MAMMAL SAVER USING IOT

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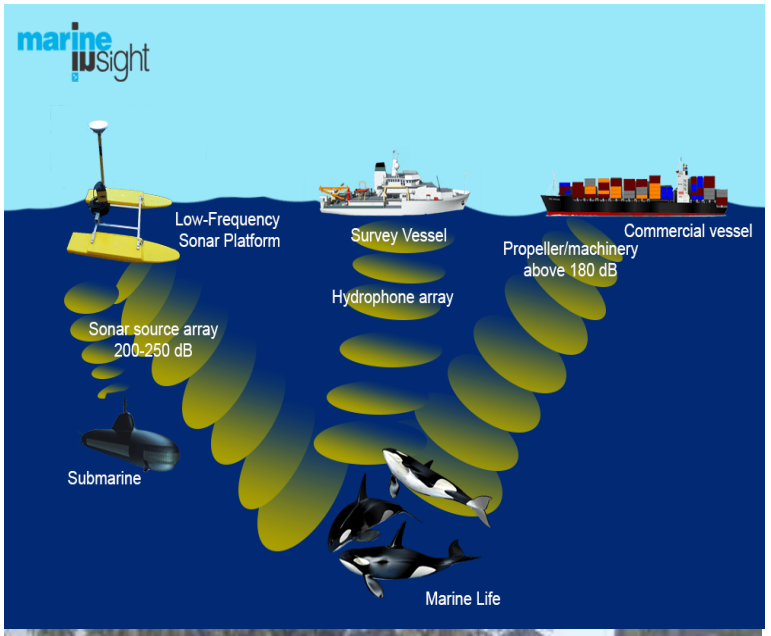
Abstract: Over the past two years, carcasses of 80 marine mammals, including dolphins, porpoises and whales, have been washed ashore in Mumbai and surrounding areas. Noise from ships, cargo vessels and trawlers is likely to be one of the main reasons behind the increasing casualties of marine mammals, a study has revealed. A study by the Maritime Research Centre at the Indian Maritime Foundation, Pune, has found that shipping activity is the single ubiquitous noise source in the ocean and it is doubling every decade.The report, titled Impact of Maritime Security Policies on Marine Ecosystem, took into account a few Mumbai cases where dolphins and porpoises lost sense of direction owing to their communication pattern being affected due to noise from ships.
Our project aims to detect the sound level of the ship. If the sound level of the ship is above 200dB ,the detector will alert the captain of the ship so that he could reduce the speed of the ship which reduce the sound energy. This could reduce the death of marine mammals.

Index Terms: Sound Noise, IOT, Sensor, Save Mammals.

