



**POLITEKNIK**  
**MALAYSIA**  
**SULTAN SALAHUDDIN ABDUL AZIZ SHAH**



**TITLE:**  
SEMI-AUTOMATIC  
GUITAR TUNER

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**DEP5B**

**POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ  
SHAH**

**SEMI-AUTOMATIC GUITAR TUNER**  
( HARDWARE )

**AHMAD HAZIQ AIMAN BIN HANAFY**

This Report Is Submitted In Partial Fulfillment Of The  
Requirement for Diploma Electrical Engineering (Communication)

Jabatan Kejuruteraan Elektrik Politeknik Sultan Salahuddin Abdul  
Aziz Shah

**June 2019**

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## DECLARATION OF ORIGINALITY

I confirm that the project report are submitting entirely my own work and that any material used from other sources has been clearly identified and properly acknowledged and referenced.

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## **Abstract**

To tune a guitar manually need a great amount of skills because it lays the foundation of learning the pitch by using ear there is some learning curves and stages you need to pass in order to tune it properly. According to a study of UNSW Australia, all sound of the instrument are recorded in Frequency and Period, they called it MIDI note numbers. Therefore, Semi-automatic guitar tuner is built to offer a customer a new alternative to tune his/her guitar. The fact that this is an Automatic Guitar Tuner that require a lot of tweaking also made the app basic enough to give a command to the Arduino and also record the frequency playing while plucking the string that needed to tune.involves a rotation of a motor and a use of an App. The uses of an Arduino MEGA, Bluetooth slave module, continuous Servo Motor coupled together with an app that works as a display. The servo are the one that does the tuning which receive the signal from Arduino and proceeds to rotate the tuning keys to a desired string Frequency. This devices will able to tune guitar automatically with the helps of the app and the hardwares.

Keyword: Servo Motor, Aduino Mega, pitch, tuning.

## **ABSTRAK**

Untuk menala gitar secara manual memerlukan sejumlah besar kemahiran kerana ia meletakkan asas pembelajaran padang dengan menggunakan telinga terdapat beberapa lengkung dan tahap pembelajaran yang anda perlukan untuk menyesuaikan dengan tepat. Menurut kajian UNSW Australia, semua bunyi instrumen dicatatkan dalam Frekuensi dan Tempoh, mereka menyebutnya nombor nota MIDI. Oleh itu, penala gitar Semi-automatik dibina untuk menawarkan pelanggan alternatif baru untuk menyesuaikan gitarnya. Hakikat bahawa ini adalah Penala Gitar Automatik yang memerlukan banyak tweaker juga membuat aplikasinya cukup asas untuk memberikan perintah kepada Arduino dan juga merakam kekerapan bermain sambil memetik tali yang diperlukan untuk menyetel satu putaran motor dan penggunaan App. Penggunaan modul hayat Arduino MEGA, modul hamba Bluetooth, Servo Motor berterusan ditambah dengan aplikasi yang berfungsi sebagai paparan. Servo adalah salah satu yang melakukan penalaan yang menerima isyarat daripada Arduino dan hasilnya akan memutar kunci penalaan kepada Kekerapan rentetan yang dikehendaki. Peranti ini akan dapat menala gitar secara automatik dengan bantuan aplikas dan perkakasan.

Kata kunci: Servo motor, Module Hamba, frekuensi, padang, rentetan

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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

In Malaysia's diverse range, the music industry is always a favourite for Malaysian people. However, there are a lot of opportunities to dive in, we took an opportunity as a student to show our talent in making an option for guitarists to choose from.

Yazid said, besides helping to unload and arrange music on stage, he enjoyed the opportunity to experience drumming for 'tuning' and 'sound check'. From there also came the idea for him, Hillary and another good friend, Zainal (Zainal Rampa) forming a rock-based group called Search around 1979. [1]

(Quoted from a quotation: Berita Harian)

Objective and imagination is an important aspect to achieve something. Once a person imagines the goal, the objective, methodology, introduction, diagram, and circuit planning is slowly coming in a grasp. From the article that we picked up, we are determined by the musicians that create their own drums.

In addition, as a musician myself, we dive into the guitar industry and find a tuning device that can be elaborated more as an option for customers to choose from. Besides manual tuning that needs a great amount of skills, there are manual tuners using pitch pickup devices that are clipped at the head of the guitar picking up the frequency and convert it to notes such as E, A, D, B, G, E in order. There are also fully automatic guitar tuners made by Gibson but the device itself is expensive and sometimes a full-time musician is interested in most of the device.

## **1.2 Problem Statement**

Refer to AGMC-GUITAR TUNING made by a student, the tuner need to be primarily accurate to Frequency MIDI table for E,A,D,B,G,E for standard tuning. Even for E Flat tuning and Drop D tuning. In addition the device need to be noise proof as possible as noise will make the pitch a bit lag/lead which leads into inaccuracies

## **1.3 Objective**

- 1.3.1 To develop Semi-Automatic Guitar Tuner using Aduino and Software.
- 1.3.2 To take the short time and accurate pitch for guitar tuning.

## **1.4 Scope of project**

The scope of this project is focusing at guitarist. This project is understand about the guitar pitch and how tuning works. This project also has the limitation:

- 1.4.1 The Semi-Automatic Guitar Tuner need a more reliable sources of information
- 1.4.2 It cannot operate on highly noise area such as high frequency area

## **1.5 The important and impact of project**

This project has an importance in terms of improvements in accuracies of the pitch itself. Besides that this project is also important for the manufacture of a faster and easier system.

- 1.5.1 Make tuning as accurate as possible
- 1.5.2 Make time tuning faster
- 1.5.3 Easy to use

## **1.6 Outline of report**

Chapter 1 gave an introduction about the project as well as problem statement, objective and project scope for project.

Chapter 2 is a literature review where the main part of programmable semi-automatic guitar tuner will be describes and understanding all components that will be used for this project. The purpose of this chapter is to provide an overview the scope of study for this project.

Chapter 3 is methodology section where the methods or steps that have been used to build up the Semi-Automatic Guitar Tuner. The main component that use in this project is Arduino software to setup the pitch pickup, and converter for motor to rotate. The motor will rotate the tuning keys, and the HC-05 will be used as a receiver.

Chapter 4 is the result and discussion where all the result of the analysis will be shown. Discussion and observation of the outcome of the research in relation to evidence obtained from project and theories will be made in this chapter.

Chapter 5 is conclusion for this project, which describe the overall project based on the observation of the result obtained and summarize the entire project. This chapter also discuss the recommendation for future planning.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 BACKGROUND

Semi-Automatic Guitar tuner is a device that tune your guitar using an aid of app and servo motor to tune the tuning keys, While its not tuned the sound quality of the guitar will differ.

Most of the frequency produced by the microphone will be picked up from Tx Rx pin. Unfortunately, it need a 3<sup>rd</sup> party software and use of other open source and licensed product

We found an Amarino 3<sup>rd</sup> party software that help and aid the data transfer between Main app and adruino. We also found an algorithm called YIN Algorithm, it is a fundamental frequency estimator for speech and music create by Hideki Kawahara from Wakayama University.

### 2.2 Amarino (Android meets adruino)

Normally smartphone events are tightly coupled to your phone device itself. When your cell phone is ringing, your phone speaker plays a ringtone. When you get a new text message, your phone displays it on its screen. Wouldn't it be thrilling to make thoses phone events visible somewhere else, on your wearable, in your living room, on your robot, in your office or where ever you want it to occur? Or would you like to use your smartphone sensors, like the accelerometer, light sensor, compass or your touchscreen to control other devices? Amarino is a toolkit, basically consisting of an Android application and an Arduino library which will help you to interface with your phone in a new dimension. You can build your own interfaces almost without any programming experience.

## **1. Mission of Amarino:**

Cell phones are great for communication in a virtual manner, but lack expressiveness in personal surroundings. Many people try to give their phones a personal touch by customizing them. Amarino is a toolkit to connect Android-driven mobile devices with Arduino microcontrollers via Bluetooth. The toolkit provides easy access to internal phone events which can be further processed on the Arduino open-source prototyping platform. Started as a project at MIT Media Lab at the High-Low Tech group, this toolkit seeks to empower people to externalize their phone events to creatively demonstrate them on wearables, living spaces, or other tangibles.

