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Automation of Noise Detection Using Internet of Things

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Abstract – With a significant increase in population in modern cities, the noise pollution also increases at an unprecedented rate. This system presents a low cost flexible and reliable automation system with personal alert messages using Arduino along with internet connectivity and remote control over devices by using a smart phone application. The proposed system uses Internet of Things[IoT] model to detect human voices present in an enclosed area. The user can also receive the alert messages with the help of a smart phone. This research work presents the automation of noise detection system using Arduino Nano, battery, LCD panel and buttons. C programming language has been used to program the functions of this application. This application can be implemented by using a tool called Pick2kit and PROTEUS. The proposed noise detector system can be used in library, office and classroom environments to identify the noisy people so that a necessary action can be taken against them.

Keywords--- Noise detection, Arduino, Internet of Things, automation.

I. INTRODUCTION

Noise pollution is an increasing issue in the emerging modern world, where rapid population growth may further increase the noise pollution. Whenever people hear about Silence, the first thing comes to the mind is a library. Since the library is the place, where people should maintain utmost silence. But not all the people, who come to the library maintains the silence. To avoid these type of activities and warn the people, who are making the loud voice, a noise detector has been proposed in this research work. This noise detector can detect the voice of the person, who are making the voice louder than allotted level and they can be continuously monitored to take necessary action. In addition to that, the person who speak loudly can be alerted with an alert message. This alert message can be send to the person personally. And the alert message can also be send to the person who is taking care of the library. These things can be done by using the Internet of Things. It is not possible for a wider area. This is possible for only a limited area. It should be very useful in library to maintain a silence for a long period of time. Another good thing about this system is noise pollution can also be reduced.

In some working area, the coworker can make the loud noises and disturb you. To avoid those things this method has been implemented. In recent years, there are many researches and system about this automation of noise detection. Those researches and system results with the detection of noises only. Fig.1 shows the recording device to record the conversion. This should be very useful for the person those who are using this.

Fig.1 The recording device records the conversation of two peoples

II. RELATED WORK

The work that contains speech recognition system having two procedures called proposed noise reduction. To identify the content of speech that contains ambient noise, these systems can be used Noise reduction and threshold based noise detection. This are the two stages in this system. Stage one determines the quantity of speech, second stage consists of noise reduction [1]. The Quality of speech recognition improved around 15% to 25%. In this noisy environment, this system reduce the effect of noise and improves quality of speech recognition.

To generate a frame signal, frame signal generator is used and getting its time length from input signal. And to generate a reference signal from where the signal has been located, reference signal generator has used to find a correct value between the frame signal and reference signal correlation calculator is used[2].to determine the frame signal includes periodic noises and to calculate the period of periodic noises. To determine the phase shift amount, range generator is used.

Open plan offices have less costs for construction, allows only important savings of space, to make communication between working people, improves working practice as same as exchange of thoughts for this, those types of offices making wider. It includes the controlling of anthropic and electro mechanical noise. In that noise measurements given by ventilation, heating and Air conditioning [3]. To find the importance of variables, to identify the important characteristics. Number of Predictor variables can be reduced by analysis the characteristics. Adoption of tool for many applications are determined by high accuracy model.

In between the multiple microphones an audio record device has been implemented. It has been implemented to generate an output audio signal depends on conditions. If the presence of wind noise and other noise has been detected, the audio recording device selects for each different frequency and the lowest noises contained by an audio signal and the combination of frequency to generate output signal [4]. When there is no detection, the audio recording device needs the microphones whether wet or dry and selects audio signals based on conditions.

In many communication applications, removed of impulsive noise from received signal is very important. This paper has two stages of mitigation approach required by the orthogonal frequency division multiplying (OFDM). In the stage first, to detect instances of impulsivity, deep neutral network is used [5]. In the suppression stage, the detected IN is to alleviate the harmful effects. There are two methods to demonstrate the DNN based approach, 1.) IN models for testing and training, 2.) Burstimpulsive environment with interleaving techniques.

Automation of city is the aim of ever smart city and it is provided with technological access. In this paper, a Machine learning based application is used for the detection of urban noise for the security of public and neighborhood safety. Various Algorithm of Machine learning by the urban noise detection includes convolutional neural networks, Long short term memory, decision tree random forest naive Bayes with 311 data set [6]. For the ML algorithms also this experiment applicable on mobile devices it can be conducted and connected to system by sending requests.

