1 Detection System of Sound Noise Level (SNL) Based on Condenser Microphone Sensor

Juniastel Rajagukguk1, Nurdieni Eka Sari1 1)Department of Physics Universitas Negeri Medan Corresponding author: juniastel@yahoo.com

Abstract. The research aims to know the noise level by using the Arduino Uno as data processing input from sensors and called as Sound Noise Level (SNL).

The working principle of the instrument is as noise detector with the show notifications the noise level on the LCD indicator and in the audiovisual form. Noise detection using the sensor is a condenser microphone and LM 567 as IC op-amps, which are assembled so that it can detect the noise, which sounds are captured by the sensor will turn the tide of sinusoida voice became sine wave energy electricity (altering sinusoida electric current) that is able to responded to complaints by the Arduino Uno. The tool is equipped with a detector consists of a set indicator LED and sound well as the notification from the text on LCD 16*2.

Work setting indicators on the condition that, if the measured noise > 75 dB then sound will beep, the red LED will light up indicating the status of the danger. If the measured value on the LCD is higher than 56 dB, sound indicator will be beep and yellow LED will be on indicating noisy. If the noise measured value <55 dB, sound indicator will be quiet indicating peaceful from noisy.

From the result of the research can be explained that the SNL is capable to detecting and displaying noise level with a measuring range 50-100 dB and capable to delivering the notification noise in audiovisual.

1. Introduction One of the undesirable condition every individual is a situation which can interfere with the comfort, e.g. hearing comfort.

Condition that may interfere with the comfort of hearing is the noise. Government regulation of the Minister of the environment (1996) States, "noise is unwanted sound from the venture or activity within a certain time and levels that can cause human health problems and environmental comfort."

Health problems that can be caused by noise surely will have impact, both in terms of psychological, physiological, communications and hearing. Suyatno (2010) States, "in daily life, especially the activities of work, a lot of things often spoken about comfort in the work, one of which was the disruption caused by the comfort noise that accepted.

" Humans in daily life surely hear many type of voices, like conversation, the sound of music, vehicles, and machinery, which unrealize can cause problems. Sound frequency that is too high can interfere with comport and human hearing. Many of the diseases and disorders can be caused by noise both in terms of psychological, communication and hearing.

In one room, the sound is not needed will make human beings that exist within disturbed and unable to concentrate. At industry events, the sound of machine work with the frequency of the vibration exceeds the threshold of hearing will have an impact on the health of worker. 2 Existing noise problems of the surroundings needs to get serious attention as it can affect the balance between human and their environment.

Because noise is a form of pollution generated sound. Therefore, if is not can be removed the needed a way to reduce the noise. Noise level measurement is a test to determine how large the value of noise on an activity. Tools used to measure Sound Levels Meter (SLM) with units of Decibel (dB) in which this tool can only measure the noise level only.

The development of a more advanced technology, make human work easier by using technology. Human work easier by using technology to all forms of activities and get the result efficiently. In the case of noise in the environment, the public may know the noise levels automatically with the diverse condition of notification in accordance with the level of the frequency displayed on the output of the detector will be designed tools, so from the information the form of the anticipate the noise by using earplugs and earmuff.

Based on the noise problem has been accompanied by the presence of designs a tool that relate with problem in it, which can help the field of health, industry and agencies in measuring noise levels for different purposes. Suyatno research (2010) managed to make a noise detection instrument sound AVR microcontroller based. The Tool created

has the ability measurement ± 58 dBA up to ± 95 dBA, the noise and able to provide information in three condition, that is safety, threshold danger, and very dangerousm which is indicated with a warning lamp.

While research Ariyanto (2011) design tool based on noise detection library Atmega microcontroller 8535 with ouput that is already in the form of warning sounds automatically. But the result of the noise level is still on a seven segment, the sound indicated in the room was 43.4 dB. Further research of kharis (2013) makes a noise detection instrument with microcontroller Atmega 16 using a microphone as the sound catcher sensor.

This tool is capable of detecting of 55 dB range value 56-75 dB with warning in the form of dot matrix LED and buzzer as a disversion. Jamaludin research (2014) makes the design and implementation of sound level meter (SLM) laboratory scale as a tool to measure the intensity of the sound-based microcontroller. This instrument is capable of measuring in relevant difference ± 5.0 % compared to SLM artificial industry.

On a specific frequency value will decrease caused by external and internal conditions, the measurement should be done on a sound-proofed room. Based on the description, we designed the noise detection instrument automatically with notification in three conditions. The condition report that displayed from instrument are safety, noisy and danger by using microphone condenser sensor with tone decoder LM 567 as amplifier circuit of sensor. Furthermore, hardware controller modules based on Arduino Uno microncontroller which contained an Atmega 328 is utilized in controlling the hardware.

Data from output voltage is measured 2. Method This work began from designing of circuits that used in SNL system. Several support devices of SNL system like circuit of power supply, noise detector, LCD display, and module voice have been developed. The construction of the system is using main components as follows microcontroller, arduino uno module, sound sensor, amplifier IC LM 567, voice module, LED and LCD. 2.1. Power Supply Circuit The power supply circuit is used to activate the sensors on the circuit as shown at Figure 1.

Transformator CT is a step down that serves to lower the voltage to 220 volt AC to 12 volt AC by using the function of the diodes on the 12 volt DC into. 12 volt DC the levelled by a capasitor so that produced 5 volt voltage regulator. 2.2. Sensor Circuit Sensor circuit based on decoder LM 567 to detection of noise was designed and shown at Figure 2.

