

**AN APPROACH TO CREATE A HIGH FREQUENCY ULTRASOUND  
SYSTEM TO PROTECT AGRICULTURAL FIELD FROM BATS**

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This Report Presented In Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Science Computer Science and Engineering.

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**DAFFODIL INTERNATIONAL UNIVERSITY  
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MAY 2019**

## **APPROVAL**

This Project titled “**An Approach to Create a High Frequency Ultrasound System to Protect Agricultural Field from Bats**” submitted by Md. Hafizur Rahman, ID: 153-15-589 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on May 5 2019.

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## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Tasniya Ahmed, Department of CSE**, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree of diploma.

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Finally, we would like to thank our family especially our parents and our elder brother for their continuous supports and encouragements throughout the whole period of this project.

## **ABSTRACT**

Ultrasonic bat Banisher disposes of bats by radiating persevering ultrasonic sound waves. Bat control is best tended to with a physical hindrance or an ultrasonic Bat Banisher. Bats chase after dim and perch during the day. Their vision isn't exceptionally intense and they explore utilizing echolocation. Thus, ultrasonic bat Banisher gadgets are the most straightforward and viable approach to dispose of bats. Bats convey high-recurrence commotions that, by methods for a reverberation, are come back to the bat's ears, telling them the separation, course, and size of the space or object(s) before them. This is called echolocation. It is the motivation behind why bats are incredibly delicate to sounds in this recurrence go. Ultrasonic bat Banisher gadgets help control bats by transmitting sound waves that meddle with echolocation, making the influenced region unwelcoming to bats. Ultrasonic sound waves are characteristic bat hindrances and don't cause hurt. The bat province will look for another perch in unprotected structures or normal regions. We are the main providers, exporters, and makers of top quality, superior Ultrasonic Bat Banisher.

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## **Chapter 1: Introduction**

### **1.1 Introduction**

It is conceivable that Bats repulsed by ultrasonic recurrence in the scope of 20 kHz to 40 kHz. People can't hear these high-recurrence sounds. Our item repulses Bats by transmitting beat ultrasonic waves [1]. Utilizing ultrasonic waves makes a loud and unfriendly condition which repulses bothers while remaining completely alright for people and family unit creatures.

Shockingly, all creatures don't respond at the equivalent ultrasonic recurrence. While a few creatures get repulsed at 35 kHz, some others get repulsed at 38 to 40 kHz or significantly higher frequencies. In this manner to build the adequacy, recurrence of the ultrasonic oscillator must be persistently changed between specific cutoff points. Recurrence of discharge of ultrasonic sound is persistently fluctuated by our item in various examples to repulse various bugs.

### **1.2 Motivation**

In our Country, every seasonal time we face bats attack in agricultural crops. For saving our fruits we just used medicine, net & manual sound system which are very costly & time consuming. As a result, we need to buy agricultural instruments again as they can't be repaired. Moreover, we need a large amount of manpower. Yet, we don't get expected crops. In order to solve this problem, we have become inspired to make such a system.

### **1.3 Objective**

- To reduce farmer's physical effort
- To reduce time & cost
- To increase agricultural product
- To ensure the best quality of product
- To reduce many type of virus attack including Nipah virus(NiV)

### **1.4 Expected Out Come**

According to Daily Star, we now export \$3.32 billion in abroad last year which is the 9.01 percent of our economy. But if we use this system, we would be able to increase this rate every year. Its help us to Increase Agricultural GDP in our country. If we use this system, we can remove NIPAH virus.

## 1.5 Report Layout

Pictorial presentation the project in a simple way with a figure that describes the whole project, contents and more. The project report contains of 6 chapter. Outline of all the chapters with a brief summery is discussed below through demographic representation:

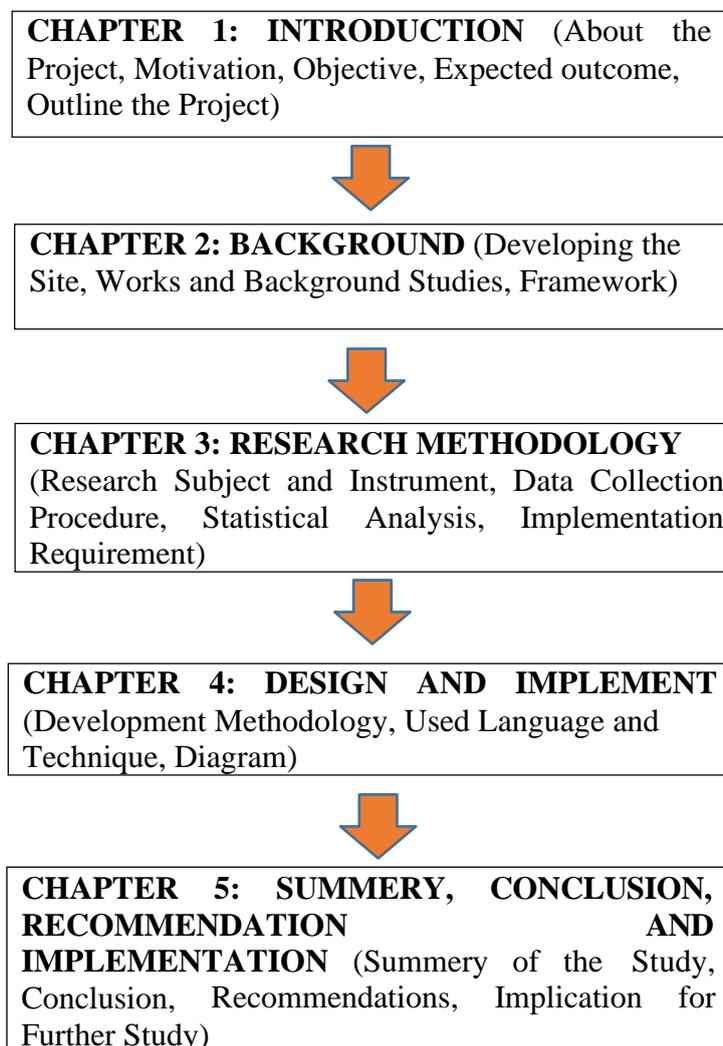
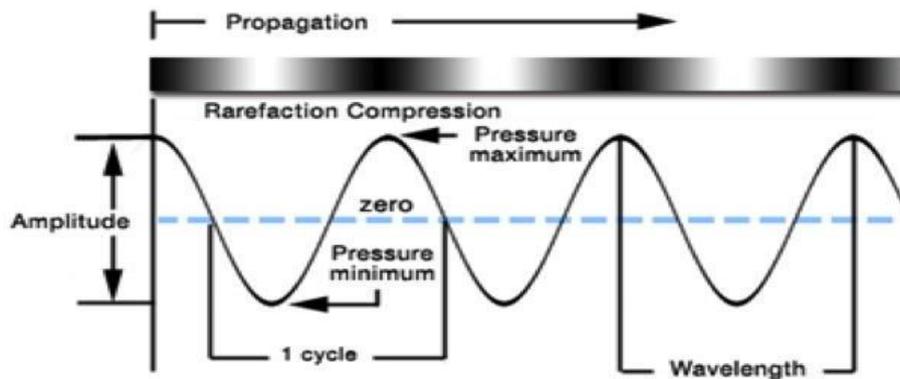