## **2. Amarino Library:**

Amarino has also an Application Programming Interface (API) which you can use to send and receive data to Arduino within your own application using Amarino's powerful communication infrastructure. There is a JavaDoc about this library at [Documentation](#) providing all necessary information you need to use the library. The `SensorGraph` and the `MultiColorLamp` examples below might also help to understand the API. Note: Since Version 18 of the Android Developer Tools (ADT) the way you add external libraries to your Android Project changed. Before you added external jar files to your Java Build Path manually, but now all you have to do is creating a `libs` directory inside your Android project folder and the ADT will add it automatically to your Build Path.



### 3. Amarino App



If the user has correctly configured and assembled an Arduino with a Bluetooth shield, one of the discovered Bluetooth devices should be the Bluetooth module attached to the Arduino. By tapping the corresponding list entry, the device gets added to Amarino. Then the amarino will record on what happen on our main app that we design on MIT App inventor.

#### 2.3 YIN Algorithm

The fundamental frequency ( $F_0$ ) of a periodic signal is the inverse of its period, which may be defined as the smallest positive member of the infinite set of time shifts that leave the signal invariant. This definition applies strictly only to a perfectly periodic signal, an uninteresting object ~supposing one exists! because it cannot be switched on or off or modulated in any way without losing its perfect periodicity. Interesting signals such as speech or music depart from periodicity in several ways, and the art of fundamental frequency estimation is to deal with them in a useful and consistent way.

##### 1. Introduction

The fundamental frequency ( $F_0$ ) of a periodic signal is the inverse of its period, which may be defined as the smallest positive member of the infinite set of time shifts that leave the signal invariant. This definition applies strictly only to a perfectly periodic signal, an uninteresting object ~supposing one exists! because it cannot be switched on or off or modulated in any way without losing its perfect periodicity. Interesting signals such as speech or music depart from periodicity in several ways, and the art of fundamental frequency estimation is to deal with them in a useful and consistent way

## **2. Conclusion**

An algorithm was presented for the estimation of the fundamental frequency of speech or musical sounds. Starting from the well-known autocorrelation method, a number of modifications were introduced that combine to avoid estimation errors. When tested over an extensive database of speech recorded together with a laryngograph signal, error rates were a factor of 3 smaller than the best competing methods, without postprocessing. The algorithm has few parameters, and these do not require fine tuning. In contrast to most other methods, no upper limit need be put on the F0 search range. The method is relatively simple and may be implemented efficiently and with low latency, and may be extended in several ways to handle several forms of aperiodicity that occur in particular applications. Finally, an interesting parallel may be drawn with models of auditory processing.

### **2.4 Github (Open source)**

GitHub is an American company that provides hosting for software development version control using Git. It is a subsidiary of Microsoft, which acquired the company in 2018 for \$7.5 billion.[4] It offers all of the distributed version control and source code management (SCM) functionality of Git as well as adding its own features. It provides access control and several collaboration features such as bug tracking, feature requests, task management, and wikis for every project.

# **CHAPTER 3**

## **METHODOLOGY**

### **3.1 BACKGROUND**

The methodology is the method or procedures used for carrying out project in more specific. These methods are very important to ensure the completion of the project. The methods that are used including the project planning flow chart and collecting data components.

In this project, We divide the task into two group which is hardware and software. Hardware can touch and feel. It also can be often categorized into input, output, and storage or processing components. Software cannot be touch and need to be design and coded in MIT App Inventor. The information of Semi-automatic guitar tuner has been collected according to the method through various kinds of journal, books and internet which is related to the project. This information has been used in developing the semi-automatic guitar tuner and complete final report appropriately.

### **3.2 PLANNING OF PROJECT SEMI-AUTOMATIC GUITAR TUNER**

In ensuring the Semi-Automatic Guitar Tuner development can be done appropriately, a project planning by using a Gantt charts has been prepared. In this Gantt chart, schedule of plan and subsequently report progress within the project environment has been stated clearly. Initially, in this project, the scope is defined with the appropriate methods for completing the project are determined.

### 3.2.1 Gantt chart

This Gantt charts are used in this Semi-Automatic Guitar Tuner project to illustrate the start and finish dates of the terminal elements and summary elements of a project. A Gantt chart is used for project management, it is the most popular and useful ways of showing activities, task or events displayed against time. This Gantt chart has shown the task that need to be completed within the dateline. Every task need to mark on which number of week the task done will.

Table 1.0 and 1.1 shows a Gantt chart for two semesters which is semester 4 and semester 5. It shows the activities need to do every week. In the table, the orange color is the duration of the task till it done. In semester 4 there are nine activities need to do in 12 weeks while in semester 5 it has six activities in 15 weeks. In semester 5 more focus in build the semi-automatic guitar tuner project while in semester 4 it more to planning and design the semi-automatic guitar tuner project. There are few activities that had been done in the planning date and few activities are not. From this Gantt chart, it make every student to be more punctual in time when doing the work.

Table 1.0: Gantt chart semester 4

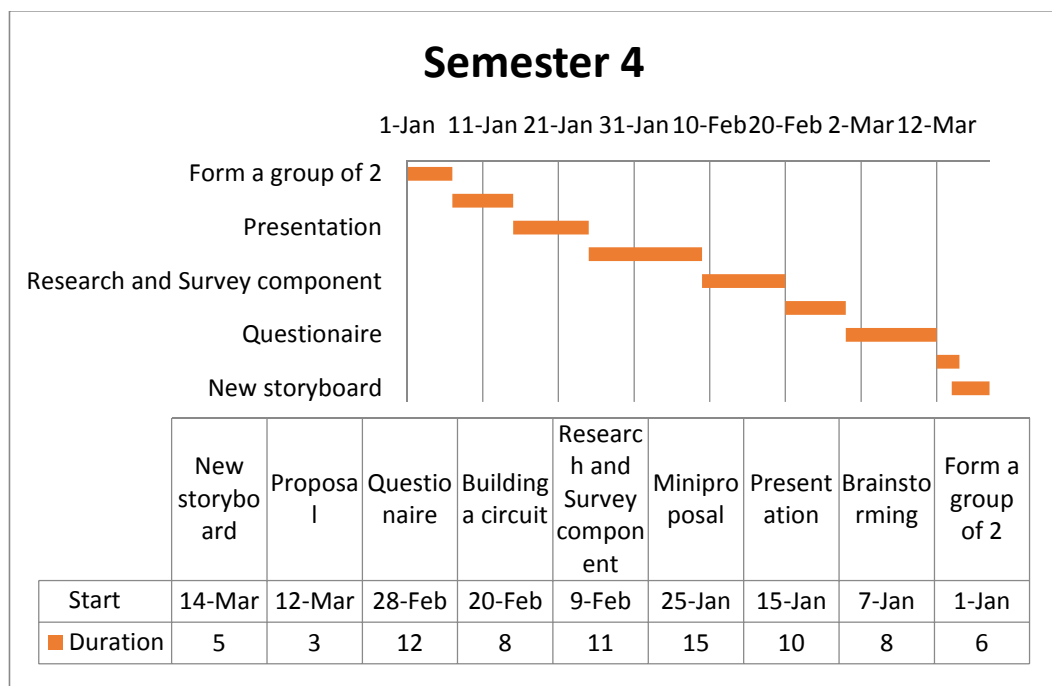
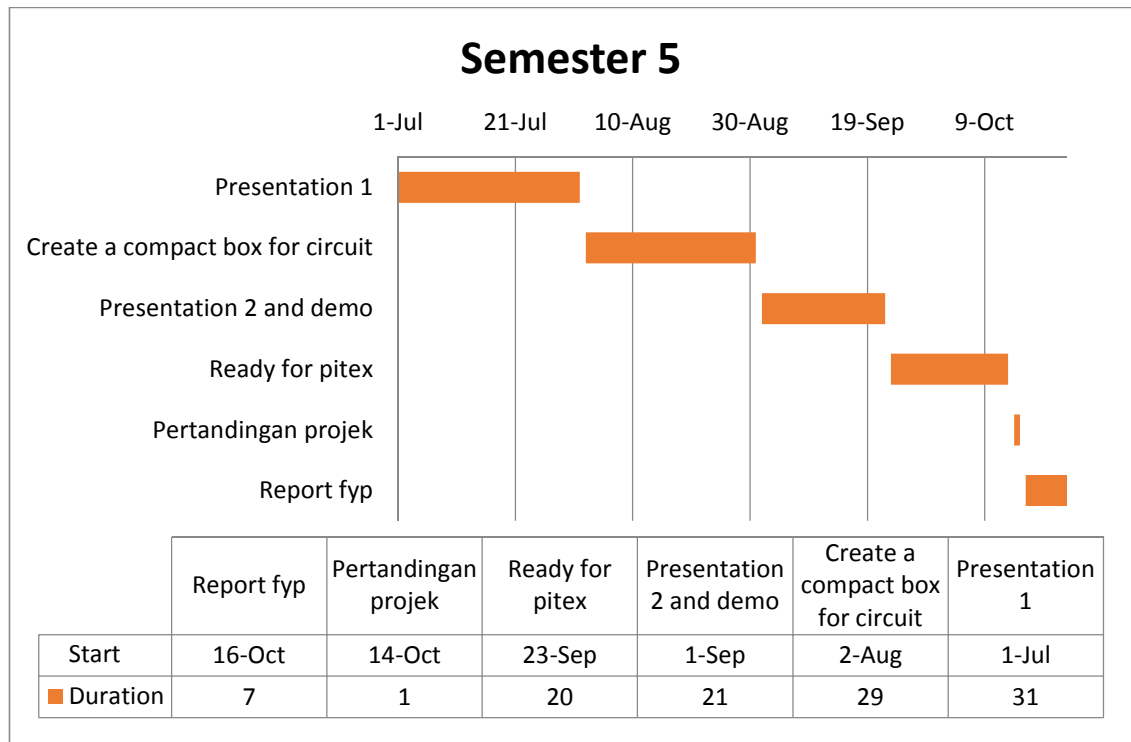


