UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF CLASSROOM NOISE DETECTOR USING ARDUINO

This report submitted accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM)) for the Bachelor's Degree of Electronic Engineering Technology (Industrial Electronics) (Hons.)

by

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ABSTRACT

Noise is characterized as undesirable sound. Ecological noise comprises of all the undesirable sounds in our groups aside from that which starts in the work environment. Ecological noise contamination, a type of air contamination, is a risk to wellbeing and prosperity. It is more extreme and across the board than any other time in recent memory, and it will keep on increasing in extent and seriousness in light of populace development, urbanization, and the related development in the utilization of progressively intense, differed, and very versatile wellsprings of noise. It will likewise keep on growing as a result of managed development in thruway, rail, and air movement, which stay real wellsprings of natural noise. The potential wellbeing impacts of commotion contamination are various, pervasive, relentless, and restorative and socially critical. Clamor delivers immediate and total unfavorable impacts that debilitate wellbeing and that debase private, social, working, and learning situations with comparing genuine (monetary) and impalpable (prosperity) misfortunes. It meddles with rest, fixation, correspondence, and entertainment. The point of illuminated legislative controls ought to be to shield residents from the unfavorable impacts of airborne contamination, including those delivered by noise. Individuals have the privilege to pick the way of their acoustical surroundings; it ought not be forced by others

Abstark

      Hingar mempunyai ciri-ciri sebagai bunyi yang tidak diingini. bunyi ekologi terdiri daripada semua bunyi yang tidak diingini dalam kumpulan kami selain daripada itu yang bermula dalam persekitaran kerja. pencemaran bunyi ekologi, sejenis pencemaran udara, risiko untuk kesejahteraan dan kemakmuran. Ia adalah lebih ekstrem dan menyeluruh daripada masa yang lampau yang pernah berlaku, dan ia akan terus meningkat di tahap dan kesungguhan dengan perkembangan penduduk, urbanisasi dan pembangunan yang berkaitan dalam penggunaan semakin sengit, berbeza, dan sangat fleksibel wellsprings bunyi. Ia juga akan terus berkembang sebagai hasil daripada pembangunan diuruskan, kereta api, dan pergerakan udara, yang tinggal sebenar bunyi semula jadi. Kesan kesejahteraan potensi pencemaran kekecohan adalah pelbagai, meluas, tidak henti-henti, dan pemulihan dan sosial yang kritikal. Teriak menyampaikan kesan yang tidak menguntungkan serta-merta dan jumlah itu melemahkan kesejahteraan dan yang menghina peribadi, sosial, bekerja, dan situasi pembelajaran dengan membandingkan tulen (kewangan) dan yg tak mudah difahami (kemakmuran) musibah. Ia ikut campur dengan yang lain, penetapan, surat-menyurat, dan hiburan. Titik kawalan perundangan diterangi sepatutnya untuk melindungi penduduk dari kesan yang buruk pencemaran udara, termasuk yang disampaikan oleh bunyi bising. Individu mempunyai keistimewaan untuk memilih cara persekitaran akustik mereka; ia tidak patut dipaksa oleh orang lain.

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APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms

of scope and quality for the award of degree of Electronic Industry Technologies Engineering.

Signature   :

Supervisor name: Mr. Mohd Syahrin Amri bin Mohd Noh

Date   : 9 January 2017

DECLARATION

I hereby, declared this thesis entitled "Development of Classroom Noise Detector Using Arduino" is the results of my own research except as cited in references.

Signature   :   *saiful*

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Date   : 9 January 2017

TABLE OF CONTENTS

Chapter

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

In order of development of this project, some overview about the noise detector in classroom and aware system using microcontroller based on Arduino such as project background, project objective, problem statement, project scope and the report outline will be obtainable.

1.0 Project Background

The noise levels in the classroom can cause discomfort among students and lecturers to continue the learning process. So, this project is to measures the volume of the noise in a classroom and displays a LCD indicator with bulb display to show whether the classroom is noisy or not. By implementation this project, its will create a calm atmosphere in classroom. For this project, Arduino kits will be used as the main hardware of this project. In this project four sensor will be used. The sensor used as receiver and transmitter. The receiver will collect the surrounded noise and it will be transmitted to the Arduino kits. The Arduino kits will process the signal whether the noise is over the set value or not in dBA. If the noise is over the set value, so the Arduino will give the output to the bulb display and the LCD display with the trigger alarm.