Figure 1.6.1: Outline the project

## Chapter 2: Background

### 2.1 Introduction

All through the latest of the years, there has been a growing example in sustenance age. As demonstrated by a starter check of BBS, in FY2016-17, sustenance grains age stayed at around 388.14 lakh metric tons (MT). In order to scale up gainfulness, assignment in cultivating wellsprings of data was extended, similarly as overhauled incorporation and extended availability of rustic credit were ensured. Regardless, If Take genuine protection, reliably a bat puts in 600-700 kilometers of communicating arrangement. Flying low, the animals get bugs at paces of around 40 meters for each second. Around night time the bat uses its hearing to investigate its way to deal with prey. Bats catch bugs always using echolocation, an impelled course system. The bat releases ultrasonic waves with high frequencies. Its calls are pitched at 20-100 kilohertz, a repeat that is unreasonably sharp for individuals to hear ordinarily. Their sounds are reflected in the earth, hitting various articles and returning to the bat as echoes. The resonance sign enables the bat to outline a mental guide of its condition. Sound is incited through a medium as the particles are vibrated making weight waves with districts of weight and rarefaction. The waves have trademark features of wavelength, repeat, and plentiful. Wavelength ( $\lambda$ ) is the detachment between two zones of maximal weight (or rarefaction). The hugeness of wavelength is that the invasion of the ultrasound wave is with respect to wavelength and picture objectives are near 1-2 wavelengths. Repeat (f) is the number of wavelengths that enjoy a reprieve. It is assessed as cycles (or wavelengths) consistently and the unit is hertz (Hz). It is a specific segment of the valuable stone used in the ultrasound transducer. It might be moved by the manager inside set purposes of repression – the higher the repeat, the better the objectives yet the lower the penetration. The degree of weight change is given by the plentiful. It is conveyed in decibels on a logarithmic scale.



The sound waves travel at a Propagation Velocity ( $v$ ) reliant on the thickness and compressibility of the medium. The connection between these factors is communicated by the Wave Equation  $v = \lambda f$

In delicate tissue, proliferation speed is moderately steady at 1540 m/sec and this is the worth expected by ultrasound machines for all human tissue. Subsequently, the wavelength is conversely corresponding to recurrence. Acoustic Power is the measure of acoustic vitality produced per unit time. Vitality is estimated in joules (J) with joules being the measure of warmth produced by the vitality being referred to. The unit is the Watt (W) with  $1W = 1J/sec$ . The organic impacts of ultrasound as far as power is in the plant watt go.

Force is the power thickness or convergence of intensity inside a region communicated as Watts/m<sup>2</sup> or mW/cm<sup>2</sup>. Force changes particularly inside the bar and is most prominent in the middle. In a beat shaft, it changes transiently just as spatially

## 2.2 Related Works

In this paper the strategy and frameworks for expelling Bat from Agriculture field. In one putting, the strategy, that might achieve on a framework, manufacture recognizing from an ultrasound framework for Bat expelling to ensure horticulture field and harvests like as mango, guava, lichi, and so forth. All things considered, this task distinguishes Bat sounds and after that make a reflect sound by the ultrasound framework to alter their course. For making this

undertaking use ultrasound framework with Arduino for changing their root goal. In additionally, incorporated into this venture IR Infrared Obstacle Avoidance Sensor Module for Bat recognition. This undertaking additionally included 8  $\Omega$  0.5W Speaker for giving Sound.

This paper speaks to that the creation is a framework and technique for expanding Agricultural rate that leads our nation.

### **2.3 Scope of the Problem**

This problem we are find out.

- This projects control system automatically not wireless network builder.
- Sensor work in limited distance of the area.
- Selected working area.
- Weather and the breeze blows condition.
- Using Rechargeable battery.

### **2.4 Challenges**

Choosing a suitable platform normally goes down to the hardware based project makers experience and the type of hardware based project to be developed. To the Create a High Frequency Ultrasound System could be developed as a hardware based project or a standalone hardware based project but must also be widely supported and platform-independent. Therefore, as the developer has minimal or no experience in Arduino programming, the decision was taken to develop a standalone project. This project mainly makes for the Farmer of Bangladesh. Here includes all information about project of a High Frequency Ultrasound System to Protect Agricultural Field from Batswhich is their need.

## **Chapter 3: Requirement Specification and Methodology**

### **3.1 Introduction**

The research methodology is the specific methodologies or techniques used to recognize, select, process, and examine information about a point. In a research paper, the methodology zone empowers the scrutinize to in a general sense survey an examination's general authenticity and trustworthiness. Here, the methodology segment:

- The data collected or generated Procedure
- Analyzation

### **3.2 Project Research Subject and Instrument:**

This paper, for the most part, arranged for arrangement Bat's concern utilizing High-recurrence ultrasound framework. My Project title "An Approach to Create a High-Frequency Ultrasound System to Protect Agricultural Field from Bats". Horticulture is the science and specialty of developing plants and domesticated animals. Agribusiness was the key improvement in the ascent of stationary human development, whereby cultivating of tamed species made sustenance surpluses that empowered individuals to live in urban areas. The historical backdrop of agribusiness started a huge number of years prior. Subsequent to social occasion wild grains starting in any event 105,000 years back, beginning ranchers started to plant them around 11,500 years prior. Pigs, sheep, and cows were tamed more than 10,000 years back. Plants were freely developed in any event 11 districts of the world. Modern agribusiness dependent on huge scale monoculture in the twentieth century came to rule farming yield, however, around 2 billion individuals still relied upon subsistence horticulture into the twenty-first. In any case, presently multi day's horticulture fields hamper by bats particularly, Mango tree, Lichi, Guava, and so forth organic products field. This research venture tells the best way to remove bats by utilizing an ultrasound framework. To make my task I Used:

- 1) 1pin Female-Male Jumper Wire 125mm
- 2) 2pin Connector Male-Female Jumper Wire
- 3) Arduino
- 4) Arduino Programs
- 5) IR Sensor
- 6) Ultrasonic Sensor
- 7) Voice Recorder Module

- 8) Glue Gun & Glue Stick
- 9) Bread Board
- 10) Integrated Circuit
- 11) Battery

### 3.2.1 Ultrasonic Sensor:



### Specifications of Ultrasonic Sensor:

Brand Name	Generic
EAN	0696611040117
Finish Type	Glossy
Item Weight	30.0 grams
Manufacturer Series Number	HC-SR04
Model Number	ROBOKART_36
Part Number	HC-SR04
Power Source Type	AC & Battery
UPC	696611040117

This Sensor for Detect and Play Sound for Banishing Bat. Initially, Its Detect object whenever distinguished article then its play sound in my undertaking We are utilizing HC-SR04 Sound comprises of wavering waves through a medium, (for example, air) with the pitch being dictated by the closeness of those waves to one another, characterized as the recurrence. Just a

portion of the sound range (the scope of sound wave frequencies) is perceptible to the human ear, characterized as the "Acoustic" extend. Low-recurrence sound underneath Acoustic is characterized as "Infrasound", with high-recurrence sounds above, called "Ultrasound". Ultrasonic sensors are intended to detect object nearness or range utilizing ultrasound reflection, like radar, to ascertain the time it takes to reflect ultrasound waves between the sensor and a strong item. Ultrasound is for the most part utilized in light of the fact that it's unintelligible to the human ear and is moderately exact inside short separations. You could, obviously, utilize Acoustic sound for this reason, yet you would have a loud robot, blaring at regular intervals.