Table 1.1: Gantt chart semester 5



### 3.2.2 Survey and investigation

Investigations of related studies have been done and explain. The investigation consist several elements. One of the studies is about the survey for Semi-Automatic Guitar Tuner. Graph 3.3 shows the survey had been doing at Politeknik and Outisde of Politeknik. The purpose for the survey is to know if Semi-Automatic Guitar Tuner are needed to the user. The surveys for Semi-Automatic Guitar Tuner are made with 20 correspondents from student Politeknik and from Guitar Shop



#### AUTOMATIC GUITAR TUNER QUESTIONNAIRE

Greetings sir/madam,

We are final year graduate student pursuing Diploma of Electronic Engineering (Communication) from Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA)

The purpose of the study is to analyze the needs of guitarist in tuning a guitar and to study the need of the application combined by a hardware. Your participation will greatly contribute to the success of the survey. We deeply appreciate your help in participating in this survey, and your responses will remain private and will be used strictly for **academic purpose only**.

#### DEMOGRAPHY RESPONDENT

**GENDER** : MALE / FEMALE

**AGE** : \_\_\_\_ y/o

**WORK** :

**Section A** – Please answer the question below

1. How long you've been playing guitar?

Less than 1 year  More than 1 year

Less than 3 years  More than 3 years

2. Is your guitar out of tune frequently?

Daily  Sometimes

1-3 time per week  Weekly



2. Do you think we need an app to automatically tune your guitar in music industry?

Yes

Maybe

No

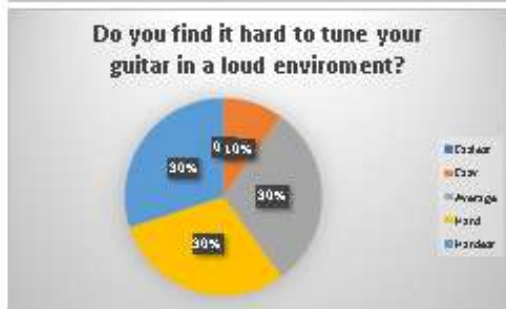
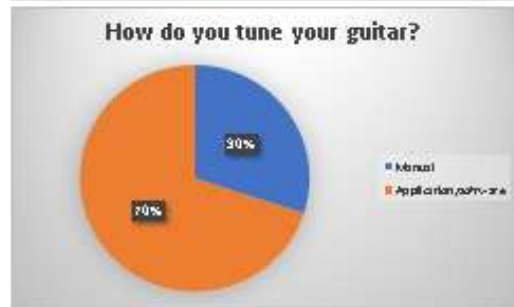
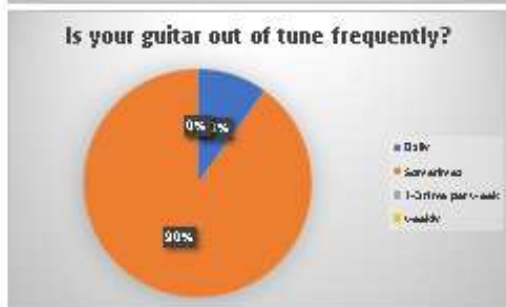
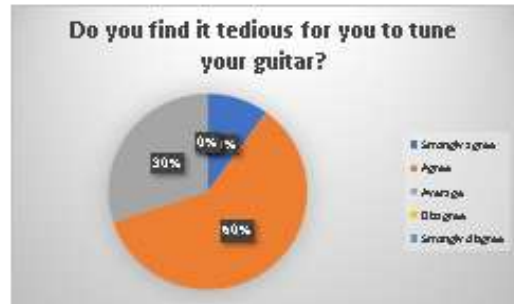
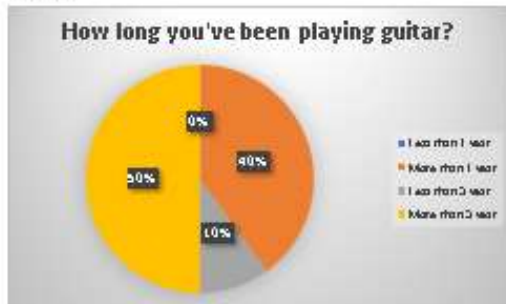
5. Are you satisfied with the way you tune right now?

Yes

Maybe

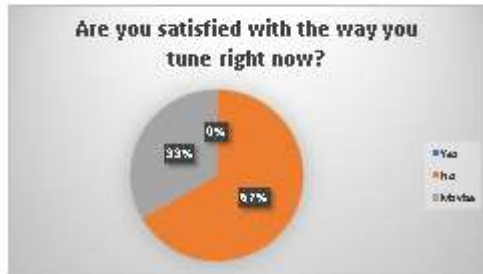
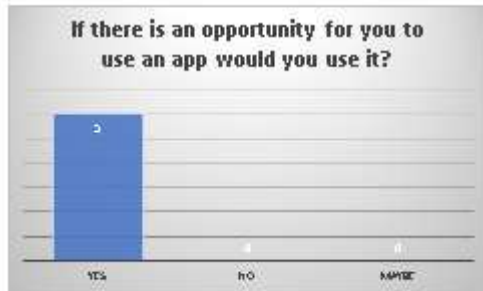
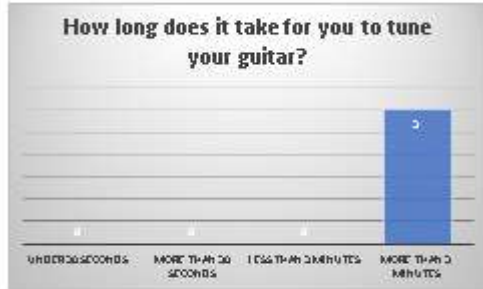
No