Beside as detector, condenser microphone with the tone decoder LM 567 role as well

op-amps. Operational Amplifier (op-amp) is the amplifiers has two inputs and one output voltage that is proportional to difference in voltage between the two input. The advantage of the use of operational 3 amplifier is ideal so that approaching characteristic in designing a circuit using this amplifier easier and be able to work on a level which is quite close to the theoretical work characteristics (Tuwaidan, 2015).

In the series there are some diodes as a wave rectifier and capasitor as electric energy stronge. Figure 1. Power Supply Circuit Figure 2. Noise detector sensor circuit. 2.3. LCD Circuit LCD (Liquid crystal Display) sircuit can be seen in Figure 3. The size of LCD is 16 x 2 used as display processed data viewer microcontroller Arduino Uno. The tool is mounted outside the box series microcontroller.

Configuration of 16 characters and 2 lines with each character formed by 8 pixel lines and 5 columns of pixel and 1 pixel line is krusor (Tokheim, 1994). Figure 3. Series LCD which is connected with the arduino 2.4. A series of module Voice A series of modules designed to use voice IC ISD 1508. On each type of IC ISD codes names on the last two digits indicate the maximum time duration of old that is able to be stored into the device.

In this IC have include some need recording and calling data back including the microphone amplifier, sound amplifier and speaker filters to display the sound back (Tokheim,1994). In figure 4 looks to form sets of voice module. 4 Figure 4. A series of module voice 3. Result and Discussions 3.1. Description of Noise detection Tools Operation of the tool starting with connecting power supply to enable the detection device.

The tool will display a description of the detection system noise and then measuring the noise level and displays the results of the measurements of the notification on the LCD. The design noise detector tool have some indicators include: 1. Audio Indicators: a. Silent is indicated safe condition b. So oBNisy" ndtes stao noa ange 2. Visual indicators in the form of LED: a. Green LED is light indicating the safe condition. b.

Yellow LED is light indicating the status of noise. c. Red LED is light indicating the status of the danger. These two types of indicators are working together and accompanied by a description of the notification on the LCD screen. Figure 5. Portable object of SNL detector 3.2. Testing of Power Supply Circuits Power supply circuit is work to serves the tension to the whole series.

This series consists of two same output value amounting to 12 volts. Voltage control for micro system using voltage with a value of 5 volts. From Table 1. It can be explained that

the results of testing the power supply in accordance to spesification and need 5 volt sensor supply. 5 Table 1. Output voltage of power supply test No Output Voltage (Volt) Measured Voltage (Volt) 1 12 12 2 5 5 3 3.3.

Testing of Noise Detection Sircuits Calibration testing is done in a closed room, sound-proof and to avoid the existence of other sources of sound affects testing. Parameters measured from the source of the sound the buzzer this is magnitudes ADC acquired and processed as well as compared with the standard detector sound Level Meters. The results of measurements of the ADC and the comparison against the SLM standard can be seen in table 2. . Table 2.

The Value of ADC Measured By a condenser microphone and comparison with SLM standard. No Noise level ADC SLM (dB) 1 1 23 50 2 2 123 55 3 3 223 60 4 4 323 65 5 5 423 70 6 6 523 75 7 7 623 80 8 8 723 85 9 9 823 90 10 10 923 95 11 11 1023 100 Based on Table 2 it can be seen that the smallest value of the ADC sensor is 23 when the sound level is the minimum level or buzzer intensity of 50 dB.

At a time when the sound level is raised in constant measurement result then the ADC also rise constantly. The big rise in the value of the ADC is of 100 for every rise in buzzer sound level. It is also directly proportional to the measuring results of the SLM that is the higher the ADC sensor value, the SLM value is also higher. Figure 6.

Noise Level Calibration Graph. 3.4. Testing of Sound Module Series Before all of main components were combained, each 6 Table 3. testing voltage input sound module. No Condition Voltage (Volt) 1 Beep 5 2 Mute 0 Testing voltage input modules sound on table 3 explains that when the condition voiced the voltage read on the multimeter by 5 volts while on the off voltage conditions read 0 volt. For testing the sound module series can be seen in table 4 below. Table 4.

Testing Sound Module Series No Sound Source (dB) Information Notice 1 50 peaceful Good 2 55 noisy Good 3 76 Danger Good Based on Table 4. It can be seen that for the value of the measured noise 50 dB then no sound information conveyed (silent). If the measured 55 dB noise and 76 dB sound module will pass on the information in the form of sound.

From the results of the above testing can be ensured that the condition of the sound module developed in good condition and in accordance with the programming done on an arduino. 3.5. Testing of LED series Before all of main components were combained Table 5. the input voltage of the LED testing No Condition Voltage (Volt) 1 Beep 5 2 Mute 0 Based on Table 5.

The input voltage of the LED test used in this study using LED with 5 volt input voltage. After the input voltage known then testing a series of LED can be seen in table 6. Table 6. Testing a Series LED No Sound Source (dB) LED Ket Red yellow Green 1 50 3.6. Testing of SNL system Table 7.

testing tools against noise No Sound Level Intensity (dB) Status in display Colour Indicator Sound Indicator Red yellow Green Silent sound 1 1 54 Good 7 6 6 81 Danger CONCLUSION Based on the research that could be taken conclusions noise detection tool-based arduino uno using sensors with tone decoder LM 567 designed worked well the percentage of errors of measurement noise of 0.7 %.

With the capabilities of the tool can measure the range of the value of the 50-100 dB accompanied by notification in three conditions, that is safety, noise and danger. References [1] Ariyanto, Iwan, (2011), Rancang Bangun Pendeteksi Kebisingan pada Perpustakaan UNISBANK Semarang, Skripsi, Universitas STIKUBANK, Semarang. [2] Jamaludin, J., Suriyanto, S., Adiansyah, D., & Sucahyo, I.,

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