1.1 Project Objective

The objectives of this project are:

    1.   To study the level of noise in FTK classroom

    2.   To develop a software and hardware using Arduino kits

3. To design a prototype that can indicate the noise level

1.2   Problem Statement

Now days, the number of FTK student are increasing year by year, so this phenomenon make the situation in FTK classroom are too noisy and it became uncomfortable situation for learning process.

The problem that encountered due to noisy situation is:

1. Noisy situations disrupt the learning process

2. This noisy situation disrupts classes nearby to continue the learning process

3. The acceptable noise level cannot be determined

1.3   Project Scope

This project scope is to build a noise level detector system by collecting the noise level in FTK classroom. The circuit is constructed with suitable sensor and microphone to collect the noise level. The noise will be collect and then convert into dbA. If the dbA value is above the set value, so the LED will give the output.

The software that will be used is source Arduino Software (IDE), the coding will be write in this software and then will be compile in Arduino kits. In hardware, the Arduino kits will be connected with the sensor and the LED display which will act as the input and output device.

1.4   Report Outline

In chapter 1 clarifies the overview that comprises concept of noise detection and noise frequency. It also sketches the objectives, problem statement and scopes of this system.

In chapter 2 describes the literature review of current records, circuits and problem statement with regard to the project.

2

In chapter 3 provides description about the methodology in order to implement this project from the start until the end. The methodology is illustrated using the flow chart and each of the contents of the flow chart is described in this part. Besides, the circuit design that uses Proteus 8 Professional will be also explained in chapter this chapter

1.5   Conclusion

This section gives general view of the project such as project contextual that outlines the project objectives, problem statements, project scopes. The search of the of noise detector, noise frequency and level of noise frequency that interrupt the atmosphere that can be used as the references in order to get the idea to implement this project. Then, the problem statement helps to improve the system that will be created, so that it will be more effective than the existing noise detector system available in the market. Besides, the project scope will set a boundary so that the study will focus only within the desired result where in this project is to proposal a classroom noise detector using Arduino.

CHAPTER 2

LITERATURE REVIEW

Literature review is the findings about the significant info in order to give the idea on how to appliance this project. All the material is occupied from numerous resources such as journals, books, thesis and some valid websites. Since these materials, associated and applicable info will be collected so that the noise detector in classroom based on microcontroller for the classroom in FTK can be established. In this chapter will clarify some of the significant findings related research existing on sound detecting project, some references circuit modifications and project contributions so that it creates novelty as compared to existing noise detecting systems.

2.0   Noise

Noise is an assortment of sound. It suggests any undesirable sound. Sounds, particularly loud ones, that irritate people or make it difficult to hear required sounds, are noise. For example, dialogs of different people may be called noise by people excluded in any of them; any undesirable sound, for instance, neighbors playing tumultuous music, helpful mechanical saws, road movement sounds, or an evacuated plane in quiet completely open, is called noise.

Noise is measured in units of sound pressure stages called decibels, named after Alexander Graham Bell, utilizing A-weighted sound levels (dBA). The A-weighted sound levels intently coordinate the impression of uproar by the human ear. Decibels are measured on a logarithmic scale which implies that a little change in the quantity of decibels results in a huge change in the measure of noise and the potential harm to a man's listening ability.

Table 2-1: Standard Noise Acceptable

LOCATION	EFFECT	MAXIMUM (dBA)
Bedroom	Sleep disturbance and Annoyance	30
Living area	Annoyance and Speech interference	50
Outdoor living area	Serious annoyance	55
School classroom	Speech interference and Communication disturbance	35
Hospitals patient rooms	Sleep disturbance and Communication interference	30 - 35

2.1 Standardization of Noise Level for The Classroom

The American National Standards Institute (ANSI), alongside endeavors of the U.S. Get to Board, Acoustical Society of America, made the ANSI S12.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools standard. Through particular outline necessities and acoustical execution criteria, the standard tries to make a classroom domain that enhances discourse understanding.