**Section A**

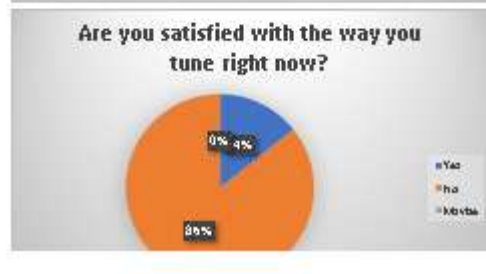
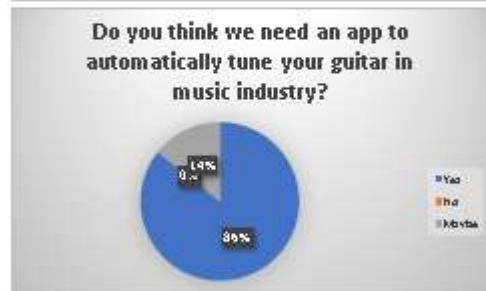
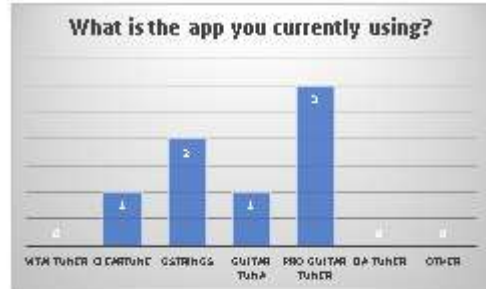




Section B



Section C



Graph 3.3: Result Survey for Semi-Automatic Guitar Tuner

### **3.3 FLOWCHART SEMI-AUTOMATIC GUITAR TUNER**

Planning flow chart is an important elements in developed Semi-Automatic Guitar Tuner. It may be included of sequence of actions, materials or services entering or leaving the process (inputs and outputs), decisions that must be made, people who become involved, time involved at each step and/or process measurements.

The process described can be a manufacturing process, an administrative or service process and a project plan. This is a generic tool that can be adapted for a wide variety of purposes. This flowchart consist of the flow for overall of Semi-Automatic Guitar Tuner.

#### 3.3.1 Overall flowchart

The overall flowchart state the flow of making the Semi-Automatic Guitar Tuner. The flowchart consist of from the starting ideas to choose the main project until the finishing of Semi-Automatic Guitar Tuner. Several test had been done from assembling the components until finishing the project. The main purpose is to test the components or to avoid short circuit when running the Semi-automatic guitar tuner. The Guitar Tuner had been tested.

While tested there is some unwanted problem occur. The problem need to overcome by troubleshooting and fix the problem.

The flowchart can be adapted when configure the device as Semi-Automatic Guitar Tuner using the arduino and mobile device that need to be configure. The process described can be a manufacturing process, an administrative or service process and a project plan. This is a generic tool that can be adapted for a wide variety of purposes. This flowchart consist of the flow for overall of Semi-automatic Guitar Tuner.

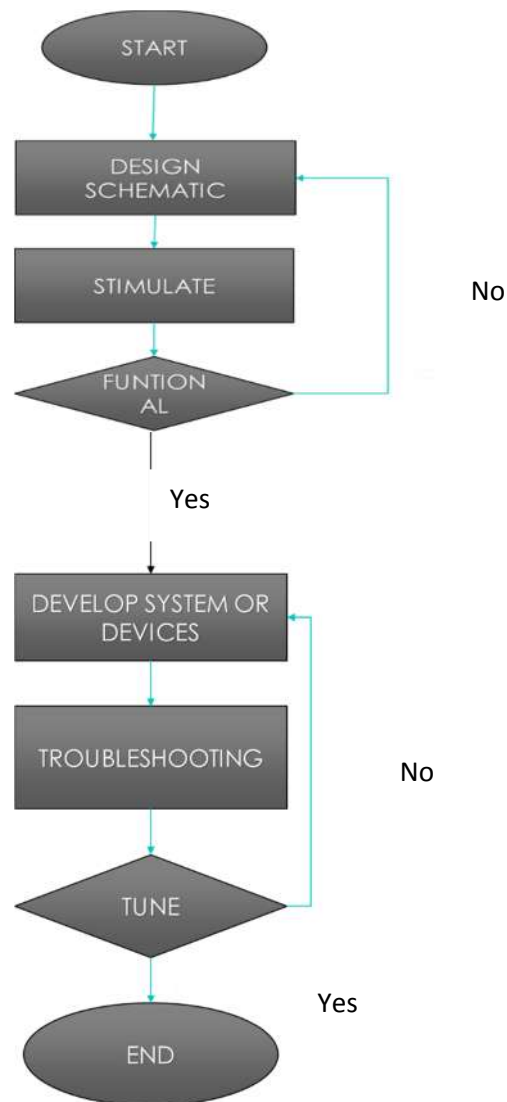


Figure 3.1: Overall flowchart

Figure 3.1 show the overall flowchart of Semi-Automatic Guitar Tuner project. First step is choosing a project title. Then collect information and start buying a component. After arrange the component. Test the functionality of the component. If the component is failed when test it, buy or test another component. If all the component are functionality, go to next step which is configuring device and finishing design the Semi-Automatic Guitar Tuner. After finishing, do again test for Semi-Automatic Guitar Tuner. If there are no failed no need to do troubleshooting. If there are failed, the Semi-Automatic Guitar Tuner need to do some troubleshooting.

### 3.4 BLOCK DIAGRAM OF SEMI-AUTOMATIC GUITAR TUNER

A block diagram is a diagram of a system for Semi-Automatic Guitar Tuner in which the principal parts or functions are represented by blocks connected by lines. It shows the relationships of each block. They are heavily used in engineering in hardware design, electronic design, software design, and process.

Block diagrams are used for higher level, less detailed descriptions that are intended to clarify overall concepts without concern for the details of implementation. Contrast this with the schematic diagrams and layout diagrams used in electrical engineering, which show the implementation details of Semi-Automatic Guitar Tuner components and physical construction.

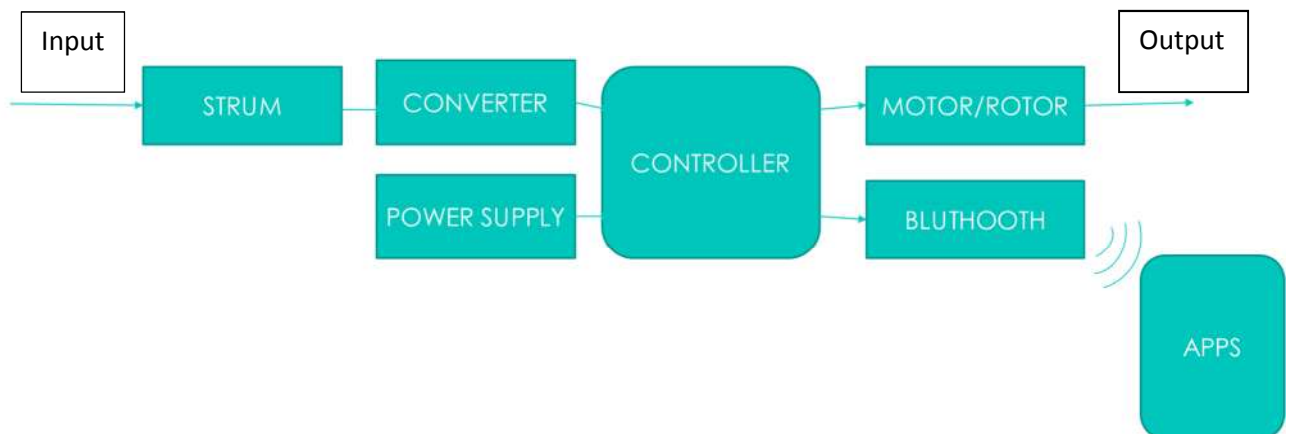


Figure 1.0: Semi-Automatic Guitar Tuner Block Diagram

Figure 1.0 show a Semi-Automatic Guitar Tuner block diagram. From a power supply which is used AC current. Then going to on/off switch which is a button to on the machine process. After the end of the process, the wifi module will be sent the information to the consumer.