Up to this, new sensing method for aero engine fan noise test only proposed. In this paper, details of validities aero engine fan noise test method and wind tunnel test. This experiment consists uniform to simulate flow by the duet, to generate different characteristics of noise, and an attention is focused on examination with reconstructed association with accuracy and probability of success [7]. The potential capability of this new fan mode method of detection that are practically tested facility.

In the tiller-Huang transform, this letter gives a speech enhancement method to mitigate the effects of impulsive noises selection and estimation of noise is based on impulsiveness [8]. It conducts speech experiments consists of five acoustic noises with different index and non-stationarity degrees comes under signal to noise radius. Three algorithms are defined in the evaluation contains spectral and time domains. The best results from the proposed solution in terms of quality measures to the competitive methods.

In Intensive care unit, Electrocardiogram signals that recorded are often corrupted by motion and noise air facts, which treads false alarms includes inaccurate detection. This system is an automated method to detect from ECG recordings. Irregular RR intervals from the QRS complexes are identified, to

identify the QRS complexes have to focus on detection algorithm. An algorithm is designed between ECG and non ECG wave forms [9]. This method is to find accurately between segments contained real ECG forms. It was founded that important reduction in false positive detection. Inaccurate detection of AF results without using it.

To detect the noise of the wind, a processed digitalized microphone signed has been used. In at least one of the microphones, both the first and second are obtained. Reflection of conman input is done by the both signals and also involves temporarily or spatially. The process of first signal to define the first distribution samples [10,11].The process of second signal to define the second distribution has been calculated. An output indicates when there is wind noise [12].

III. PROPOSED WORK

A voice model established by the system is according to voice characteristics of human, analyzing the input voice signal and proceed the required features on this basis, it establishes the required template of the speech recognition. The computer is used in the identify process by the model of the speech recognition to compare the voice template that has stored inside computer and the characteristics of the input voice signal. Search and matching strategies to identify the optimal range of the voice matches the template.

TABLE I. HARDWARE USED

Arduino Uno	It is the controller board, which controls the other hardware.
Step-Down transformer	Reduces 230V and give it to the other hardware.
Led Display	To display the title of the project.
Voice Recognition Board	Used to play the recorded voice.
Power supply board	It gives the power supply to the hardware.

- Table I displays the hardware used. According to the definition of this template through the lookup table can be given the recognition results of the computer. Voice commands based on the voice recognition system (voice recognition unit) system can recognize voice commands, convert them to desired data coordination and data transmission via and micro controller (Arduino Uno) Receiving this signal by PC Monitoring (IOT)then get a full control that works by voice commands. The software consists of a Micro C language programmable microcontroller. This system is of low cost and flexible with growing variety of devices that can be controlled.
- Operating voltage is 5V. The input voltage ranges from 7V to 12V.
- USB Serial Converters allow new laptops to communicate safely with … Wide operating temperature range for harsh environments. Turn Serial Devices into IoT-Connected Devices.

TABLE II. NOISE LEVELS OF EVERYDAY SOUNDS

Decibel	**Environment**
10 decibel	Sound during breathing
20 decibel	Whispering away from five feet
30 decibel	Whispering nearby
40 decibel	Sounds in quiet library
50 decibel	Sound while refrigerator is on
60 decibel	Electric toothbrush
70 decibel	Sound while using Washing machine
80 decibel	Alarm clock
90 decibel	Sounds in Subway train
100 decibel	While using Machinery in factory
110 decibel	Sound while using Car horn
120 decibel	Siren

The Table II represents the noise levels of everyday sounds that people are hearing in a modern day.

A. METHODOLOGY

Internet of Things (IOT) is currently an emerging technology spread globally. IOT has stepped in various fields comprising of Industries, Government, academia, and still various research are carried in this domain. Nowadays IOT plays a vital role in the business sector, many glooming and blooming business depends on IOT & Industrial IOT.

