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Noise Detection with Data Recording and Digital Notice Board

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Abstract - *In In this paper, we present the implementation of an Internet of Things (IoT) application that perform the sound level detection and display data on the digital board. We have developed a simple and low-cost sound detection system which can be used in places like library, industries, traffic signals, Construction sites, etc. The digital board can be work as notice board for schools, banks, public advertisements, stoke exchanges etc. The real time data get stored in IoT cloud database at specific location and an application is made which is connected to the display so that any specified message can be displayed on it by the authority. The working principle of the system is noise detection which shows indications with the help of LED and buzzer will beep when intensity of sound crosses a certain limit. This project puts a great impact in the society for the growing noise problems in the environment and on our health.*

***Key Words*: Noise detection, Node-MCU, IoT, LCD, Real time, Sound Sensor, Clouds**

1. INTRODUCTION

Noise pollution is usually defined as regular exposure to elevated sound levels which will result in adverse effects in humans or other living organisms. sound pollution is taken into account to be an unpleasant harmful noise whose source are often people, electronic devices, or mechanical elements. The source of outside noise worldwide is principally caused by machines, construction equipment, transport, and propagation systems. Sound is often described in terms of the loudness (amplitude) and therefore the pitch (frequency) of the wave. Loudness (also called pressure level, or SPL) is measured in logarithmic units called decibels (dB). At certain levels and durations of exposure, it can cause physical damage to the eardrum and also the sensitive hair cells of the labyrinth and lead to temporary or permanent deafness. hearing impairment doesn't usually occur at SPLs below 80 dBA (eight-hour exposure levels are best kept below 85 dBA), but most of the people repeatedly exposed to over 105 dBA will have permanent deafness to some extent. Additionally to causing hearing disorder, excessive noise exposure can raise pressure level and pulse rates, cause irritability, anxiety, and mental fatigue, and interfere with sleep, recreation, and private communication. consistent with World health organization (WHO), pollution is responsible every year for 50000 hearts attacks. Due to such adverse effects of pollution on human health it's necessary to live the noise within the environment and convey measures to manage it.

The Internet of Things (IoT) environment is currently considered to be the fastest growing technological field within the world. it's the trendy technology used for controlling and measuring noise publicly area like office, school, libraries, colleges, and public places. The essential concept of the IoT is predicated on connecting different smart devices through a network to attach individuals over the networking platform. In the IoT, smart devices can transmit data over the net and connect various people and things. IoT promises to open massive prospects for brand new applications that may improve the standard of life. Several kinds of applications are often applied using IoT technologies, including healthcare, intelligent grid, localization, and environmental monitoring.

2. LITERATURE REVIEW

In this paper, a proposed system is developed Which supported with Arduino and high-end microphone sensors and their algorithm to detect and distinguish between Normal sound and Noise based sound. By this system decides which Vehicle riders present at that stoplight are penalized with additional time spending on a particular junction [1].

Bhumi Merai, Rohit Jain and Ruby Mishra developed a SMS based noticeboard which GSM to facilitate the communication and displaying message on noticeboard from user's device. The operation relies on microcontroller AT89c52 which is programmed in C or C++ language. When the user sends a SMS from anywhere via registered number from his portable it's received by the modem at the receiver's end and SMS is displayed on the LCD display [2].

In this paper, Authors developed a Cloud-based real-time Electronic Notice Board which comprises of a firebase Cloud Messaging (FCM) system and an external hosted MySQL server for delivering notification based on the notices generated through the system. The entire system is modular with scalable and secure authentication levels, offline-notice generation support, real-time syncing of notices across all connected devices and an omnipresent cloud support [3].

3. PROPOSED METHODOLOGY

We propose "**Noise Detection with Data recording and Digital Notice Board**" in which we have developed sound sensor Module based system which detects sound and display it on the Digital board. It consists of an in-built

capacitive microphone, which uses the vibration and converts it into current and voltage signals. We have Categorises in 3 levels of loudness low, moderate and high. Sound below 60 dB (low) is generally considered as safe. Sound above 60 dB (moderate) is also safe for 15 to 20 minutes but after that it is irritating and can cause headache. Sound above 80 dB (high) is very harmful and long or repeated exposure can cause hearing loss.

