Brilliance
Research of Artificial Intelligence

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

Identification Noise monitoring for students in SMAN 1 Tapaktuan

Alfy Ariswan[1], Dirja Nur Ilham[2*], Rudi Arif Candra[3], Arie Budiansyah[4], Fauzun Atabiq[5]
[1,2,3]Politeknik Aceh Selatan, Indonesia, [4]Universitas Syiah Kuala, Indonesia,[5]Politeknik Negeri Batam, Indonesia
[1]alfi4228@gmail.com, [2]dirja.poltas@gmail.com , [3]rudiarifcandra@gmail.com, [4]arie.b@unsyiah.ac.id,
[5]atabiq@polibatam.ac.id

open access

***Corresponding Author**

Article History:
Submitted: 02 Desember 2021
Accepted: 02 Desember 2021
Published: 03 DESEMBER 2021

Keywords:
Sound Sensor; dfplayer; Blynk; Intenet Of Things.

ABSTRACT

A high school is a place that is used as a place for the learning and teaching process, so a comfortable place is needed from disturbances in the study room. The Design System for Noise Monitoring Devices as an Effort to Minimize Noise Based on the Internet of Things (IoT) is designed to create comfort in the learning and teaching process at SMAN Tapaktuan so that teachers can concentrate without disturbing the noise generated by students. This tool is controlled by nodemcu and a sound sensor as a noise detector with an appropriate output by sending notifications to the Blynk Application. How the tool works when the sound sensor detects a noise level between 30 dB to 49 dB then dfplayer will issue a warning in the form of a warning "this room is noisy" and send a notification to the blynk application with the text form "room A is noisy" if the sensor detects above 50 dB then a warning loud sound will be issued by Dfplayer in the form of sound and at the same time send notifications to the blynk application. The purpose of the tool Any noise detected by the sound sensor then dfplayer will issue a small or loud warning and send a notification to the blynk application.

INTRODUCTION

A school is a place that is used as a place for the learning and teaching process, so a comfortable place is needed from disturbances in the study room. Noise in the study room is still common, especially coming from the students themselves. The picket teacher has made efforts to overcome this, among others by giving warnings to students who make noise (noise), but the picket teacher certainly can't control the situation all the time due to limited manpower and others. Based on the decision of the Minister of Health, No. 718/Men.Kes/Per/XI/1987 that the school environment noise standard ranges from 45-55 dB. Classrooms categorized as normal can be categorized as zone B. However, in reality, there is often noise caused by students who exceed the threshold value set. has been determined. This of course will be very disturbing comfort because with the convenience of concentration the mind will always be awake, thus making reading activities less run optimally (Pringgahapsari, 2010).

Previous researchers have some of them have made noise problems such as Design and Build Room Noise Control and Monitoring Based on the ATMega 8535 AVR Microcontroller by taking several measurements and drawing the average value of the overall results so that the noise standard in the room is obtained (Jmr & Widianti, 2018). and next is the Analysis of Noise Levels on Teaching and Learning Activities at the Faculty of Engineering, University of Semarang by applying noise standards in the education zone, the results do not meet the standards because the noise level is still high (Ahmad, Handayani, & Nurweni, 2018). Analysis of Noise Levels at Semarang University with Contour Maps using Golden 14 Software by measuring noise levels using Sound Level Meter (KRISBOW) type KW08-291 by taking several data collection points spread across Semarang University, both open and closed environments (Ahmad, Handayani, Margiantono, et al., 2018). Internet of Things-based Noise Level Detector as a Library Room Comfort Control Media with test results showing that this tool can detect noise levels in the range of a minimum of 41 dB and a maximum of 69 dB with a deviation of 0.6 and an average error of 1.0%. The average sound intensity measured in the library room is 56.24 dB. The average percentage of success of the system on Buzzer and Warning text alerts is 97.3% and the average percentage of success in sending data to the webserver on the noise level detector is 95% (Hidayat et al., 2019). Design of low-cost wireless noise monitoring sensor unit based on IoT concept by involving a complete noise data information system, ranging from sensor structures to data visualization and data analysis. The overall design, characteristics, and performance of the sensing system for continuous measurement of urban noise pollution are discussed (Anachkova et al., 2021). A Real-Time Noise Monitoring System Based on Internet of Things for Enhanced Acoustic Comfort and Occupational Health with results showing the proposed system as adequate sound surveillance to improve acoustic comfort and well-being. The system was tested in the laboratory for two months using

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

continuous, real-time data collection. Average sound levels range from 47.35 to 52.99 dBA and from 46.22 to 51.84 dBA stratified by day of the week and time of the week, respectively (Marques & Pitarma, 2020).