Input:
Play the recorded voice in the voice recognition board

Output:
VOICE DETECTION ALERT

1. **Begin the process**
2. Reduces the voltage from the 230V to 12V by Step down transformer
3. Train the power supply board
4. p=a(5V) v(5V) l(5V) (p=POWER SUPPLY BOARD)
5. t>230V(t=TRANSFORMER)
6. a=5V(a=ARDUINO UNO)
7. v=5V(v=VOICE RECOGNITION BOARD)
8. l=5V(l=LCD DISPLAY)
9. Connect the pins to the arduino
10. Code the arduino
11. #For the powersupply
12. Power supply board to vin
13. Power supply board to ground
14. Enable 5V to voice recognition board
15. LCD enable pin to 11
16. LCD D4 pin to 2
17. LCD D5 pin to 3
18. LCD D6 pin to 4
19. LCD D7 pin to 5
20. Liquid Crystal lcd(rs,en,d4,d5,d6,d7)
21. int led=1
22. Code the arduino to voice recognition board
23. Voice recognition to pin 13
24. Voice recogntion to ground
25. Play the recorded voice
26. #if the alert message received
27. **End the process**

Fig. 4 Voice Detection Algorithm

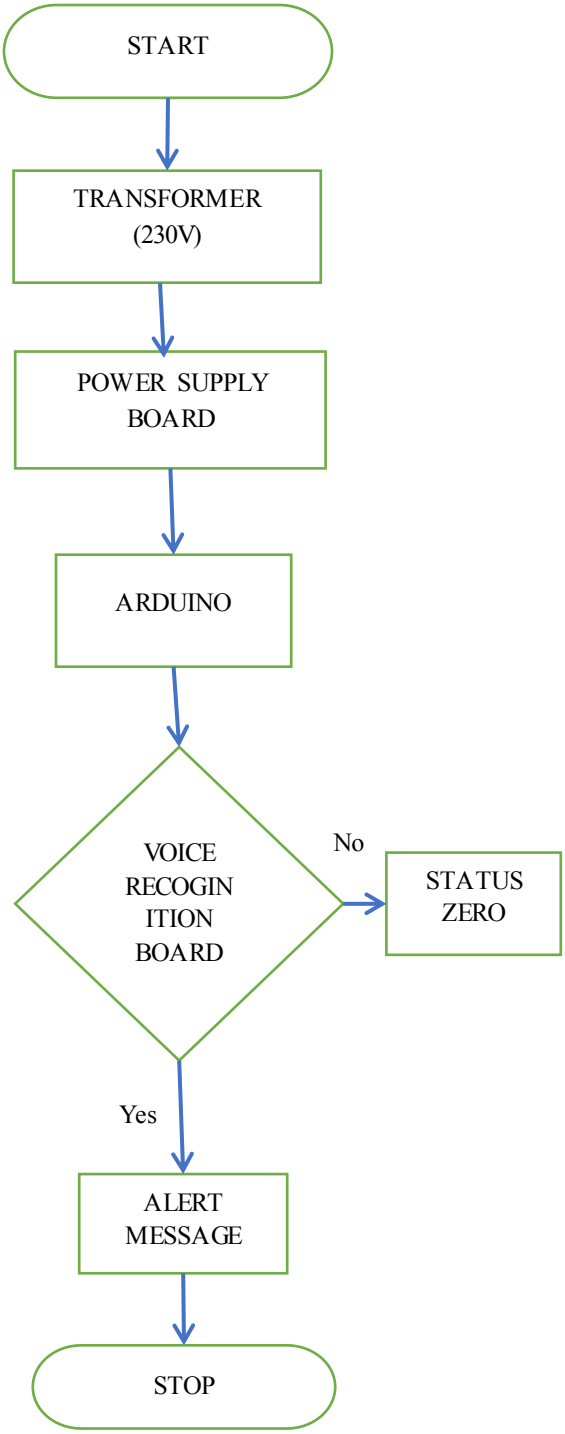

Fig.5 Hardware processing Flowchart

Fig.4 explains algorithm and Fig.5 explains flowchar for voice detection. IOT cuts across various presentation domains ranging from civilian to security sectors. Voice processing of instructions received from the user starts with the node red skill using the JavaScript, which debugs and deploy the skill to the cloud. It tests with voice input whether all the commands are recognized appropriately and integrated with arduino UNO board. When it receives API call from the cloud, arduino UNO understands the command and checks the current status of the appliances and redirects message to API. arduino UNO controller the instructions based on the received message such as ON/OFF.

B. APPARATUS

The hardware requirement for this system are

- Arduino,
- Battery,
- LCD,
- Button.

The Software requirements are

- Pick2kit and
- Proteus.

In this system have a very large library that will difficult to manage. If the software is corrupted whole data will unsecure easily. It is very time consuming and it is extremely complex system. User friendly environment and it is Dynamic and fully computerized system will develop with the data base of any data can be added, modified, deleted, very quickly. High secure and scalable and reliable. It has Record Maintenance.