### 3.5 CIRCUIT DIAGRAM

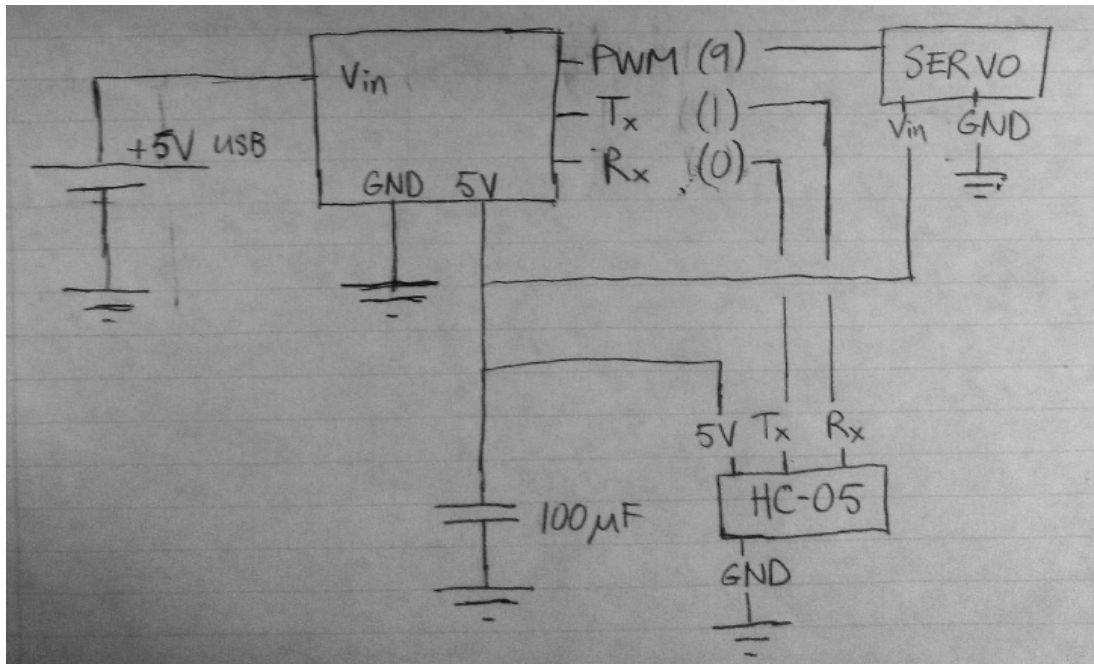


Figure 1.0: Circuit diagram

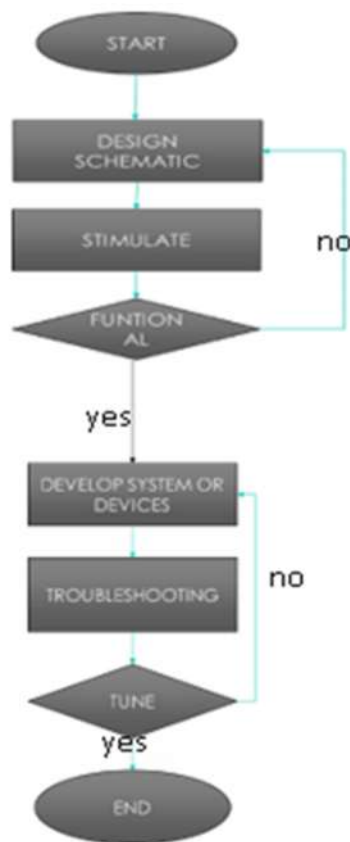


Figure 2: Flow Chart

Figure 1.1: Block diagram

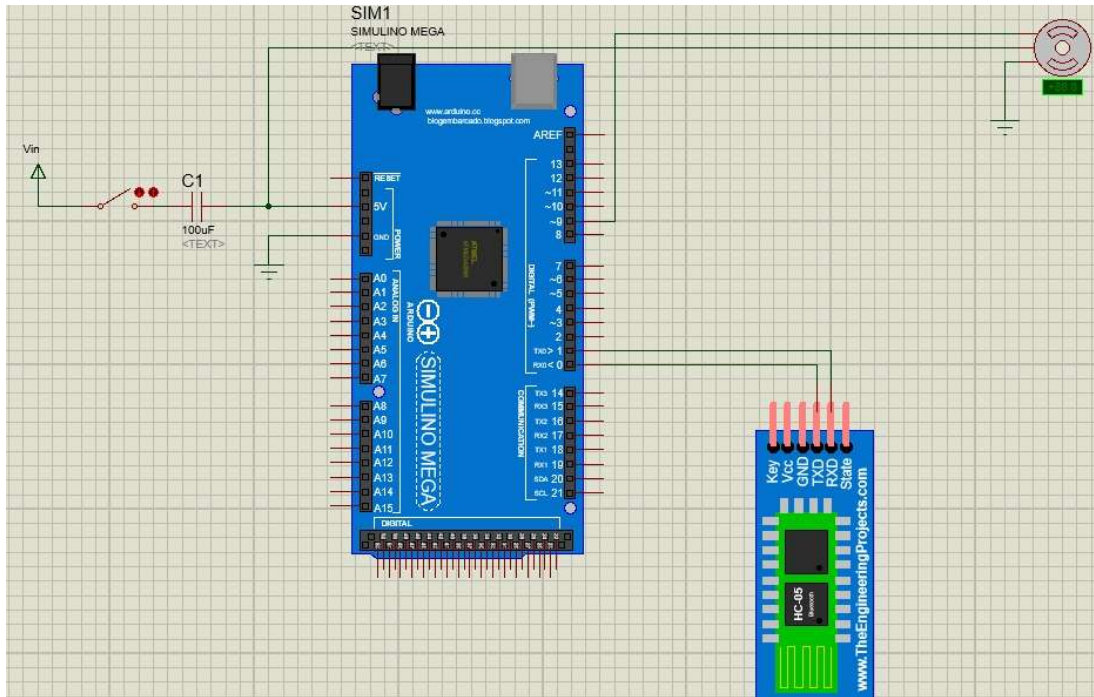


Figure 1.2: Circuit Diagram in proteus8

Figure 1.2 shows Semi-Auto Guitar Tuner circuit diagram by using proteus software. The components in this circuits are Bluetooth slave module (HC05) for the wireless connection between phone and this Semi-Auto Guitar Tuner, Servo Motor is to receives a command from arduino to spin to desire sound from guitar, switch to on/off the Semi-Auto Guitar Tuner. The arduino Mega act as a microcontroller of the project. The software programming of arduino Mega has been embedded into the hardware of Semi-Auto Guitar Tuner.

### 3.6 COLLECTING DATA COMPONENT

The analysis of data collected is collected by testing the duration and accuracy of the tuning with our project itself. We use it to prove that this project is reliable and one of incentive that our generation can use to benefit.

This analysis study was conducted for our semester five in electrical engineering study in politeknik we use it for better understanding of the guitar tuner itself

The trend of the graph itself prove that our guitar tuner work as long as it sounds good. The guitar tuner itself is made from a combination of adruino, hc-05 and asus phone.

#### 3.6.1 Semi-AutoGuitar Tuner (HARDWARE)



This product is made from plastic as its cover about 24cm x 12cm, the machine is a combination of HC-05 (Bluetooth), Aduino (Microcontroller), App in Android and Servo Motor to rotate the tuning keys/pegs in correct pitch. Our tuner is mostly use for beginner to professional to avoid breaking guitar strings. The objective of this product to help guitarist to tune their guitar precisely. Throughout this project, main thing that we both learnt on how to setup an Application, coding and circuit precisely. The workability of this project is depends on how good your guitar condition is, sometimes a cheap guitar have a really tight tuning keys which make it hard for motor with medium power to turn it, we recommend that you use it on a good guitar around RM200+ which mostly are in good quality.