There have also been many applications of internet of things technology made by other researchers, such as measuring the alcohol content in fruit with the application of the internet of things using the blynk application (Nursila et al., 2021). Furthermore, there is also the application of the internet of things on the notification of the infusion running out using social media applications with the telegram application (Candra et al., 2020). Rain monitoring system for internet of things-based nutmeg drying using the ThingsiO.AI website (Ilham et al., 2021). Application of internet of things for Heart Rate Monitoring and Stimulation tool with the Thingspeak application display as the interface display (Ilham et al., 2019). The application of the internet of things for light control by using the telegram application (Candra et al., 2019).

From several studies that become the background above, this research focuses on Noise Monitoring as an effort to minimize Internet of Things (IoT) based noise by utilizing sound sensors as sound detectors and dfplayer devices as a warning if the detected sound exceeds a predetermined standard. and also apply the control system via the blynk application to the smartphone.

LITERATURE REVIEW

Learn how to teach

The teaching and learning process is a process that educates students so that students have good character, teachers, and students based on reciprocal relationships that take place in educational situations to achieve certain goals in the process of educating students' character. The interaction or reciprocal relationship between teachers and students is the main requirement for the ongoing teaching and learning process. Interaction in the teaching and learning process has a broader meaning, not just the relationship between teachers and students, but in the form of educative interactions or mutual support between teachers and students. In this case, it is not only the delivery of messages in the form of subject matter but also the cultivation of attitudes and moral values in students who are learning.

Standard Noise Level Limits Based on Environmental Noise Zones are classified into several groups according to the noise level produced as follows: Zone A: Intensity 30 – 45 dB. Zone designated for education and recreation.

Sound sensor

The sound sensor is a very sensitive sensor module that can detect the amount of sound to be converted into electrical quantities with a converter to dB which will be processed by the microcontroller chip. This module works on the principle of the power of incoming sound waves with a current to dB converter.

Figure 1. Sound sensor

DFPlayer mini

DFPlayer Mini is a sound player module that can support several files, one of which is an mp3 file which is generally used as a sound file format. This mini DFPlayer has a 16 pin interface, namely standard DIP pins and header pins on both sides. Here is a mini DFPlayer image:

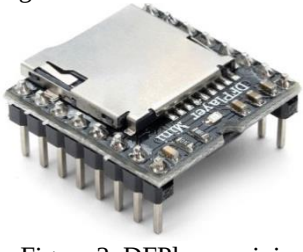

Figure 2. DFPlayer mini

Brilliance
Research of Artificial Intelligence

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

Speaker

Speakers are output hardware that displays the results generated by the CPU in the form of audio/sound. Speakers can also mention tools for the sound output produced by music devices such as MP3 players, DVD players, and so on. The speaker here functions as a tool to convert electrical waves that were originally from an audio/sound amplifier device into a vibration wave in the form of the sound itself. The process of changing the electromagnetic wave to the sound wave starts from the electric current in the audio/sound amplifier and then flows it into the coil. In the coil there was an influence of the magnetic force on the speaker by the strength of the electric current obtained, the resulting vibration ie on the membrane will follow. Thus, there are sound waves that we can hear in everyday life.