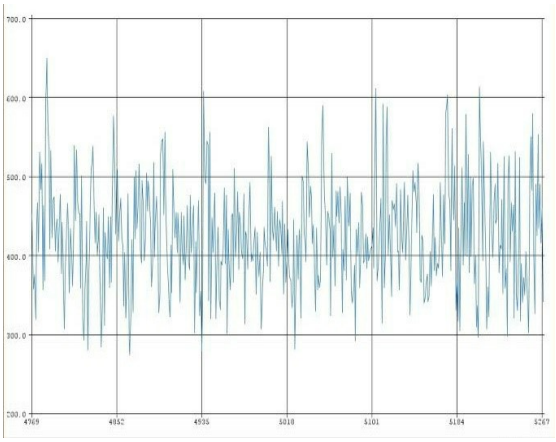

Fig. 6 Graph of Sound Record

Fig 6 of bar chart. Added to that Sound levels are shown This Graph represents that the sound can never be in a straight line graph. It changes every second. From this data, can only deduce is the peak value when there is a loud sound. Interconnection of uniquely identified computing devices are defined by internet of things in the existing infrastructure.

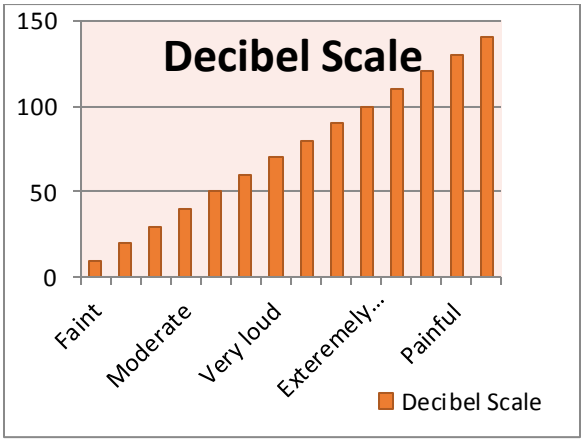

Fig.7 Decibel scale

Fig.7 the future will be overlaid with embedded devices of communication creating "AUTOMATED LIBRARY SYSTEM". A prototype platform called arduino is used to (open source) give inputs to use software and hardware arduino uno board module-serial-voice recognition. Voice commands can be stored by this module. Lot of attention are gained by the internet and inertnet of things now. Sensory Substitution systems are very encouraging with the evolution of machine learning and Personal computer technologies.

IV. RESULT ANALYSIS

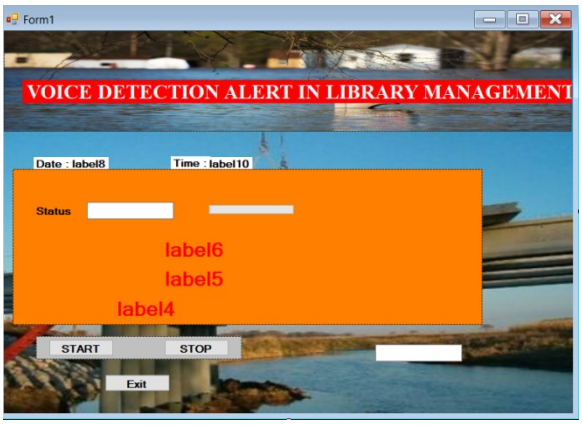

Fig.8 Voice recognition status form

Fig. 8 form page represents the voice recognition status when the play button pressed from the voice recognition board.

A. SPECIFICATIONS

TABLE III SPECIFICATIONS OF ARDUINO

Operating the Voltage for arduino.	5Volt
Recommended input voltage for the arduino.	7 Volt to 12 Volt
Limits for the input voltage.	6 Volt to 20 Volt
Total input and output pins.	14 pins labelled in form of (0-13).
Total analog input pins	6 pins labelled in form of (0-5)

Table III represents the specifications of the arduino uno that are used in the

V.CONCLUSION

The "AUTOMATION OF NOISE DETECTION USING INTERNET THINGS" process made the surrounding to reduce the noise in the way of controlling noise pollution. The main focus of this system is to reduce human voices. Several solutions have been proposed for identifying the voice detection. The maintenance of the noise is made efficient, as all the recorded voice are stored in the secure database, through which data can be retrieved easily. By this system, the person who speaks in the enclosed area will get a mail to his/her mail address. This may ensures that the alert message make the person who have been spoken and made the person not to speak. Hence I conclude my words with that the loud voice from a coworker may mentally affect your mood. These system helps you from that type of affect.

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