### 3.6.1.2 Bluetooth Slave Module ( HC-06)



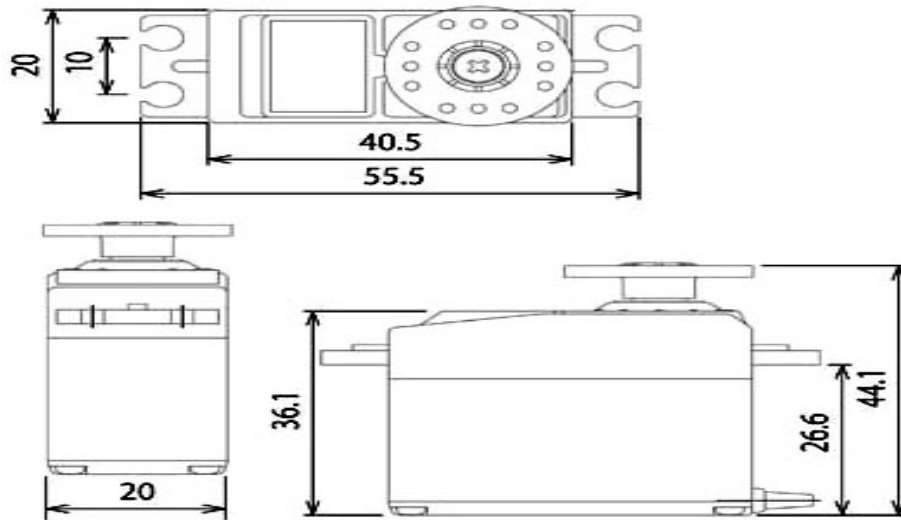
HC-05 embedded Bluetooth serial communication module (can be short for module) has two work modes: order-response work mode and automatic connection work mode. And there are three work roles (Master, Slave and Loopback) at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically.

### 3.6.1.3 Servo Motor (s3003)



Servo Motor (s3003) Metal Gear Servo Motor is a high-speed standard servo can rotate approximately 360 degrees. The speed of this servo motor 4.8V: 0.23 sec/60°, 6.0V: 0.19 sec/60°. The current that flow is 7.2 mA – 8 mA. And its weight is 1.31 oz (37.0 g).





Dimensions = 1.6" x 0.8" x 1.4" (41 x 20 x 36mm)

Product Weight = 1.3oz. (37.2g)

Output Shaft Style = 25 Tooth (3F) Spline

Voltage Range = 4.8V - 6.0V

No-Load Speed = (4.8V) = 0.23sec/60°

No-Load Speed = (6.0V) = 0.19sec/60°

#### 3.6.1.4 Arduino (MEGA)



Arduino Mega. It is a microcontroller board based on Atmega 2560 microcontroller. Arduino Boards have revitalized the automation industry with their easy to use platform where everyone with little or no technical background can get started with learning some basic skills to program and run the board.

### 3.6.1.5 Switch



a switch is an electrical component that can "make" or "break" an electrical circuit, interrupting the current or diverting it from one conductor to another.

### 3.6.1.6 Capacitor

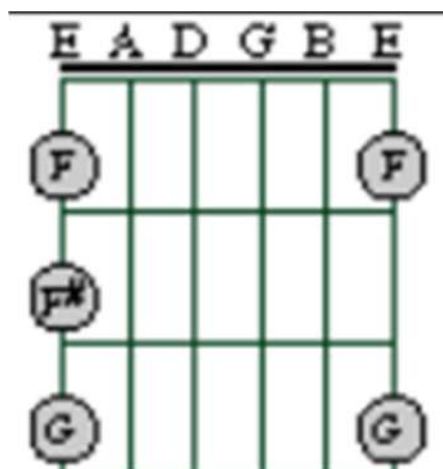


The proper selection and use of bypass capacitors is the most effective way of reducing unwanted noise and interference in an electronics circuit. Connecting the correct capacitor between the power supply and ground pins creates a low impedance path for the AC noise.

### 3.6.2 Semi-Auto Guitar Tuner (SOFTWARE)



This App will help through user to tune their guitar. What does this app do? This app will detect the frequency of string from each strings, for example As known an acoustic guitar has 6 string each string have its own frequency. For string High E (330Hz), For string A (110Hz), For string D (147Hz), For string G (196Hz), For string B (247Hz), For Low E string (82Hz). Based on the 'figure 10' below:



### 3.6.2.2 MIT



MIT App Inventor is a web application integrated development environment originally provided by Google, and now maintained by the Massachusetts Institute of Technology.

## **3.8 BUSINESS PLAN**

### **INTRODUCTION**

**NAME OF COMPANY:** GUITAR SHOPPE

**NATURE OF BUSINESS:** Music industries

**LOCATION OF BUSINESS:** Jalan Tengku Ampuan Zabedah A, 9/A, Seksyen 9, 40100 Shah Alam, Selangor

#### **FACTORS IN SELECTING THE PURPOSE BUSINESS:**

Guitar Shoppe is committed towards helping the music industries achieve Users desire by providing what need in music instrument for all kinds of instrument. Our goal is to help instrument user to feel free to move forward in music industries.

#### **COMPANY BACKGROUND**

**NAME OF THE COMPANY:** GUITAR SHOPPE

**ADDRESSES:** Jalan Tengku Ampuan Zabedah A, 9/A, Seksyen 9, 40100 Shah Alam, Selangor

**TELEPHONE NUMBER:** +6016 246 2648

**EMAIL:** afzan.guitarshoppe@gmail.com

**FORM OF BUSINESS OWNERSHIP:**

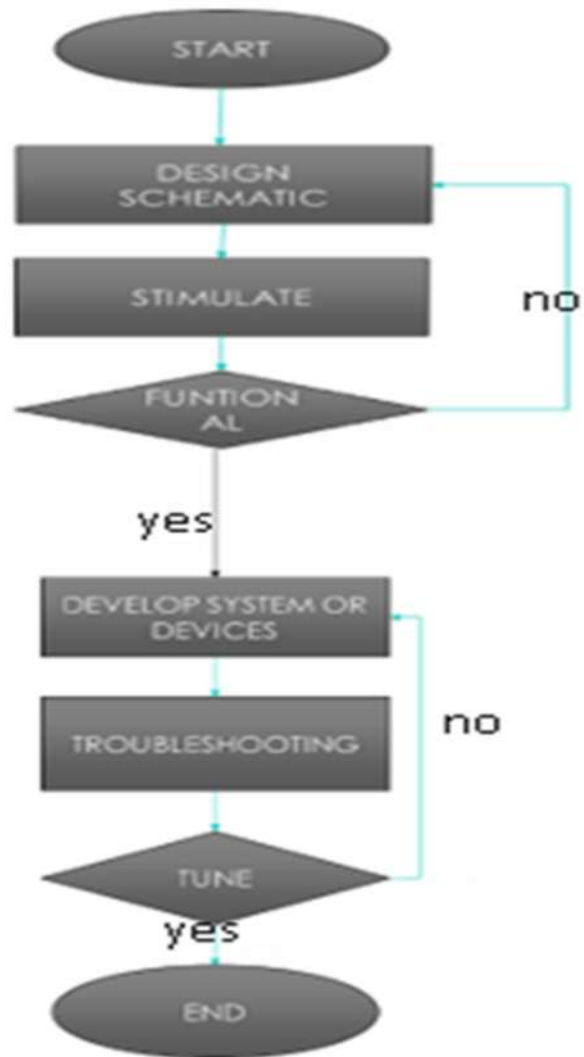
Partnership



Guitar Shoppe, the instrument specialist provides an service to repair and teach user.

