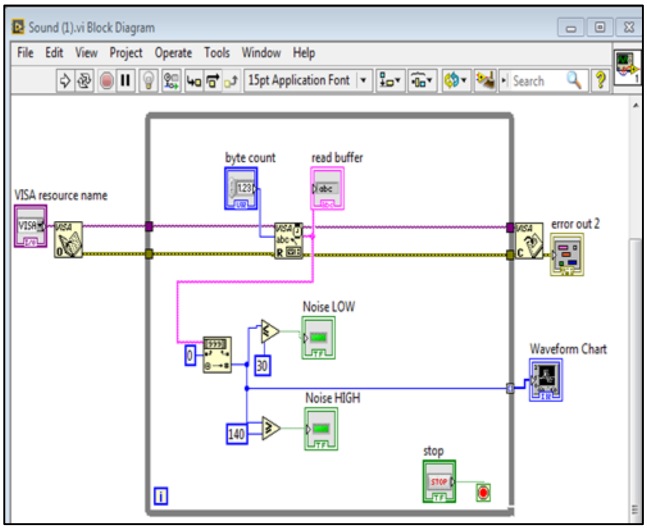

Fig. 9: screen short of block diagram

We have performed experiment to verify our theory. The experimental set up is ready.

Firstly, we have measured noise frequency (db) and air pollution ppmv (parts per million volume)

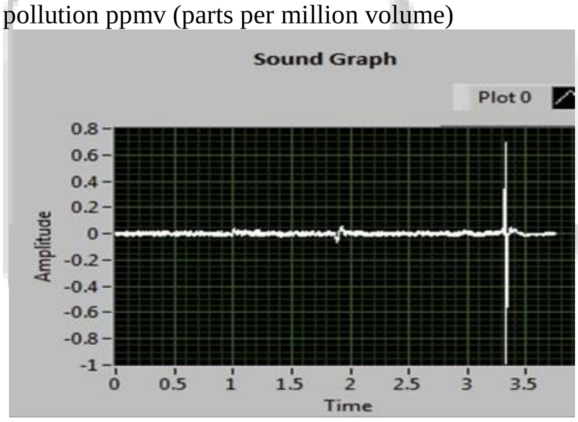

Fig. 10: Sound Graph in Zero Noise Level Zone

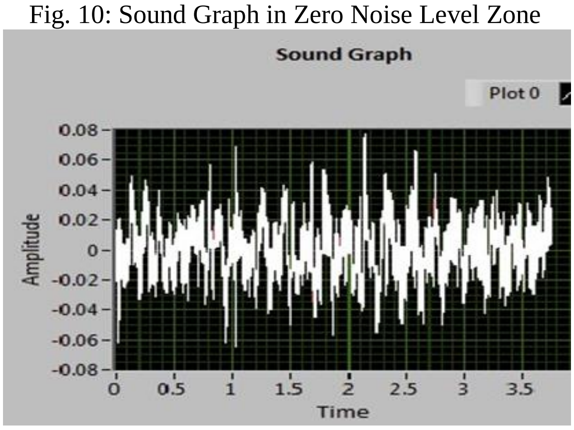

Fig. 11: Sound Graph captured with Noise Environment

We found that for the range of frequencies. Here we have the readings for frequencies 73.5MHz, 74MHz, 75MHz......we have reached to the optimum output of system.

VIII. CONCLUSION

As discussed in this, the recent technological Developments in the miniaturization of electronics and wireless communication technology have to the emergence of Environmental Sensor Networks (ESN). These will greatly enhance monitoring of the natural environment and in some cases, open up new techniques for taking measurements or allow previously impossible deployments of sensors. There are very beneficial for monitoring different high risk regions of the country. It will provide real-time information about the level of Noise pollution in these regions, as well as provide alerts in cases of drastic change in quality of air. This information can then be used by the authorities to take prompt actions such as evacuating people or sending emergency response team.

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