Figure 3. Speaker

METHOD

In the implementation of the implementation of this tool using hardware and software as follows:

Hardware

The hardware used includes:

Table 1. Hardware and Specifications

Number	Hardware	Specification
1	Nodemcu	Amica Version 3
2	Sound Sensor	standard
3	Breadboard	Mini
4	Jumper Cable	Male to Female
5	*DFPlayer mini*	16 pin

Software

The software used in this research are:

Table 2. Software and Specifications

Number	Software	Specification
1	Blynk	2.27.15
2	Arduino IDE	1.8.5
3	Fritzing	0.9.2b

Design Chart

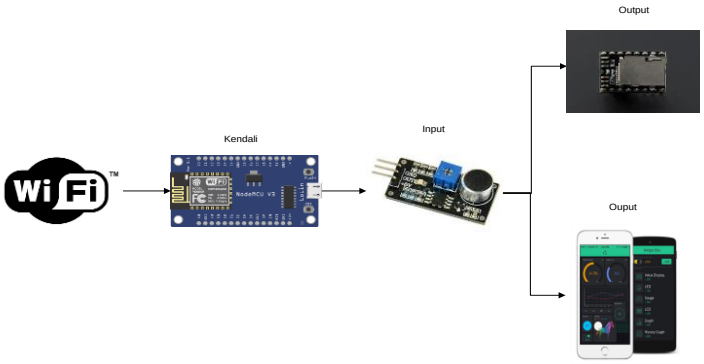

Figure 4. Design Chart

Information:
1. Wifi works as a hotspot
2. Nodemcu works as a component controller
3. Sound sensor works as a detector

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

4. Dfplayer as Sound Output
5. Blynk as monitoring site

Design Analysis

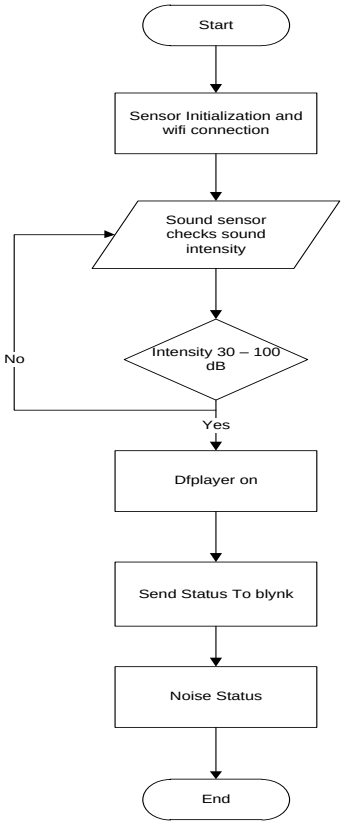

Figure 5. Design Analysis

Based on Figure 5. the design analysis can be explained in the design of the tool consisting of several stages, namely:

1. first when the system starts up, nodemcu is connected to wifi, initializes the sound sensor.
2. The sound sensor checks the sound intensity.
3. If the intensity exceeds 50 – 100 dB then the dfplayer is on
4. If it does not exceed 50 dB, the sensor will check the sound intensity again
5. The data is sent to the blank in the form of a graph
6. Can be monitored to the blynk application

Tool Design Schematic

Where all components are connected, the system starts to run, then run, nodemcu will be connected to the wifi/network and the sound sensor detects the noise of the schoolroom if the noise exceeds 50 to 100 then the dfplayer will issue an output in the form of sound and frequency graphs can be monitored dB in the Blynk App.

Brilliance
Research of Artificial Intelligence

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

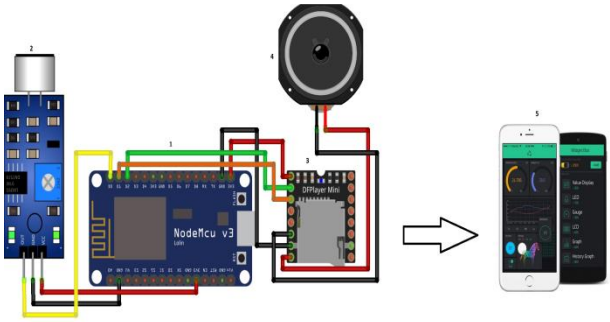

Figure 6. Design Schematic

The ATMega328 microcontroller is written using Arduino IDE 1.6 software after the program has been written, the entire program content has been entered into the microcontroller chip through the interface with the computer. So that all programs have been entered and can be read by the microcontroller, and then from the program, the microcontroller can control the system according to the program instructions given/entered.

The microcontroller is an IC (Integrated Circuit) which contains complex logic circuits to perform actions. The microcontroller has a memory so that it can store programs for control.

