Decibel Sound Detector: Sensor and Notifier

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***Abstract*— On the Indian subcontinent and worldwide, people celebrate a number of happy life occasions that call for the lighting of fireworks; yet, some welfare groups of multiple communities have erected a no crackers-inside restriction. Due to the noise and air pollution cracker popping causes, the government frequently alerts the populace to the health concerns involved. At all costs, seniors and young children should refrain from using firecrackers. In India, it is forbidden to use fireworks between the hours of 10 p.m. and 6 a.m. The selling of firecrackers has drastically diminished, which has had a very favourable influence for the government. For the company, it represents a sizable loss, nevertheless. Our project aims to reduce the noise pollution caused by firecrackers near hospitals, schools, and other significant public locations, to lower the cost of production and the quantity of chemicals used to make crackers, and to develop a tool that will enable people to live in a secure environment free from harm. All the requirements outlined in the law that the Indian government has enforced regarding firecracker noise standards are to be met by the manufacturer.**

I. INTRODUCTION

People celebrate several joyful life events on the Indian subcontinent and abroad that call for the lighting of fireworks, yet some welfare organizations of numerous communities have put up a no-crackers-inside restriction. People who enjoy popping crackers are controlled. The government frequently informs the general public of the health risks associated with popping crackers due to the noise and air pollution they produce. Senior citizens and little children should avoid using firecrackers at all costs. A sudden exposure to loud noises, such as those from fireworks, can result in heart attacks, high blood pressure, sleep difficulties, and temporary or permanent deafness. Fireworks are not permitted in India between the hours of 10 p.m. and 6 a.m. The government has seen a very positive impact of this restriction, and the sale of firecrackers has significantly decreased. However, it is a significant loss for the firm.

According to the 89th Section of the Environment Protection Act, 1986's firecracker noise guidelines, it is illegal to manufacture, sell, or use firecrackers that produce noise levels of 125 dB (Al) or 145 dB (C) or more at a distance of 4 meters from the place of bursting. The market's selection of firecrackers exceeds the allowed noise limitations. For a single cracker, the noise limit is 125 db. The tested firecracker's maximum noise level was 146.8 db. Even when the relevant officials take action against fire-cracker vendors who set up shop in congested places, they do not monitor the noise level of firecrackers because they lack a suitable system for accomplishing this.

Our project is intended to assist the manufacturer in meeting all the requirements outlined in the law that the Indian government has enforced regarding firecracker noise standards, to lessen the noise pollution caused by crackers near hospitals, schools, and other significant public locations, to lower the cost of production and the quantity of chemicals used to make crackers, and to develop a tool that will enable people to live in a secure environment free from harm.

High sensitivity microphones are used to pick up ambient sound. Voltage is the measurable value. The controller receives the voltage and converts it to the corresponding dB value. Once the conversion is complete, a Bluetooth module sends the value to a nearby mobile device. Here, HC-05 series Bluetooth is being used, allowing for two-way communication. Utilizing IoT technology, data from the mobile device is uploaded to the cloud. The benefit of using Bluetooth is that the user can see the sound value from a distance, preventing them from coming into contact with the cracker as it is bursting. Additionally, anyone can access the readings from the database by using the mobile application

II. MOTIVATION

The government frequently informs the general public of the health risks associated with popping crackers due to the noise and air pollution they produce. Senior citizens and little children should avoid using firecrackers at all costs. A sudden exposure to loud noises, such as those from fireworks, can result in heart attacks, high blood pressure, sleep difficulties, and temporary or permanent deafness. Fireworks are not permitted in India between the hours of 10 p.m. and 6 a.m. The government has seen a very favourable impact of this restriction, and the sale of firecrackers has significantly decreased. However, it is a significant loss for the firm. We chose this subject for our study in order to assist the government and manufacturers.

III. OBJECTIVE

Our project is aimed at assisting the manufacturer in meeting all the requirements outlined in the law that the Indian government has enforced regarding firecracker noise standards, to lessen the noise pollution caused by crackers near hospitals, schools, and other significant public locations, to lower the cost of production and the quantity of chemicals used to make crackers, and to develop a tool that will enable people to live in a secure environment free from harm.