A fundamental ultrasonic sensor comprises at least one ultrasonic transmitters (essentially speakers), a recipient, and a control circuit. The transmitters discharge a high-recurrence ultrasonic sound, which bobs off any adjacent strong items. A portion of that ultrasonic clamor is reflected and recognized by the recipient on the sensor. That arrival sign is then prepared by the control circuit to figure the time contrast between the sign being transmitted and got. This time can in this way be utilized, alongside some cunning math, to compute the separation between the sensor and the reflecting item [4,6].

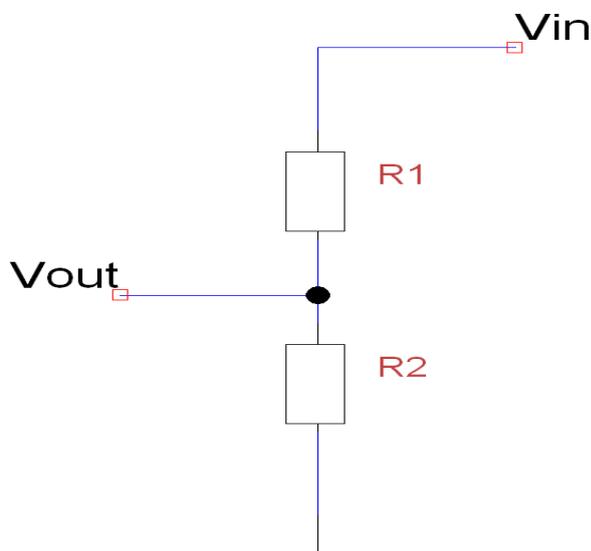
The HC-SR04 Ultrasonic sensor we'll be utilizing in this instructional exercise for the Raspberry Pi has four pins: ground (GND), Echo Pulse Output (ECHO), Trigger Pulse Input (TRIG), and 5V Supply (Vcc). We control the module utilizing Vcc, ground it utilizing GND, and utilize our Raspberry Pi to send an information sign to TRIG, which triggers the sensor to send an ultrasonic heartbeat. The beat waves bob off any close-by articles and some are reflected back to the sensor. The sensor distinguishes these arrival waves and measures the time between the trigger and returned heartbeat, and after that sends a 5V signal on the ECHO stick.

Reverberation will be "low" (0V) until the sensor is activated when it gets the reverberation beat. When an arrival heartbeat has been found ECHO is set "high" (5V) for the span of that beat. Heartbeat span is the full time between the sensor yielding an ultrasonic heartbeat, and the arrival heartbeat is distinguished by the sensor recipient. Our Python content must, thusly, measure the beat length and after that figure good ways from this [6].

Significant. The sensor yield signal (ECHO) on the HC-SR04 is evaluated at 5V. Be that as it may, the info stick on the Raspberry Pi GPIO is appraised at 3.3V. Sending a 5V signal into that unprotected 3.3V info port could harm your GPIO pins, which is something we need to dodge! We'll have to utilize a little voltage divider circuit, comprising of two resistors, to bring down the sensor yield voltage to something our Raspberry Pi can deal with.

### Voltage Dividers

A voltage divider comprises two resistors (R1 and R2) in arrangement associated with an info voltage ( $V_{in}$ ), which should be diminished to our yield voltage ( $V_{out}$ ). In our circuit,  $V_{in}$  will be ECHO, which should be diminished from 5V to our  $V_{out}$  of 3.3V.



The accompanying circuit and a straightforward condition can be connected to numerous applications where a voltage should be decreased. On the off chance that you would prefer not to get familiar with the geek bit, simply snatch 1 x 1k  $\Omega$  and 1 x 2k  $\Omega$  resistor [10].

### 3.2.2 IR Sensor

#### Product Specification

Board size 3.2CM \*  
1.4CM Comparators  
LM393

Model Number ACK-SENSOR-IR-OBS-ARD

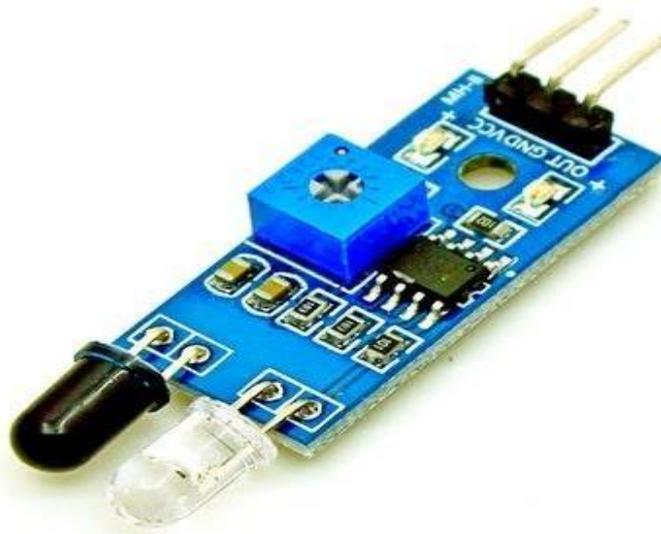
Power 3-5V DC power

supply. Screw holes 3mm

### Product Description

Utilizing the abilities of our certified group of experts, we are instrumental in offering a wide scope of IR Sensors.

### Product Image



+

### Feature:

Power	3-5V DC power supply. At the point when the power is turned on, the red power marker lights;
Screw gaps	3mm, simple fixed establishment;
Board size	3.2CM * 1.4CM
Comparators	LM393, stable;
Module Interface Description	1 VCC 3.3V-5V outside voltage (can be legitimately associated with 5v and 3.3v MCU) 2 GND External 3 OUT little board advanced yield interface (0 and 1)

### 3.2.3 1pin Female-Male Jumper Wire 125mm



#### Specifications for this item

<b>Brand Name</b>	ZIYUN
<b>EAN</b>	0736104456466
<b>Part Number</b>	1
<b>UNSPSC Code</b>	32000000
<b>UPC</b>	736104456466

### 3.2.4 Arduino for Voice Record

Voice Recorder is a gadget that catches discourse (or sound) in different circumstances like gatherings, addresses, interviews, meetings, communicates, and so forth with the goal that you can without much of a stretch alter or play them back. There are various sorts of equipment and programming committed to a voice recording that give a few customization alternatives.

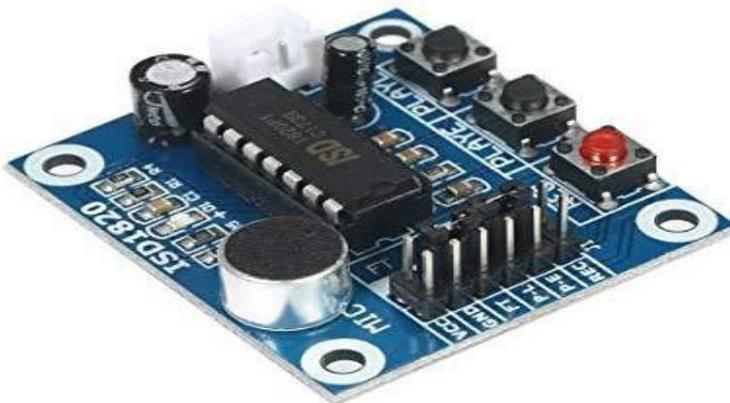
In this undertaking, I will discuss one of the most regularly utilized Voice Recorder Modules in the hardware specialist network, the ISD 1820 Voice Recorder Module and tell you the best way to control it with the assistance of Arduino.