## OPERATIONAL PLAN

### PROCESS OF FLOW CHART:



*Figure 1: Flow Chart*

### ACCURACY TABLE:

Time\ Strings	1	2	3	4	5	6	7	8	9	10	11
E (82Hz)	82	81	84	80	82	83	86	88	86	82	82
A (110Hz)	110	111	109	112	109	112	110	109	109	108	110
D (147Hz)	146	146	146	147	146	146	146	147	147	146	146
G (196Hz)	196	197	196	195	195	196	195	196	197	197	196
B (247Hz)	248	248	248	246	249	245	247	246	246	248	248
E (330Hz)	330	331	329	330	328	330	331	328	330	331	330

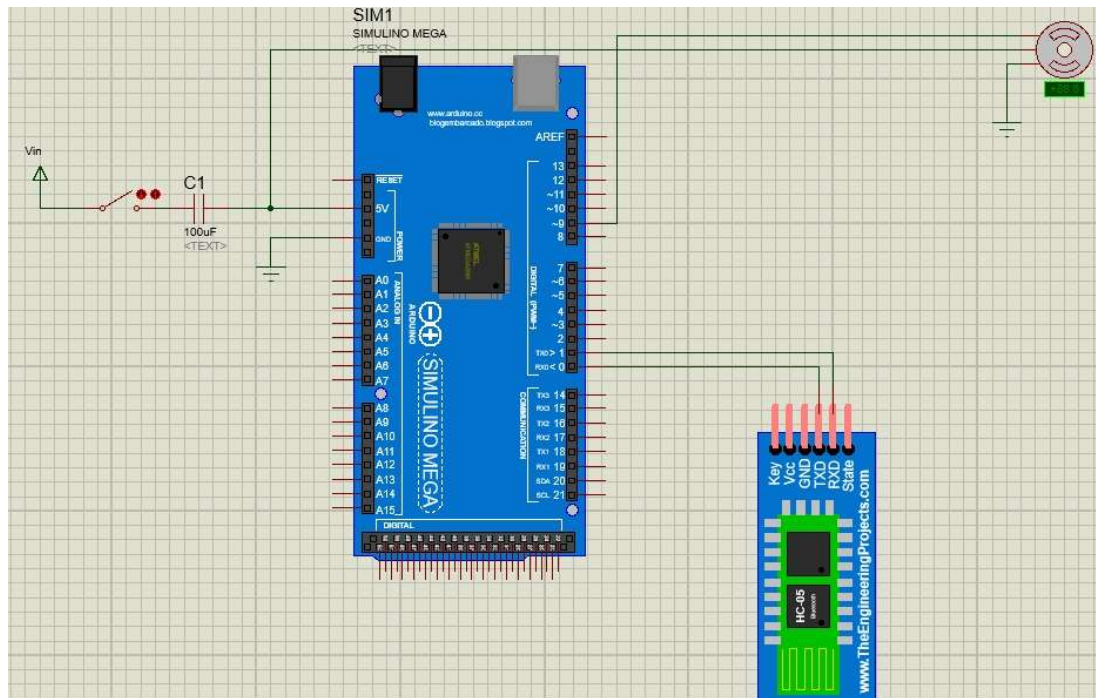
  

12	13	14	15	16	17	18	19	20		
83	84	83	83	82	81	81	81	86	mean	standard deviation
109	112	110	110	109	109	111	112	111	83.00	2.10
146	146	147	146	147	147	147	146	146	110.10	1.25
195	196	195	197	196	194	195	196	195	146.35	0.49
250	248	247	247	246	248	247	248	247	195.75	0.85
331	329	330	329	330	331	328	331	330	247.35	1.18
									329.85	1.04

### MATERIAL REQUIREMENT:

NO.	TYPE/MODEL	UNITS	PRICE
1.	Arduino (mega)	1	RM 50
2.	Hc-06 Bluetooth	1	RM 16
3.	Servo Motor	1	RM 40
4.	Switch	1	RM 3
5.	Capacitor	1	RM 2
6.	Supply (5V)	1	RM 15
7.	Cassing	1	RM 25
<b>TOTAL</b>			<b>RM 151</b>

## OPERATION LAYOUT PLAN:





# CHAPTER 4

## RESULTS AND DISCUSSION

### 4.1 ANALYSIS OF PROJECT

After designed and programmed the (Semi-Auto Guitar Tuner) to the needed standards, this product was test functionally. First, test all the function on the Semi-Auto Guitar Tuner. This product was functioning well.

### 4.2 SURVEY QUESTION SEM 4

#### SEMI-AUTO GUITAR TUNER QUESTIONNAIRE

Greetings sir/madam,

We are final year graduate student pursuing Diploma of Electronic Engineering (Communication) from Politeknik Sultan Salahuddin Abdul Aziz Shah (PSA)

The purpose of the study is to analyze the needs of guitarist in tuning a guitar and to study the need of the application combined by a hardware. Your participation will greatly contribute to the success of the survey. We deeply appreciate your help in participating in this survey, and your responses will remain private and will be used strictly for **academic purpose only**.

#### DEMOGRAPHY RESPONDENT

**GENDER** : MALE / FEMALE

**AGE** : \_\_\_\_ y/o

**WORK** :

**Section A** – Please answer the question below

1. How long you've been playing guitar?

Less than 1 year  More than 1 year

Less than 3 years  More than 3 years

2. Is your guitar out of tune frequently?

Daily  Sometimes

1-3 time per week  Weekly

3. Do you find it hard to tune your guitar in a loud environment

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easiest				Hardest

4. Do you find it tedious for you to tune your guitar manually

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly agree				Strongly disagree

5. How do you tune your guitar? \* (Proceed to Section A or B depending on your answer)

Manual                       Application/ Software

**Section B - Answer this question if you answered 'Manual'**

1. How long does it take for you to tune a guitar

Under 30 seconds     More than 30sec

Less than 3 minutes     More than 3 minutes

2. If there is an opportunity for you to use an app would you use it?

Yes                       No

Maybe

3. Are you satisfied with the way you tune right now?

Yes                       Maybe

No

**Section C – Answer this question if you answered 'Application'**

1. What is the app you currently using?

VITALtuner

Cleartune – Chromatic tuner

gStrings

GuitarTuna

Pro Guitar Tuner

Da Tuner

Other : \_\_\_\_\_

2. Do you think we need an app to automatically tune your guitar in music industry?

Yes

Maybe

No

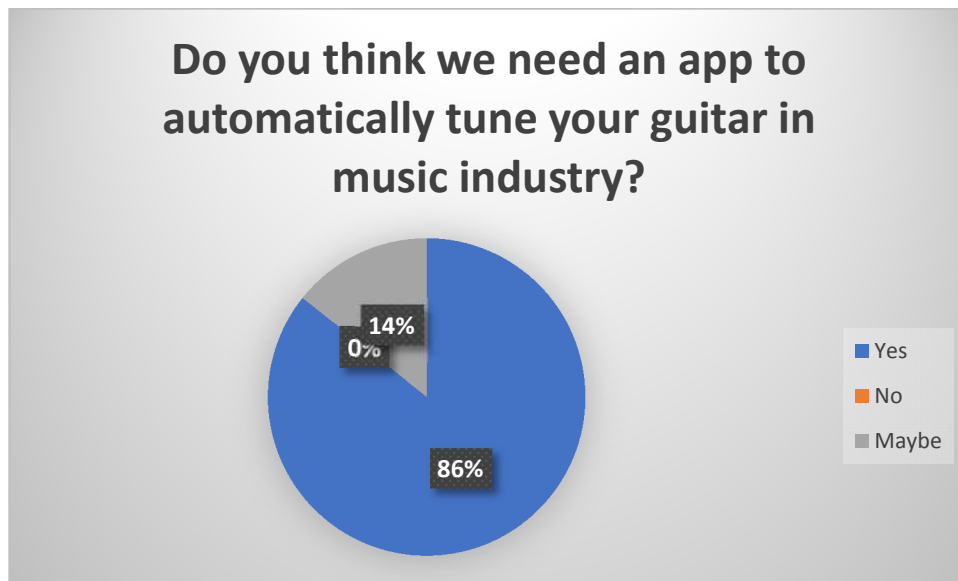
5. Are you satisfied with the way you tune right now?

Yes

Maybe

No

#### 4.3 RESULT OF SURVEY QUESTION



#### 4.4 SURVEY QUESTION SEM 5



### QUESTIONNAIRE

TITLE: SEMI-AUTO GUITAR TUNER

**SECTION A:** Respondent background.

**INSTRUCTION:** Please tick (/) where applicable.

1. Gender

- Male ( )
- Female ( )

2. Age

- 18-20 ( )
- 21-23 ( )
- 24-26 ( )

**SECTION B:** The level of understanding on the management of innovation.

**INSTRUCTION:**

Please indicate your level of understanding in the management innovation. Please tick (/) your answer on the number provided on the scale as follows. Scale level of approval.