The sound sensor detects the noise in three different levels assigned such as low, moderate and high. According to the code loaded in the Node-MCU it will connect to wi-fi. Once the wi-fi is connected, the LCD display will start displaying the decibel values of the amount of noise detected by the sound sensor. The decibel value changes according to noise detected by the sensor. When the noise is at low level green LED turn ON, when the noise level increases and goes to moderate level the green LED turns OFF and the yellow LED turns ON, as soon as the noise level reaches the highest level the yellow LED turns OFF and red LED turns ON along with the buzzer alarm.

Also, we have access to display the required message on the LCD display through the app in our phones. The real time data will be shown in the cloud data channel through a field graph. We can also download the records in the excel sheet to the recorded decibel values.

3.1 Block Diagram

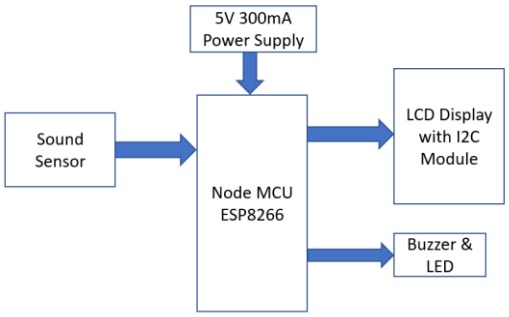

Figure 1: Block Diagram of Noise detection system with LCD Display

4. FINAL RESULT

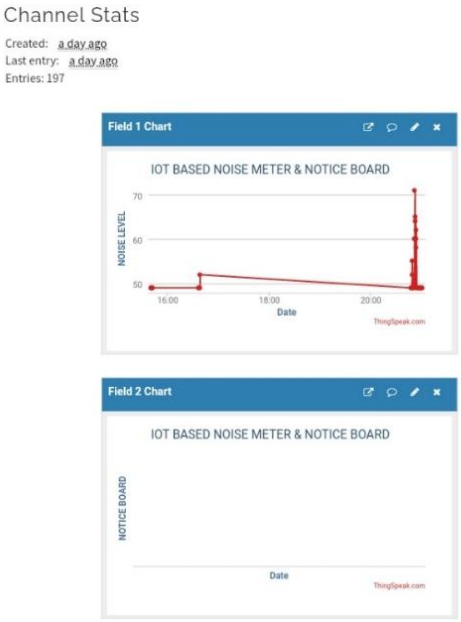

Figure 2: Channel Statistics

62	2022-03-07T	61 49r
63	2022-03-07T	62 49r
64	2022-03-07T	63 hi
65	2022-03-07T	64 iot based
66	2022-03-07T	65 iot based
67	2022-03-07T	66 49r
68	2022-03-07T	67 49r
69	2022-03-07T	68 49r
70	2022-03-07T	69 iot based
71	2022-03-07T	70 49r
72	2022-03-07T	71 49r
73	2022-03-07T	72 49r
74	2022-03-07T	73 49r
75	2022-03-07T	74 49r
76	2022-03-07T	75 49r
77	2022-03-07T	76 49r
78	2022-03-07T	77 49r
79	2022-03-07T	78 49r
80	2022-03-07T	79 49r
81	2022-03-07T	80 49r
82	2022-03-07T	81 49r
83	2022-03-07T	82 49r
84	2022-03-07T	83 49r
85	2022-03-07T	84 49r
86	2022-03-07T	85 49r
87	2022-03-07T	86 49r
88	2022-03-07T	87 49r
89	2022-03-07T	88 49r
90	2022-03-07T	89 49r
91	2022-03-07T	90 49r
92	2022-03-07T	91 49r
93	2022-03-07T	92 49r
94	2022-03-07T	93 49r

Figure 3: Real-time data of noise level intensity

Our proposed system can easily detect and categorise the noise in low, moderate and high. The real-time data of the sound level is continuously storing in the Cloud channel for the further reference. The user can access these data from anywhere of these World.

4. CONCLUSION

The above technical paper explains how we can develop sound detection system in real time and notice board. The project has successfully completed and tested with troubleshooting to the best of our knowledge. The implemented system has been created by using Node-MCU, sound sensor and LCD with I2C module. The implementation is cheap and easy comparing to other road detection solutions. The collected data can be stored in database created on server for further processing to obtain relevant statistical parameters of environmental noise.

5. FUTURE SCOPE

16x2 LCD Display can be replaced by another large display which can display more characters according to the need. Along with sound sensor, sensors like humidity sensor, temperature sensor, radiation sensor, carbon dioxide sensor, etc can be attached to the system. "Node-MCU" can be replaced with "Raspberry pi" to perform various function from a single system. This project can be modified where an alert will be send to mobile phone of authorized person.

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