### 3.2.4.1 About ISD 1820 Voice Recorder Module

The ISD1820 Voice Recorder Module depends on the ISD1820 IC, which is a solitary chip Voice recorder IC for single message record and playback. I don't know about the accessibility of just the IC yet it is regularly found in the module with all the fundamental parts and hardware.

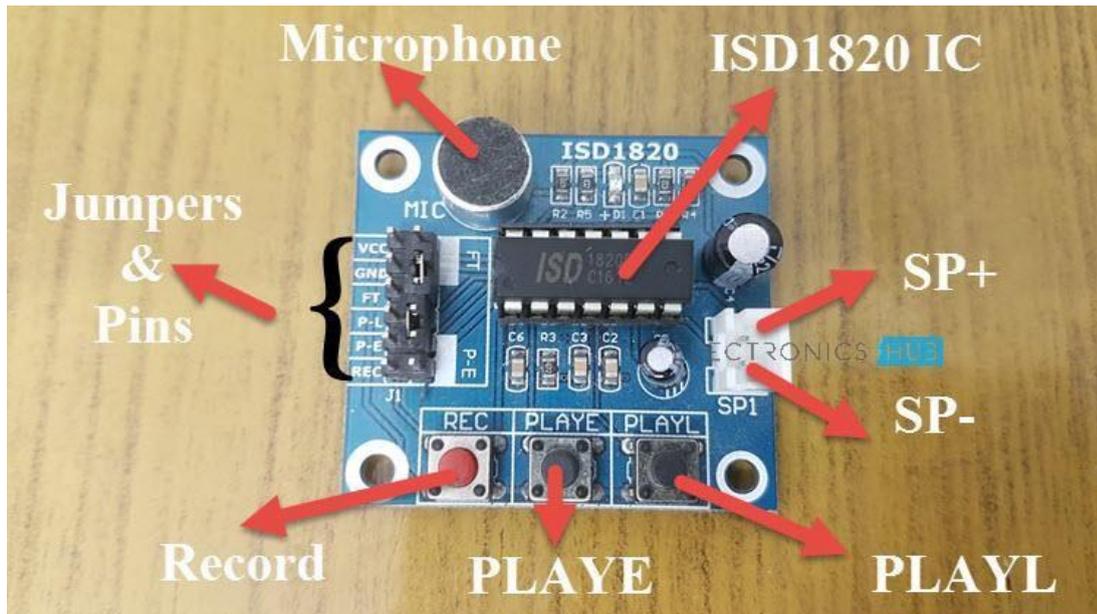
A noteworthy component of the ISD1820 Voice Recorder Module is that it can store the messages in its non-volatile memory and can be arranged to store messages of length between 8 Seconds to 20 Seconds.

The ISD1820 Voice Recorder Module utilized in this task is demonstrated as follows. As should be obvious, there are a ton of parts on the board that helps the ISD1820 IC in recording and playback.



Another main feature of this module is that it has internal audio amplifier that can drive a 0.5W 8Ω Speaker directly without the need for any external amplifier circuit. But if you want to drive more powerful speakers, you can connect the output of this module to an external amplifier IC like LM386, for example.

The following image shows few of the important components on the ISD1820 Voice Recorder Module.



### 3.2.4.2 Operating System of ISD1820 Voice Recorder Module

- Connect small 8Ω Speaker at the output of the Module i.e. across SP+ and SP-pins.
- Push the record button (REC) on the module and the module starts recording. Continue to push the button until you record the complete message (about 10 Seconds, for example).
- In order to playback, you can use either PLAYE or PLAYL. Push the PLAYE button one time and the entire message is played back.
- You need to push and hold the PLAYL button and the message starts playing and if you want to stop the play back at any time, release the button.
- If you activate the PE Jumper, the playback is in endless loop mode.

### 3.2.4.3 Interfacing ISD1820 Voice Recorder Module with Arduino

It is clear that the ISD1820 Voice Recorder Module can work independently without any microcontroller. But controlling the record and playback function with the help of a microcontroller like Arduino, for example, gives you an opportunity to expand the functionality of the module to the complex application level.

Imagine a situation where you are designing a security system which should automatically record the voice upon detection of a movement. This would be possible only if you Interface ISD1820 Voice Recorder Module with Arduino (or any microcontroller).