1) INTRODUCTION

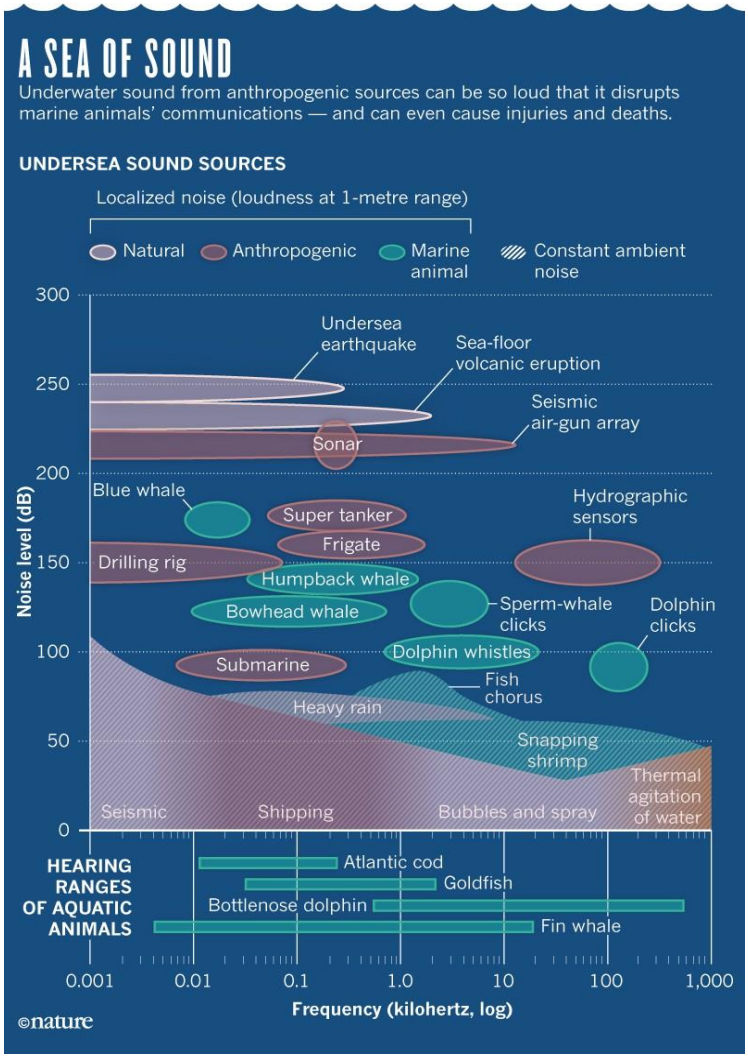
A study by the Maritime Research Centre at the Indian Maritime Foundation, Pune, has found that shipping activity is the single ubiquitous noise source in the ocean and it is doubling every decade.
The report, titled Impact of Maritime Security Policies on Marine Ecosystem, took into account a few Mumbai cases where dolphins and porpoises lost sense of direction owing to their communication pattern being affected due to noise from ships.
The study found three main sources (see box) – ships using sonar technology, seismic surveys, and the sound of various machines used by ships and vessels – as the cause of noise pollution under water.
“The growing stranding and fatalities of marine mammals off the Indian west coast are strongly attributable to acoustic habitat degradation. The marine mammals are known to use sound for biologically critical function and thus, over a period of time have developed very sensitive acoustic capabilities,” said Arnab Das, author of the paper, former commander in the Indian Navy and director of the Maritime Research Centre. “Growing human activities at sea have significantly increased the noise in the ocean.”
We will use a normal Electret Condenser microphone with Arduino and try measuring the sound or noise pollution level in dB as close as possible to the actual value. We will use a normal amplifier circuit to amplify the sound signals and feed it to Arduino .We use regression method to calculate the sound signals in db. If the sound level is above the critical level (200 dB) then the indicator light will be glown.



2) RELATED WORKS

In this paper, The plan is to detect the sound level of the ship. If the sound level of the ship is above 200dB ,the detector will alert the captain of the ship so that he could reduce the speed of the ship which reduce the sound energy. This could reduce the death of marine mammals. The number of marine watercraft is on the rise–from private boats in coastal areas to commercial ships crossing oceans. A concomitant increase in underwater noise has been reported in several regions around the globe. Given the important role sound plays in the life functions of marine mammals, research on the potential effects of vessel noise has grown–in particular since the year 2000. We provide an overview of this literature, showing that studies have been patchy in terms of their coverage of species, habitats, vessel types, and types of impact investigated. The documented effects include behavioral and acoustic responses, auditory masking, and stress. We identify knowledge gaps: There appears a bias to more easily accessible species (i.e., bottlenose dolphins and humpback whales), whereas there is a paucity of literature addressing vessel noise impacts on river dolphins, even though some of these species experience chronic noise from boats. Similarly, little is known about the potential effects of ship noise on pelagic and deep-diving marine mammals, even though ship noise is focused in a downward direction, reaching great depth at little acoustic loss and potentially coupling into sound propagation channels in which sound may transmit over long ranges. We explain the fundamental concepts involved in the generation and propagation of vessel noise and point out common problems with both physics and biology: Recordings of ship noise might be affected by unidentified artifacts, and noise exposure can be both under- and over-estimated by tens of decibel if the local sound propagation conditions are not considered. The lack of anthropogenic (e.g., different vessel types), environmental (e.g., different sea states or presence/absence of prey), and biological (e.g., different demographics) controls is a common problem, as is a lack of understanding what constitutes the 'normal' range of behaviors. Last but not least, the biological significance of observed responses is mostly unknown. Moving forward, standards on study design, data analysis, and reporting are badly needed so that results are comparable (across space and time) and so that data can be synthesized to address the grand unknowns: the role of context and the consequences of chronic exposures.