1.	Strongly disagree
2.	Disagree
3.	Neutral
4.	Agree
5.	Strongly agree

No.	Question	Level Agreement
1.	I'm interest with this product.	(1) (2) (3) (4) (5)
2.	I think this product is valuable to purchase.	(1) (2) (3) (4) (5)
3.	Consumer will be interest with this product.	(1) (2) (3) (4) (5)
4.	The function of this product will help the user.	(1) (2) (3) (4) (5)
5.	This product is widely use at studio.	(1) (2) (3) (4) (5)
6.	The function of this product facilitate the user.	(1) (2) (3) (4) (5)
7.	IoT used in this product make it even easier for the consumer to monitor it.	(1) (2) (3) (4) (5)
8.	I believe this product is safe to use.	(1) (2) (3) (4) (5)
9.	It is portable to bring it anywhere.	(1) (2) (3) (4) (5)
10.	This product helps to tune guitar in Malaysia.	(1) (2) (3) (4) (5)

Suggestion to improvement

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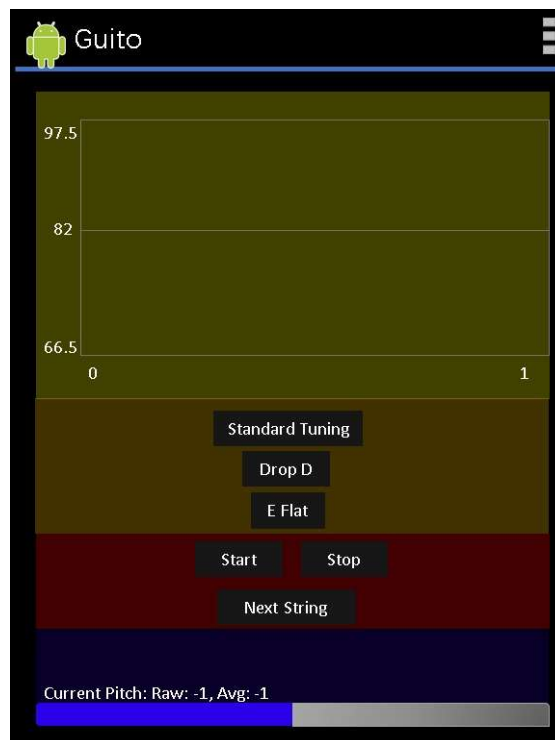
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## 4.5 RESULT

### 1) Application on Mobile Phone



### 2) HardWare Build



# CHAPTER 5

## CONCLUSION AND RECOMMENDATION

### 5.1 CONCLUSION

The analysis of data collected is collected by testing the duration and accuracy of the tuning with our project itself. We use it to prove that this project is reliable and one of incentive that our generation can use to benefit.

This analysis study was conducted for our sesmster five in electrical engineering study in politeknik we use it for better understanding of the guitar tuner itself

The trend of the graph itself prove that our guitar tuna work as long as it sounds good. The guitar tuner itself is made from a combination of adruino, hc-05 and asus phone

### 5.2 RECOMMENDATION

As a suggestion, I hope this product can be improved by use a power cord or power bank to change the power source from using a battery. Other than that, reducing the size of the Semi-Auto Guitar Tuner.

## REFERENCES:

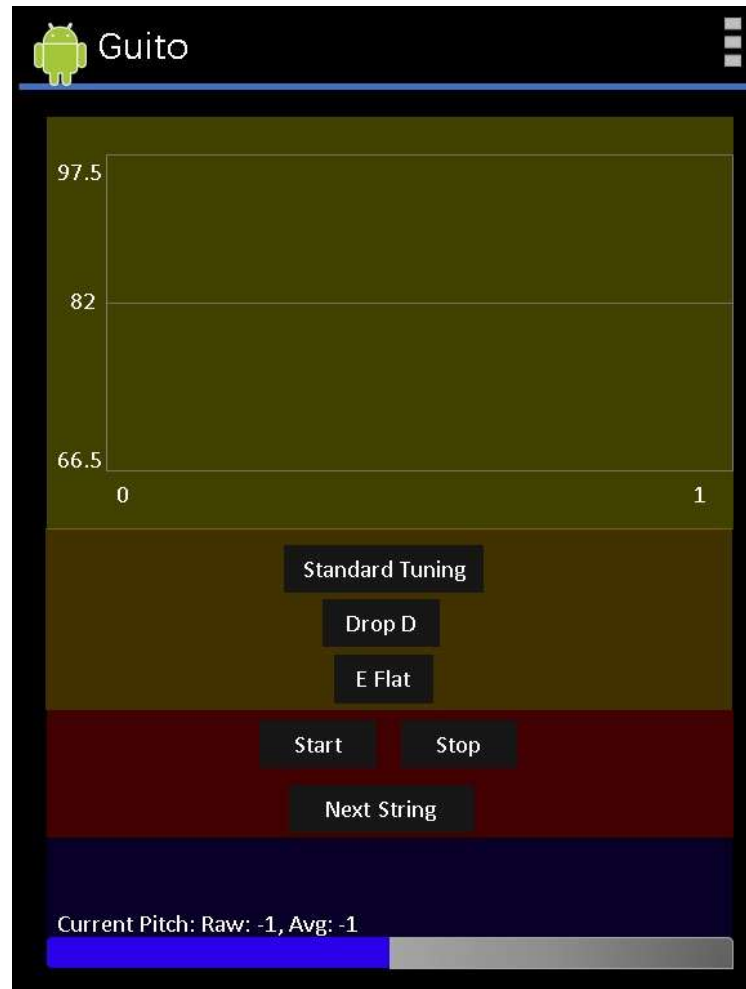
1. <https://appinventor.mit.edu/>
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# APPENDICES-

## APPENDIX A

### USER MANUAL:



- I. Switch ON the Semi-Auto Guitar Tuner on hardware, Bluetooth and Tune Application on Mobile Phone.
- II. Hardware and Software will Automatically connected.
- III. On the application press “Standard Tuning” then press “Start”
- IV. Put the Servo motor to the tuning key and pluck the string on the guitar near to the phone and let it spin until the graph on application turns green
- V. Then press “next string” on the application to tune the next string
- VI. Then continue to the next string repeat until all string is tuned.

## APPENDIX B

### SURVEY QUESTION:

#### SEMI-AUTO GUITAR TUNER QUESTIONNAIRE

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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easiest				Hardest

4. Do you find it tedious for you to tune your guitar manually

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strongly agree				Strongly disagree

5. How do you tune your guitar? \* (Proceed to Section A or B depending on your answer)

Manual  Application/ Software

#### **Section B** - Answer this question if you answered '**Manual**'

1. How long does it take for you to tune a guitar

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Less than 3 minutes  More than 3 minutes

2. If there is an opportunity for you to use an app would you use it?

Yes  No

Maybe

3. Are you satisfied with the way you tune right now?

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No

**Section C** – Answer this question if you answered ‘**Application**’

1. What is the app you currently using?

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Cleartune – Chromatic tuner

gStrings

GuitarTuna

Pro Guitar Tuner

Da Tuner

Other : \_\_\_\_\_

2. Do you think we need an app to automatically tune your guitar in music industry?

Yes  Maybe

No

5. Are you satisfied with the way you tune right now?

Yes  Maybe  No

**SURVEY QUESTION SEM 5**



**QUESTIONNAIRE**

**TITLE: SEMI-AUTO GUITAR TUNER**

**SECTION A: Respondent background.**

**INSTRUCTION:** Please tick (/) where applicable.

1. Gender

- Male ( )
- Female ( )

2. Age

- 18-20 ( )
- 21-23 ( )
- 24-26 ( )

**SECTION B:** The level of understanding on the management of innovation.

**INSTRUCTION:**

Please indicate your level of understanding in the management innovation. Please tick (/) your answer on the number provided on the scale as follows. Scale level of approval.

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No.	Question	Level Agreement
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4.	The function of this product will help the user.	(1) (2) (3) (4) (5)
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6.	The function of this product facilitate the user.	(1) (2) (3) (4) (5)
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8.	I believe this product is safe to use.	(1) (2) (3) (4) (5)
9.	It is portable to bring it anywhere.	(1) (2) (3) (4) (5)
10.	This product helps to tune guitar in Malaysia.	(1) (2) (3) (4) (5)

Suggestion to improvement

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