### 3.2.4.4 Circuit Diagram

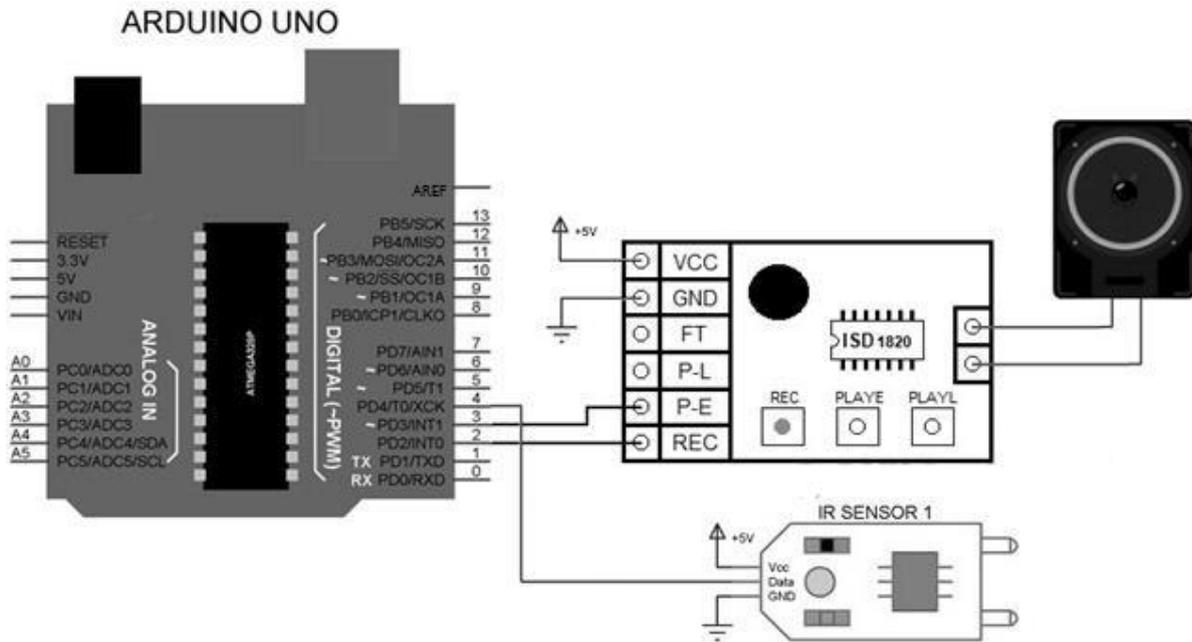


Fig: Main Circuit diagram

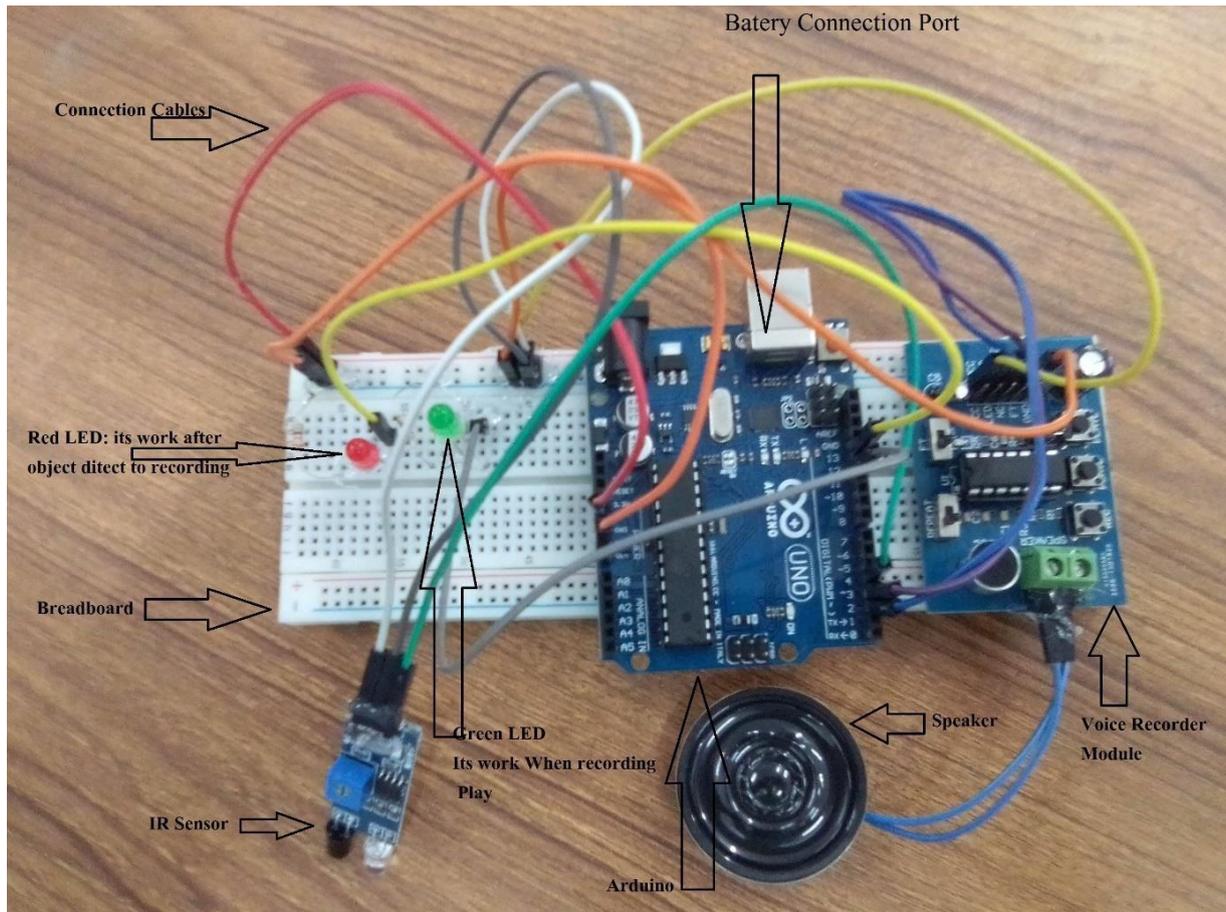
### Components Required

- Arduino UNO
- ISD1820 Voice Recorder Module
- 8Ω Speaker
- IR Sensor (Reflective Type)
- Connecting Wires
- Breadboard
- Power Supply

### 3.2.4.5 Circuit Design

The SP+ and SP-pins of the ISD1820 Module are associated with the terminals of the speaker. VCC and GND of the Module are associated with +5V and GND. The REC and PLAYE pins are associated with Computerized IO Pins 2 and 3 of Arduino.

An intelligent sort Infrared Sensor is utilized here and the advanced yield of the sensor is associated with Stick 4 of Arduino.



### 3.2.4.7 Working

Make the associations according to the circuit graph and give the capacity to the circuit. At the point when there is no article before the IR Sensor, its yield is LOW and Arduino sits idle. At the point when there is an article before the IR Sensor, its yield turns out to be HIGH and Arduino then begins recording a message by making the REC Pin HIGH for around 5 Seconds. During this time, the LED associated with Pin 13 is lit up to demonstrate that the module is recording a message. In the wake of chronicle, the message, the message is played back by making the PLAYE stick HIGH for around 5 Seconds.

### 3.3 Statistical Analysis

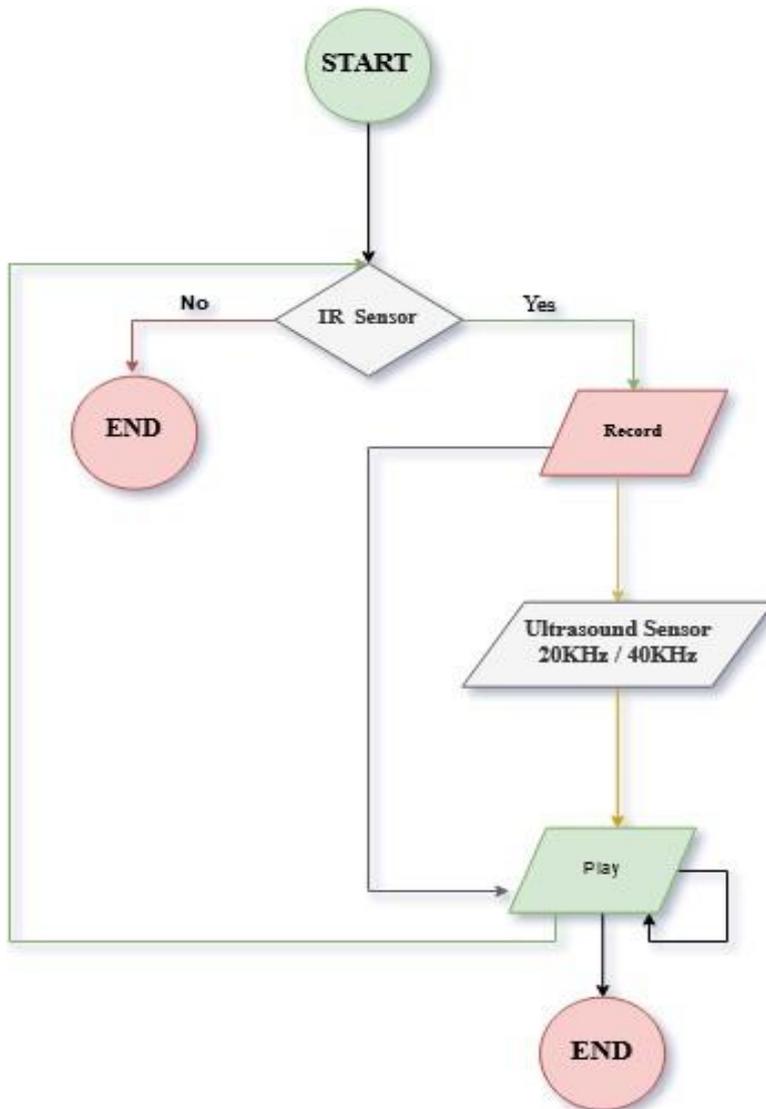
In our field tests, the best by and large approach to repulse bats is to introduce our Ultrasound Bat Banisher. Subsequent to testing over an ultrasound gadget to repulse a scope of Bat, I at long last chose to have a unit worked to our particulars. The last outcome is a unit will do all that I have to repulse a scope of bats. The rundown of highlights is too long to even consider listing in this research yet here are the significant settings required for bat control.