In 2004, the American Speech-Language-Hearing Association's (ASHA's) Working Group on Classroom Acoustics suggested that a fitting acoustical environment be built up in all classrooms and learning spaces. ASHA embraces the ANSI standard and prescribes the accompanying criteria for classroom acoustics:

- Unoccupied classroom levels must not exceed 35 dBA

- The signal to-noise proportion (the distinction between the instructor's voice and the foundation noise) ought to be no less than +15 dB at the youngster's ears.
- Unoccupied classroom resonation must not outperform 0.6 seconds in littler classrooms or 0.7 seconds in bigger rooms.

2.2   Different Noise Level Acceptable between Europe and Asian

Acceptable noise level in Europe.

Table 2-2: Noise Level In Europe

Area	Maximum Noise (dBA)
Industrial areas	65
City and town areas	60
Office areas	55
Commercial areas	50
Residential	45

Acceptable noise level in Asian.

Table 2-3: Noise Level In Asian

Area	Maximum Noise (dBA)
Rural living	45
Residential	52
Rural industry	57
Light industry	57
Commercial	62
General industrial	65
Special industry	70

2.3 Research On Similar Project

2.3.1 Classroom Noise Detector

Based on, James W. Groff (2013). A noise alarm for use in a school classroom to detect sound exceeding a predetermined level and which actuates a two-tone audio alarm and a light-emitting diode to notify both the instructor and students when excessive noise has been detected. The noise alarm aids the instructor in preventing excessive classroom noise which can and does disrupt and destroy a given learning situation. A sensitivity controller is provided to let the instructor to regulate the noise level at which the alarm will automatically respond, and time delay means are provided so the audio alarm will not sound unless excessive noise occurs twice

and within a predetermined time frame. The noise alarm also provides a digital LED readout displaying how many times the audio alarm has been triggered, thus providing the instructor with a temporary record which can be used to reinforce acceptable classroom noise levels. Other controls are also provided, allowing the instructor to "erase" the count displayed or to place the noise alarm in a "hold" mode so that the alarm is temporarily disabled without disturbing any count which is currently displayed by the LED readout.