A new Microcontroller is still empty memory because it needs to be filled in the program to be used. On Arduino there is a special program for data communication as well as for translating the Arduino programming language, this program is called the bootloader. The bootloader serves to bridge Arduino programs made with ATMega hardware as well as the operating system on a computer that bridges its hardware and software. Therefore, for a microcontroller to function as an Arduino, it must first enter the appropriate bootloader. The bootloader can automatically be inserted into the Microcontroller using the Arduino IDE.

RESULT

Testing Tool

After the system is completed, it is necessary to test the system. Where the instrument is tested at SMA Negeri 1 Tapaktuan with a total of 35 students and a room area of 4 x 3 M. When the sound sensor detects a noise level between 30 dB to 49 dB then dfplayer will issue a warning in the form of a warning "this room is noisy" and send a notification to the blynk application with the text "room A is noisy" if the sensor detects noise above 50 dB then a loud warning will be issued by dfplayer in the form of sound and at the same time send a notification to the blynk application.

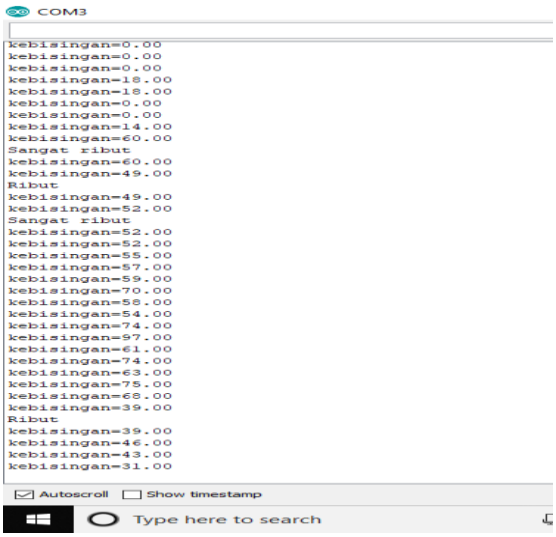

Figure 7. Testing Tool on Serial monitor

In figure 7. the noise number is 30 to 49 dB, it will give a warning that "this room is noisy" if it is 50 to 100 dB, a loud warning will come out that "this room is very noisy" and send a notification via the blynk token so that the data received by the sensor can be monitored via the blynk application on the smartphone. To check directly through the Arduino idea, you can open a serial monitor to directly monitor the data read by the sensor.

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

Table 3. Sound sensor reading distance

Number	Distance	Sensor reading	Information
1	5 Cm	30 dB	This room is noisy
2	20 Cm	18 dB	No fuss
3	50 Cm	60 dB	This room is very noisy
4	100 Cm	49 dB	This room is noisy
5	125 Cm	54 dB	This room is very noisy
6	250 Cm	52 dB	This room is very noisy
7	300 Cm	68 dB	This room is very noisy

The first study used tool A in the SMA 1 Tapaktuan room. When the sound sensor detects noise in the room, the sensor will send a warning according to the noise level. If the noise is between 30 and 49 dB, the first warning will sound “this room is noisy” and send a notification to the blynk application with the text “this room is noisy”. when the sensor detects a noise level of 50 dB and above, a loud warning is issued in the form of a sound "This room is very noisy, it can interfere with the concentration of teaching and learning" and sends a notification to the blynk application with the text "this room is very noisy" making it easier for the picket teacher to know that the room is in a state of emergency. noisy . and the sound sensor reading distance is 200 cm.

Classroom testing

Where the tool is placed in the middle of the room so that it detects noise in the room faster. When the sound sensor detects a noise level of 30dB, dfplayer will issue a warning in the form of a "this room is noisy" sound and send a notification to Blynk. If the noise level is 50dB then dfplayer will issue a loud warning in the form of "this room is very noisy" and send a notification to Blynk.

Figure 8. Tool A in the room

DISCUSSION

Testing of noise detection devices to minimize noise in classrooms at schools has been carried out and obtained results that are in accordance with the plans and designs that have been designed, namely testing the detection of sound sensors and dfplayer and speaker connections used as well as network connections for notifications using the blynk application.