- a) First, I should set it to run at night or day. For bats in the attic, I'll want to run it all the time since they might want to use my attic during the day but at night, come and go. In the yard, run them only at night.
- b) Second, my units are weatherproof so I only need one unit for bat control inside or outside my agriculture field.
- c) Third, my unit comes with a power supply so I can run it all the time using any wall outlet. Power consumption is minimal and when kept always on bats will never come close to the protected area.
- d) Fourth, my units have an included "High Frequency ultrasound" which make sound to protect field from bat.
- e) Fifth, we have an optional mounting block which allows you to angle units up at a 0 to 90-degree angle and to place them over a 1" stake. Stakes can be any standard garden stake or 1" piece of rebar. Units only need to be top of the to keep them dry so a 2-foot piece of rebar driven into the ground will do a great job of keeping the unit pointed where it will most matter.
- f) Lastly, units can be powered by 2 "C" cell batteries if need be. We recommend using the power supply for the first 2-3 weeks when first installing the units to make sure the bats relocate quickly.

You can get 33 ft and 66 ft additional strings to expand the power link so there is no motivation to not utilize a close-by divider outlet to control them. This gives you an ideal range since units consistently on will repulse bat for 70 feet or more. However, when depending on batteries, they will possibly turn on when enacted and bats should go inside 54.46 feet to turn them on. This could restrain their underlying effect so use them by keeping them connected at whatever point conceivable.

Utilizing a mounting block, you'll have the option to set the unit simply off the ground and direct the sound where required. The stature off the ground is significant Over 30 feet high is fine. Make sure to guide it to the segment of the field where the bats are either perching or entering.

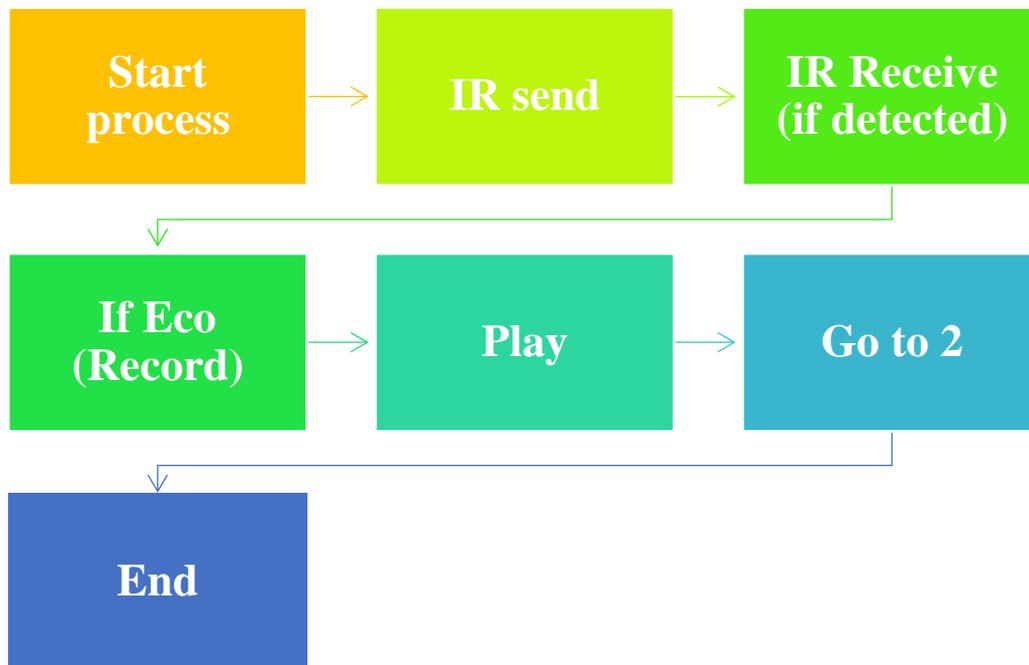
### 3.4 Implementation Requirements:



**Fig: Flow Chart Diagram**

This Chart Demonstrates my task total from Begin to End. Initially, I have to press detail Switch Catch at that point It's hurried to IR sensor. Either IR sensor doesn't distinguish object it will stop nor it will record articles voice then it moves to play or recording item voice move to Ultrasound sensor and ultrasound sensor expanding recorded sound 20KHz – 40 KHz and it plays Then it will end. The Bat calculation is a metaheuristic calculation for worldwide streamlining. It was propelled by the echolocation conduct of microbats, with fluctuating

heartbeat paces of outflow and clamor. The Bat calculation was created by Xin-She Yang in 2010. The admiration of the Bat Banisher can be outlined as pursues:



**Step 1:** Start process

**Step 2:** IR send

**Step 3:** IR Receive (if detected)

**Step 4:** If Eco (Record)

**Step 5:** Play

**Step 6:** Go to 2

**Step 7:** End

### 3.5 Summary of Project Cost:

This task in all-out cost will be not exactly just 2000BDT Taka just and It will be required just Change Battery or Charge its cost will be just 50-60 BDT Taka For each month as it were.

### 3.6 About Device

#### 3.6.1 Power Unit:

This unit can be fueled by the included air conditioning power converter or 2 "C" batteries. On the off chance that you have to control it with batteries, we recommend you utilize the "IS

Sensor" setting (see underneath). This will enable the batteries to last 1-2 months. Running the unit set to "consistent" signifies it will be consistently on so the batteries will just last a couple of days. In the event that you have to set the unit to "steady" for your annoyance creature (see proposed settings beneath), plan on utilizing the included power supply. Utilizing this will cost next to no every month Simply need to Charged Battery or Change Battery. IT cost will be under 50-60 BDT Taka as it were

### **3.6.2 Target Animal: Bats**

### **3.6.3 Ultra Sound Works:**

It's critical to comprehend UltraSound does not infiltrate anything strong. This implies it can't experience dividers, around structures, and so forth. It is compelling just in the zone straightforwardly before where a unit is put and relying upon the position and encompassing territory, can secure up to 4900 sq/ft per machine. Noticed that, the utilization of UltraSound can't harm creatures including pets. As clarified over, the sounds radiated will make certain creatures awkward and need to move somewhere else. This happens in light of the fact that essentially, most any creature is "touchy" when dynamic in another territory and sound is a sense they all utilization. Truth be told, for some creatures, the sound is the most significant sense so it's basically they hear "typical" sounds. This gadget will discharge sound anything other than ordinary [12]. What's more, the sounds change. That implies in the event that you are attempting to expel bats and dial in that setting, canines, and felines wouldn't fret the sound despite the fact that they can hear it. Whenever utilized in the yard, your pooch or feline will no uncertainty identify the unit when it's initially introduced. Most won't mind following a couple of moments; others may go up to the unit to perceive what all the complain is about [3].

### **3.6.3 Range of Sound**

This will vary based on the settings. For the ultra sound waves, the impact needs "line of sight" since ultrasound does not penetrate. So for open areas, fields, etc. it will be heard up to 70 feet away and effectively protect up to 4900 sq/ft. The audible sound is quite loud and can be heard up to 300 feet away.

### **3.6.4 IR Detector Range:**

This setting is adjustable with the highest setting (30) enabling it to pick up movement 50 feet away (animal size will impact performance as explained below so plan accordingly based on your target animal).

## **3.7 Repelled Settings**

### **3.7.1 Configure Settings:**

This unit has many options and settings. See below for the recommended setting for your target animal. The following is a brief explanation of how each setting will control the unit.

#### **3.7.1.1 Operating Time Slider:**

Use this to configure the unit to be active any time of the day, during the night only or during daylight hours only.