2.3.2 Noise Detector with a Warning Device

In this project, in light of Cawaling, Carreden Fred V Duque, Francis Ray L Capricho, Neil C (2011) the microphone is the kind of sound sensor. Condenser the microphone is the kind of sensor that been use in this project. The gadget plans to recognize noise level that extents from 30-80dBA. Condenser amplifier can get the pointed noise level recognition. The pre-amplifier of the receiver which is to amplifying signal that the microphone grabs. In the wake of amplifying signal, it will be sent to the transmitter. The transmitter signal may be obtained through the receiver and amplified it again through the amplifier and relay the facts to the PIC. The PIC is appearing as the mind of the system which analyzes the signal and triggering its output. The PIC will be relying on the variable time manage when to operate. The variable time manage is the set time of the person while the device can operate. The output of the tool is the LED display. The output of the device will depend upon the PIC.
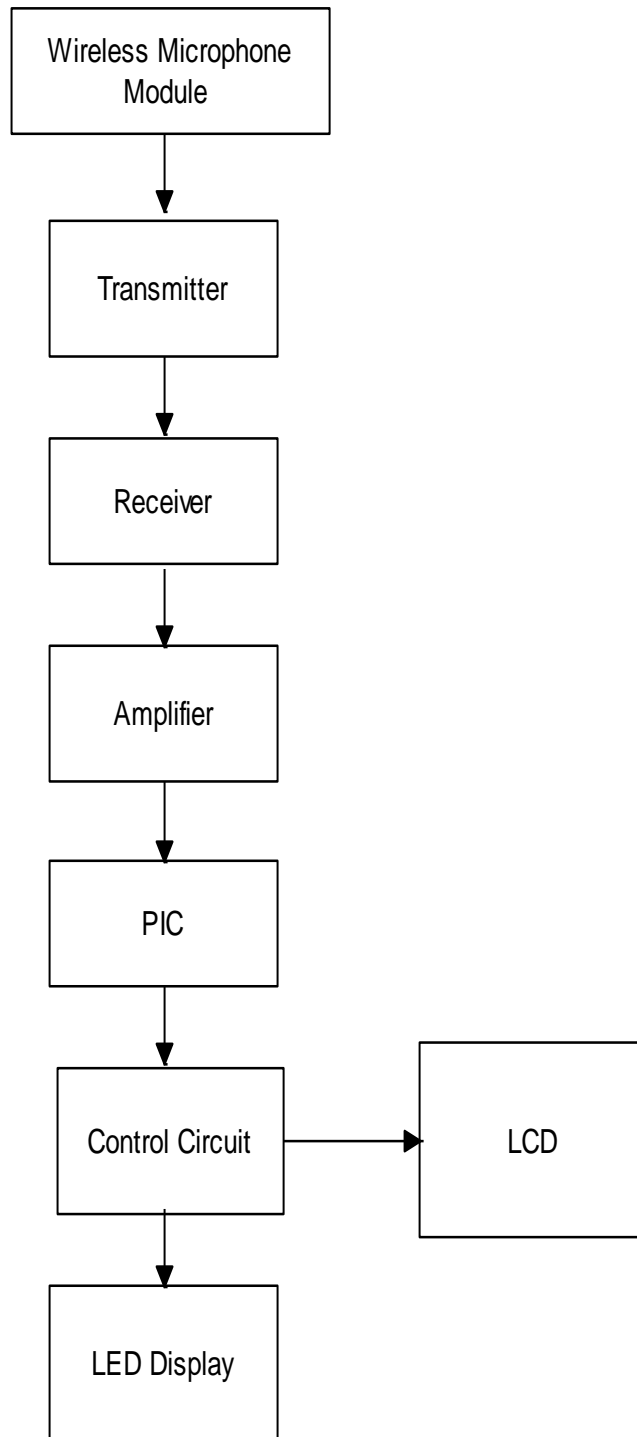
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│   Control Circuit   │───────▶│         LCD         │
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          │
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┌─────────────────────┐
│     LED Display     │
└─────────────────────┘
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Figure 2-1: Noise Detector With a Warning Device Flow Process