CONCLUSION

After designing and realizing the Noise Monitoring Tool as an Effort to Minimize Internet Of Things (IoT)-Based Noise and then testing the tool, both testing in the form of each series or as a whole. So it can be concluded:

1. Any noise detected by the sound sensor then dfplayer will issue a small or loud warning and send a notification to the blynk application.
2. Every noisy room can be displayed its status on the blynk application
3. Sensor readings of 30 to 49dB can be categorized as noisy, while 50 to 100dB is categorized as very noisy.

REFERENCES

Ahmad, F., Handayani, I. D., Margiantono, A., Teknik, F., & Semarang, U. (2018). Analisis Tingkat Kebisingan di Universitas Semarang dengan Peta Kontur menggunakan Software Golden 14. *ELEKTRIKAL*, *10*(2), 22–27.

Ahmad, F., Handayani, I. D., & Nurweni, S. (2018). Analisis Tingkat Kebisingan Terhadap Aktivitas Belajar Mengajar

Volume 1, **Number** 2, November 2021
https://doi.org/10.47709/brilliance.v1i2.1217

Di Fakultas Teknik Universitas Semarang. *Jurnal Pengembangan Rekayasa Dan Teknologi*, *13*(2), 43. https://doi.org/10.26623/jprt.v13i2.930

Anachkova, M., Domazetovska, S., Petreski, Z., & Gavriloski, V. (2021). Design of low-cost wireless noise monitoring sensor unit based on IoT concept. *Journal of Vibroengineering*, *23*(4), 1056–1064. https://doi.org/10.21595/jve.2021.21709

Candra, R. A., Ilham, D. N., Hardisal, H., & Sriwahyuni, S. (2019). Light Control Design by Using Social Media Telegram Applications Based on Internet Of Things (IOT). *SinkrOn*, *3*(2), 200. https://doi.org/10.33395/sinkron.v3i2.10094

Candra, R. A., Saputra, D. S., Ilham, D. N., Setiawan, H., & Hardisal, H. (2020). The Infusion of Notification Design With an Application of Social Media Based on a Internet of Things (IOT). *SinkrOn*, *5*(1), 129. https://doi.org/10.33395/sinkron.v5i1.10610

Hidayat, A. D., Sudibya, B., & Waluyo, C. B. (2019). Pendeteksi Tingkat Kebisingan berbasis Internet of Things sebagai Media Kontrol Kenyamanan Ruangan Perpustakaan. *Avitec*, *1*(1), 99–109. https://doi.org/10.28989/avitec.v1i1.497

Ilham, D. N., Hardisal, H., Balkhaya, B., Candra, R. A., & Sipahutar, E. (2019). Heart Rate Monitoring and Stimulation with the Internet of Thing-Based (IoT) Alquran Recitation. *SinkrOn*, *4*(1), 221. https://doi.org/10.33395/sinkron.v4i1.10392

Ilham, D. N., Satria, E., Anugreni, F., Candra, R. A., & Kusumo, H. N. R. A. (2021). Rain Monitoring System for Nutmeg Drying Based on Internet of Things. *Journal of Computer Networks, Architecture, and High-Performance Computing*, *3*(1), 52–57. https://doi.org/10.47709/cnahpc.v3i1.933

Jmr, S., & Widianti, S. Y. (2018). Rancang Bangun Pengontrolan dan Monitoring Kebisingan Ruangan Berbasis Mikrokontroler AVR ATMega 8535. *Electrical Technology*, *3*(1), 1–5.

Marques, G., & Pitarma, R. (2020). A Real-Time Noise Monitoring System Based on Internet of Things for Enhanced Acoustic Comfort and Occupational Health. *IEEE Access*, *8*, 139741–139755. https://doi.org/10.1109/ACCESS.2020.3012919

Nursila, N., Ilham, D. N., Yunan, A., Harahap, M. K., & Candra, R. A. (2021). Prototype of IoT-Based Fruit Alcohol Level Measurement Tool. *Brilliance: Research of Artificial Intelligence*, *1*(1), 8–13. https://doi.org/10.47709/brilliance.v1i1.1078

Pringgahapsari, S. (2010). Intensitas Kebisingan pada ruang baca di Kantor Arsip Perpustakaan Daerah Kota Yogyakarta. In *SKRIPSI*.