### **3.7.1.2 Ultrasonic Settings:**

Of course, the unit will consistently a band of ultra sound when actuated. Utilize this change to control decide whether the unit should possibly go off dependent on movement or in the event that you need to be consistently on (this would be the "Steady" position). The "Cont. Range" signifies it will utilize both ultra sound and capable of being heard sounds when actuated. At the point when set to "consistently on", the unit will be dynamic for 20-30 seconds and after that mood killer for 20-30 seconds. The will be the typical example of on/off activity for this setting. During this time, the unit will discharge a scope of ultra sound to go off so the recurrence won't generally be the equivalent. At the point when setting to "Cont. Scope", there will be much to a greater extent a distinction in sound range as capable of being heard sounds will be worked in with the general mish-mash. For all settings, the lights won't streak reliably or in an example; is this particularly by configuration to keep obtrusive creatures tense.

### **3.7.1.3 Sonic Volume:**

Utilize this control in the event that you might want to include sound when repulsing bat. Much of the time outside, this will help. When utilizing in farming, you might need to keep the sound turned right down which means you won't hear it by any stretch of the imagination. For repulsing most creatures in the objective territory, the sound won't be suggested however utilizing it tends to be useful on the off chance that you needing to "hear" when bat or some sort of development is recognized by the machine.

### **3.7.1.4 Frequency Setting:**

This control has the red top on the button and will allow you to turn it 90 degrees from left to right and its frequency will be 20-40 Hz

### **3.7.1.5 Dc Input Connection:**

Plug in your AC power supply to this port if powering the unit with the included power supply.

## **3.8 Battery Compartment:**

Insert 2 "C" cell batteries to this compartment taking care to point them in the right direction. And remember that once the unit has batteries, it will automatically turn on and be active to place it in standby mode.

**3.9 Device Size:** 6.5" wide by 5.5" tall by 3.5 inches deep.

As a last resort, you can also use a flat head screwdriver to gently "pry" the lip of the Tupperware cover outward so it can slide over the housing.

Use your thumb to firmly press the sides of the device inward so the "Tupperware" cover will slide on and seal properly.

### **3.10 Replacing Back Cover:**

This unit is considered "weatherproof". It's not waterproof so you should keep it above water when put in the yard. The back spread fits like a Tupperware spread and successfully seal the back where all the control catches and the electronic board is housed. This spread is intended to fit tight so when supplanting it subsequent to making your ideal settings, take care to appropriately join it easing back by beginning the main two corners first.

Next, slide the sides over the side lodging and work the two sides down leaving the corners free until you set the waist of the base. The plastic lodging is adaptable enough so you can press solidly on it to twist it only enough to fit inside the plastic edge of the spread. Push one corner on along these lines and afterward the subsequent corner.

You can likewise utilize a level head screwdriver to delicately twist the lip of the spread out a slight piece so it will slide over the lodging. This ought not to be required as long as you are sufficiently able to twist the edge of the unit inside the spread width. Additionally, occasional temperatures can influence the manner in which the unit fits because of mugginess, temperatures, and so on. When the spread has been supplanted two or multiple times, it will go now and again effectively.

## **Chapter 4: Experimental Result and Analysis**

### **4.1 Introduction**

The Bat Banisher may be used independently. Generally, it is very important for agriculture technique. I explain a use case for using high-level frequency for banish bat from the agriculture field. This use case is very good effective for agriculture.

Main components for Banishing Bat between two components: Bat and (Farmer) Agriculture field. There are many standard "parts" in this system. Generally, I use the high-frequency ultrasound system for target elements. I wish, it will be helpful for the farmer by default Agriculture field.

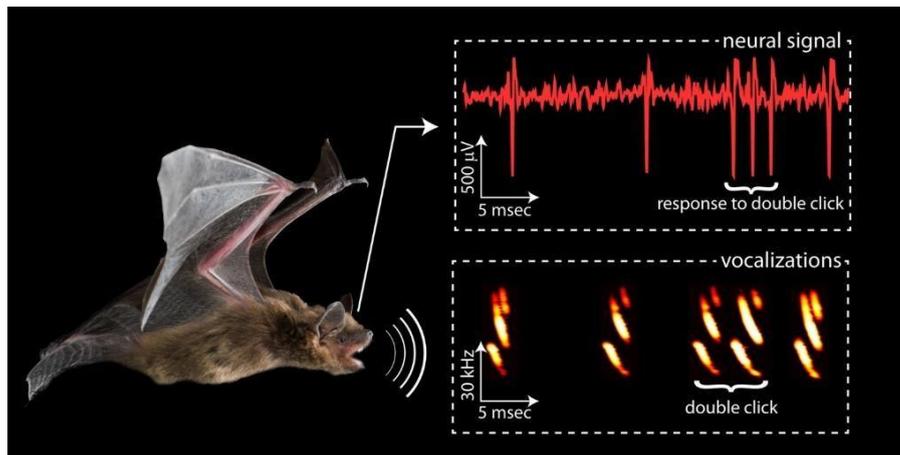
### **4.2 Experimental Result**

Bat Banisher in effectively helpful for farmer in agriculture. After experiment I can Say it will be essential for farmer to protect agriculture field. This is active and effective module. We use for experiment Lichi yard, Guava Yard. Mango Garden. We used Frequency 20-40KHz for protect Fruits from bat. And it's perfectly worked by this project. This project is mainly bat banisher; Bat use their frequency to find out their destination when its throughout their frequency my project module detect it and through same frequency within a second for making a barrier their destination and my project perfectly change bats destination. When my project detects susceptible objective (Bat) my project detect it shows red light and also record objects voice then it's through same frequency to make a barrier for object.

### **4.3 Descriptive Analysis**

In this undertaking I utilized high-recurrence Ultrasound framework, Bat utilizes natural recurrence for distinguishing their goal like Lichi, Mango, Guava yard. My task likewise through a similar recurrence to secure my subject (Lichi, Mango, Guava yard, and so forth.)

Primarily Bat fly after nightfall, at the daytime it's never observed to fly. Since it's utilized to go their goal its utilization organic recurrence. Bats through their recurrence more than 20KHz that man can't hear We as people can hear numerous things. From the goliath truck driving by to the composition of a pen. The few sounds we can't hear are bat sounds. Their frequencies of creating sound are a lot higher than our own thus we can't hear it [6].



Recurrence is the manner by which quick an article vibrates and sound vibrates in waves. The vibrations are estimated in Hertz. So one Hertz (1 Hz) is equal to one vibration in a second. People can get notification from 20 Hz to 20 kHz. Anything higher is called ultrasound or ultrasonic sound. The reason that bats use ultrasound is that it has such a high recurrence and it has low diffraction or it twists less. They utilize this sound to complete a few things like to get their prey and furthermore just to get around. The strategy for doing such errands is called echolocation. They cause a sound and hang tight for it to ricochet back to hear it. On the off chance that they hear it come quicker in a specific zone than the remainder of the sounds, at that point they realize that something is close. The frequencies of bats are distinctive in numerous books found. In one source like the reference book, it says that the recurrence is 120 kHz. While in another it says 100 kHz [4]. Truly it ranges since when the bat makes a sound it isn't of a similar recurrence constantly.

In this way, at that point the qualities the recurrence ranges from are expressed to be as low as 10 kHz to as high as 120 kHz.

Bats are in the family Mammalia and in the request Chiroptera [literally, hand-wing]. They are night-flying vertebrates with forelimbs altered into wings. Ages before researchers created sonar, bats were utilizing sound waves for correspondence and route. At one time, individuals had felt that solitary bats had this capacity, yet later examinations have demonstrated that various creatures additionally utilize such methods including some fish. Creepy crawly eating bats are one of the creatures with the best sonar.