2.3.3 The design of the noise detector based on AT89C52 microcontroller

By referring this project by Cai Shasha Fu Sheng College of Mechanical Engineering and Applied Electronics Technology, (2011). In order to achieve real-time detection of noise in the manufacturing field, and offer the basis for the control of noise, the author intended the noise observing system using SCM AT89C52 as the core. Linking the features of the MCU real-time control and data processing competences with the sensor, the device can precisely detect the noise of industrial place. The noise degree will be showed on the LCD screen. Rendering to the noise size, the device will direct out sound and light alarm signs in time. It can also upload the converted data by AD converter chip to the PC using the serial port communication, the drive is to enable the storing of important data and printing. The sensor contains the control circuit, noise observing and conversion circuit, keyboard settings circuit, sound and light alarm circuits, LCD display circuit, communication circuit.
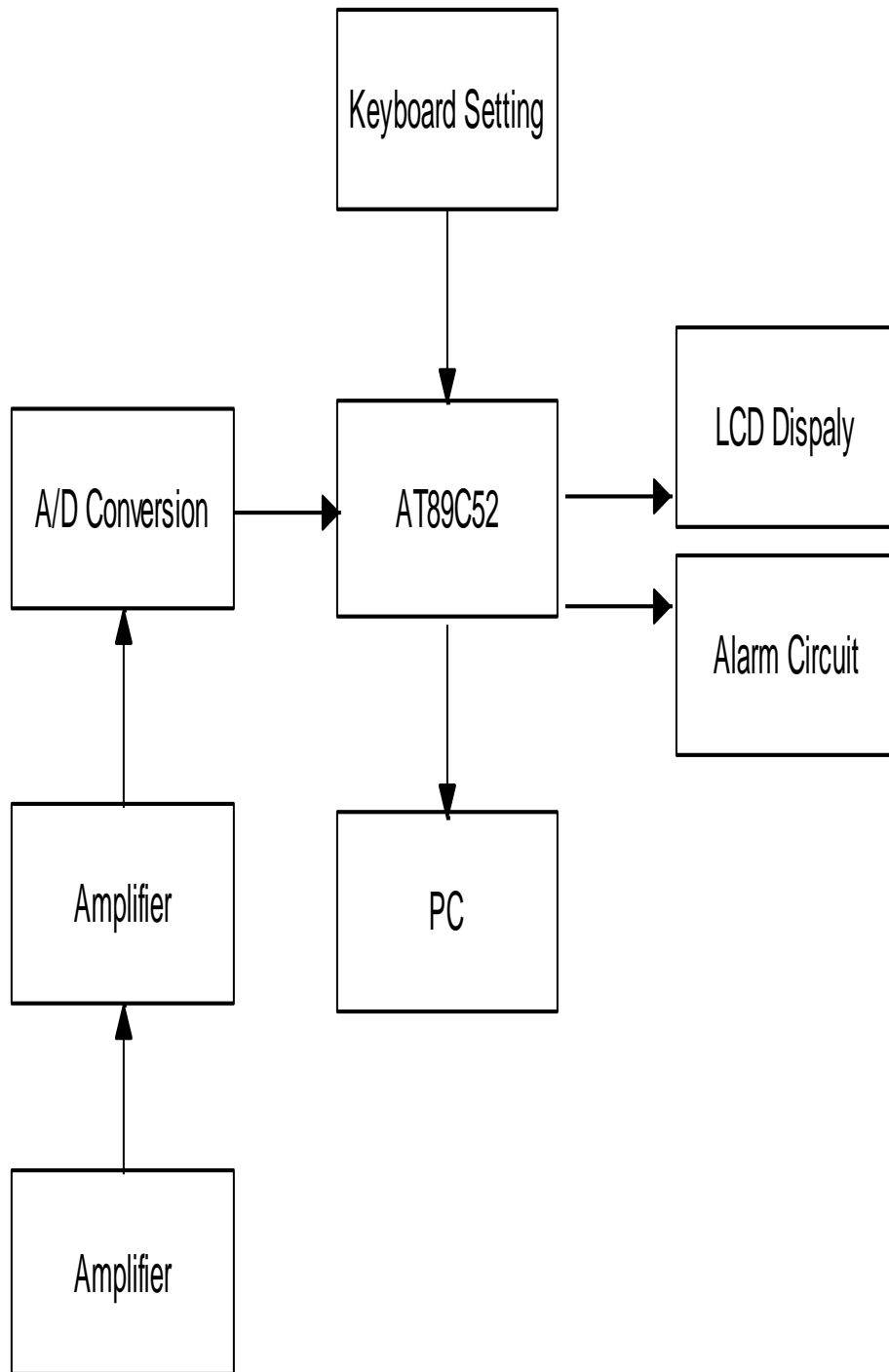
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Figure 2-2: Block Diagram

2.4 Comparison Between Arduino, Microcontroller and Microprocessor

2.4.1 Arduino

An Arduino is such a board, and involves a microcontroller, regular a 8-bit AVR, for instance, the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560, notwithstanding power supplies, pearl, and female headers to interface with disparate periphery sheets.

These periphery sheets are called shields, and are planned to stack on top of each other (there are male sticks on the base of the sheets to interface with the Arduino itself or another shield, and female headers on the top to recognize the male pins of a shield stacked on top of it).

Outline shields are motor control sheets, general I/O sheets, hand-off sheets, Ethernet sheets, and LCD's, ordinarily with a touch-screen. Regardless, I don't know about any resistive touch screens that would be used just for distinguishing proof (without a LCD).

Despite the gear delineated above, Arduino moreover go with a cross-arrange Integrated Development Environment (IDE) written in Java. It was expected to familiarize programming with masters and distinctive novices, much as the BASIC tongue did 50 years earlier. A venture for Arduino is known as a depiction.

Arduino ventures are formed in C or C++, however an expansive number of the purposes of intrigue are gotten away from the customer: only two limits (called by the structure) ought to be described to make a framework that perpetually circles (which is usually for introduced programs).

2.4.2 Microcontroller

A microcontroller then again is a individual single-chip IC that contains a CPU, read-just memory to store the project, RAM to store variables utilized as a part of the execution of the system, and different I/O transports to associate with the outside world, for example, SPI, I2C, UART and others. Independent from anyone else, it can't execute any projects without