IV. COMPONENTS

1. ESP8266 NodeMCU

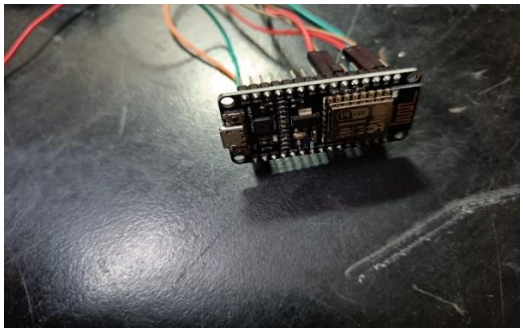

Fig 1: ESP8266

The NodeMCU (*N*ode *M*icro*C*ontroller *U*nit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

2. Display

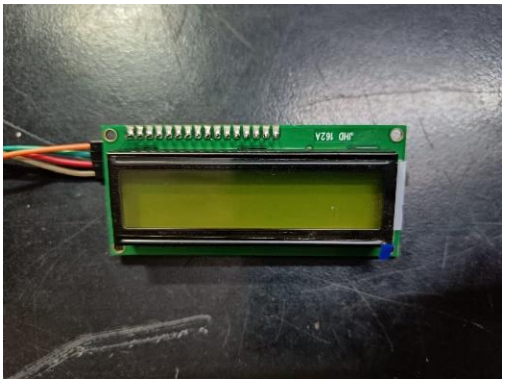

Fig 2: 16*2 LCD Display

Display units are the most important output devices in embedded projects and electronics products. The 16x2 LCD is one of the most used display units. 16x2 LCD means that there are two rows in which 16 characters can be displayed per line, and each character takes 5X7 matrix space on LCD.

3. Sound Sensor

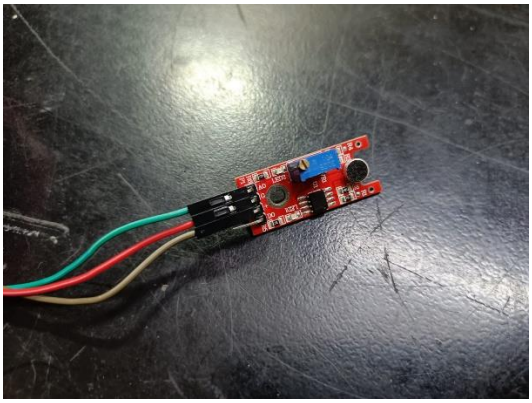

Fig 3: Sound Sensor

Sound detection sensor works similarly to our Ears, having diaphragm which converts vibration into signals. However, what's different as that a sound sensor consists of an in-built capacitive microphone, peak detector and an amplifier (LM386, LM393, etc.) that's highly sensitive to sound.

V. CIRCUIT DIAGRAM

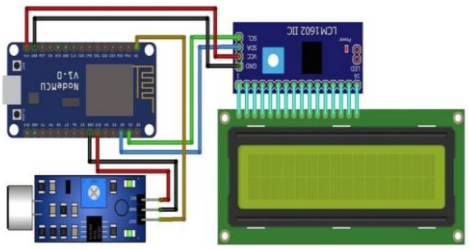

Fig 4: Circuit diagram of decibel sound detector

A. ESP8266 to LCD

i. D1 port of NodeMCU to
ii. D2 port of NodeMCU to
iii. GND port of NodeMCU to GND port in I2C
iv. Vin port of NodeMCU to Vcc port in I2C

B. ESP8266 to Sound Sensor

i. A0 port in NodeMCU to A0 port in Sensor
ii. GND port in NodeMCU to G port in Sensor
iii. VCC port in NodeMCU to + port in Sesnor

VI. OUTPUT

Fig 5: ThingSpeak Graph Output

VII. CONCLUSION

The aim to reduce noise pollution caused by firecrackers near hospitals, schools, and other significant public locations, to lower the cost of production and the quantity of chemicals used to make crackers, and to develop a tool that will enable people to live in a secure environment free from harm is achieved through this device. The sound from the environment is detected through Mic Sensor and given to ESP8266 NodeMCU board. The decibel value calculated is displayed on the screen. For every 10 secs, the value gets uploaded to ThingSpeak website through Wi-Fi. In ThingSpeak website, the user can view the graph and download the data in Excel format, also a message notification is sent to registered smart phones which gives a high sound decibel level alert. This way the production company can keep check on the sound pollution.

VIII. REFRENCES

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