In 1793, Lazzaro Spallanzani of Italy found that bats were not influenced if their eyes were blindfolded but rather were bewildered on the off chance that they couldn't hear. It was recommended by an English physiologist in 1920 that bats explore, find, and caught their prey by hearing. With the development of the mouthpieces touchy to high frequencies during the 1930s, Donald Griffin found that bats produce ultrasonic (sounds of higher recurrence than those capable of being heard to people). He taped either of their ears shut and found that the bats could never again explore. Investigations directed with many wires mismatching a fenced in area were utilized to show the sonic direction of bats. It is presently realized that bats discharge ultrasonic sounds extending from 20 to 100 kHz. The sounds are transmitted through the bats' mouth or nostrils and are helped by a perplexing fold structure to give directivity [7]. The reverberation that profits from such discharges empower the bats to choose little flying creepy crawlies from some separation. The bats can likewise decide the size, area, thickness, and development of an article.

"Echolocation" portrays how a creature uses echoes from sound it produces to find protests in its way. Echolocation is best known from bats, yet it isn't remarkable nor is it a characterizing highlight: other understood echolocators are dolphins, porpoises, and toothed whales and even some blind people can utilize echolocation to explore. What's more, there is a whole group of bats called Pteripodidae (Old World Natural product Bats) which don't echolocate!

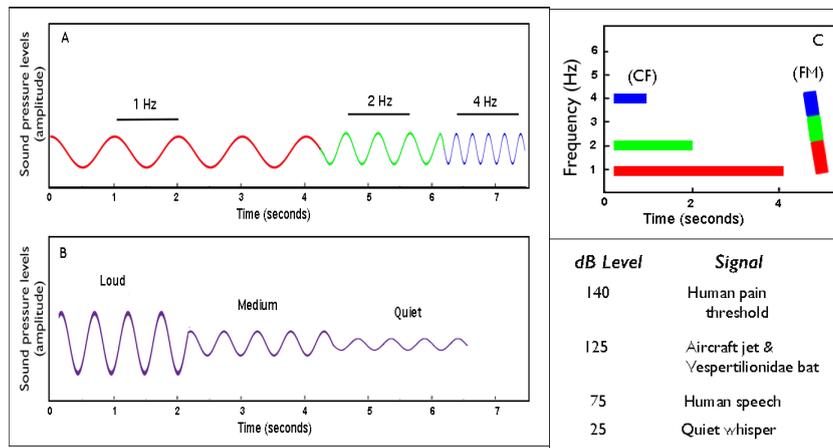
Echolocation requires the dynamic generation of a beat of sound (signal) and the receipt of the reverberation before creating the following sign. The contrasts between the first sign and its echoes contain the crude information fundamental for echolocation. Effective echolocation empowers a bat to fly around inside a dim cavern and not collide with the dividers or slam into different bats; it empowers bats to go during the evening and not crash into trees; and it empowers bats to find, recognize, track, and effectively catch prey.

To acknowledge what every specie of bat is achieving in its own exceptional manner, we have to comprehend a couple of fundamental highlights of sound [1].

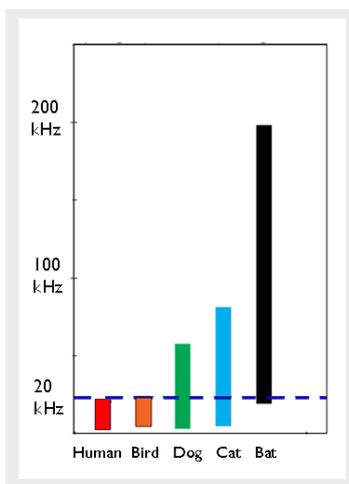
Sound is created by cycles of changes in weight which can get transmitted through different media, including air and water [5]. These adjustments in weight can be plotted as waves, with qualities of:

- Frequency = number of cycles of pressure change with respect to time
- Hertz (Hz) = the SI unit of frequency, equal to one cycle per second; 1000 cycles per second equals 1 KiloHertz (kHz)
- Amplitude = the height of the pressure wave, which corresponds to the intensity of the sound and is measured in decibels (dB).
- Wavelength = the distance covered by one cycle and which is dependent upon the velocity of sound. In air at sea level, this is about 340 meters per second. Thus, the wavelength of a 340 Hz note would be one meter while that of a 3.4 kHz note would be 10 cm. The wavelength of a 34 kHz note (which is what the Free-tailed Bat *Tadarida brasiliensis* uses), is a mere 1 cm [11].

We can graph these wave characteristics in several ways. For example, as three different frequencies produced with the same intensity (A); or the same frequency at different intensity levels (B). If each of the three discrete frequencies presented in (A) are produced individually, they would be emitted at a Constant Frequency (CF); if a singer did a "glide" from high frequency to low frequency in 1/2 second, we describe this as Frequency Modulated (FM) [1,5].



### *Audible vs. Ultrasonic*



Despite the fact that Vespertilionidae bats are yelling as uproariously as a flying machine fly motor, people can't hear them in light of the fact that the recurrence of their calls is past our scope of the hearing. We can hear sounds with frequencies extending from 12 Hz to 15,000 Hz (i.e., 15 kHz). Underneath 12 Hz is viewed as subsonic (for example like the tunes of whales) and ultrasonic is > 20 kHz. So as to hear ultrasonic sounds, Before we look all the more carefully at the ultrasonic sounds of bats, it recollects a few general guidelines of wave proliferation:

- ➔ Low frequency waves (sounds) carry farther
- ➔ High frequency waves (sounds) attenuate more quickly i.e., sound pressure level (intensity) decreases with distance -- pressure halves for each doubling of distance
- ➔ Higher frequency signals and their associated echoes give better "resolution" (rather like pixel size in images -- smaller and more pixels create a sharper image; more call cycles per second give better acoustic resolution)

## Bat Acoustics

Numerous bats produce echolocation beats that spread the scope of frequencies. The scope of frequencies is the "data transmission" of the sign. What's more, a bat will put more (or less) vitality into certain frequencies of the sign than it does into others, especially when it shifts from movement mode to question location, object ID, lastly, article catch (or, endeavor to catch . . .).

We can see this in the one-second call arrangement of a Pallas' Free-followed Bat (molossus), chasing in the outside space over Windsor House (outwardly evaluated to have been around 20 m over the ground). The arrangement starts with a "narrowband, extreme" search stage

(A), changes to "higher most extreme recurrence, more extensive data transfer capacity, medium force" for an item recognized/approach-object stage

(B), and "broadest data transfer capacity, short heartbeat interim, calm" (i.e., best goals) stage

(C) as the bat endeavors to catch whatever creepy-crawly was flying near. This last stage (C) is ordinarily called the "terminal buzz" period of an insectivore's call. Sadly, we can't tell from the consider whether the bat effectively caught the creepy-crawly, however it gave a decent attempt. The "recognition of foe sonar" and evasion conduct by creepy crawlies is an entire another energizing story [13].

## **Chapter 5: Conclusion**

In this project We Used High frequency Ultrasound, IR sensor, 8  $\Omega$  0.5W Speaker, to complete my project. After Complete my project I analysis this project in an agriculture field (Lichi, Mango, guava yard). My project is successfully work. A Bat through their frequency 20KHz and also my project first detect Bats frequency then it's through same frequency to make a barrier for bat. After analyzation I can Say, my project is very effective for farmer and an agriculture Field.

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