But there's still a gap in the science. Because noise is so pervasive, it is hard to study the impact as it ramps up. It isn't clear whether marine systems can work around or adapt to it – or whether it will drive crashes in already-stressed populations. So researchers are becoming acoustic prospectors, searching for quiet zones and noisy habitats in efforts to chronicle what exactly happens when sound levels change. Efforts range from natural experiments on the effects of a plan to re-route shipping lanes in the Baltic Sea, to investigating the impact of a trial scheme in Canada to reduce ship speeds in coastal waters off Vancouver.



a normal Electret Condenser microphone with Arduino and try measuring the sound or noise pollution level in dB as close as possible to the actual value. We will use a normal amplifier circuit to amplify the sound signals and feed it to Arduino .We use regression method to calculate the sound signals in db. If the sound level is above the critical level (200 dB) then the indicator light will be glown. And the buzzer will also alert us. The captain of the ship so that he could reduce the speed of the ship which reduce the sound energy. This could reduce the death of marine mammals. Our plan will be more useful for saving the mammals.

3) SYSTEM ARCHITECTURE

A. PROPOSED SYSTEM

The proposed system consists of two main portions: The first portion includes all the hardware components which pick up all of the data which is detected. The hardware includes the Electret Mic, Arduino Uno, resistors, capacitors and the connecting wires. The second portion includes the details about how much frequency sound data which is detected is delivered to the arduino code. Here, the arduino sends a signal to the ship captain by glowing the led.

B. BLOCK DIAGRAM

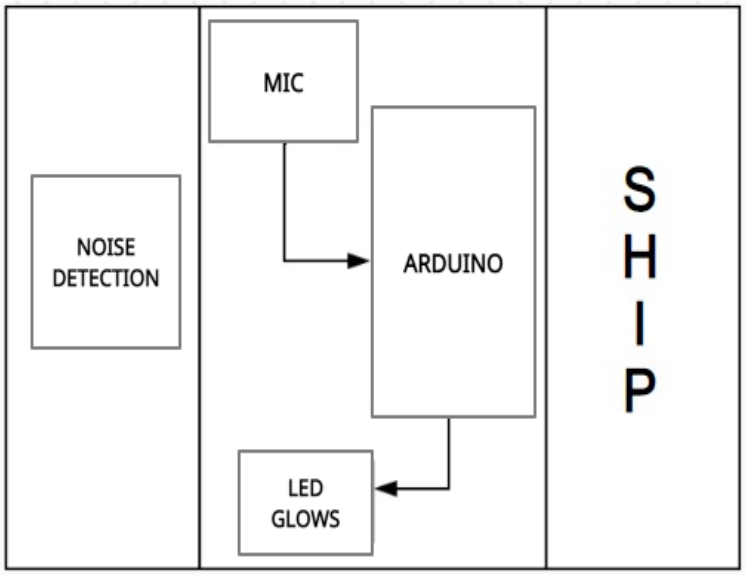


Fig 1. *Block Diagram of Proposed System*

C. WORKING MODEL

We will use a normal Electret Condenser microphone with Arduino and try measuring the sound or noise pollution level in dB as close as possible to the actual value. We will use a normal amplifier circuit to amplify the sound signals and feed it to Arduino .We use regression method to calculate the sound signals in db. If the sound level is above the critical level (200 dB) then the indicator light will be glown and the buzzer makes buzzing Noise.

The detector will alert the captain of the ship so that he could reduce the speed of the ship which reduce the sound energy

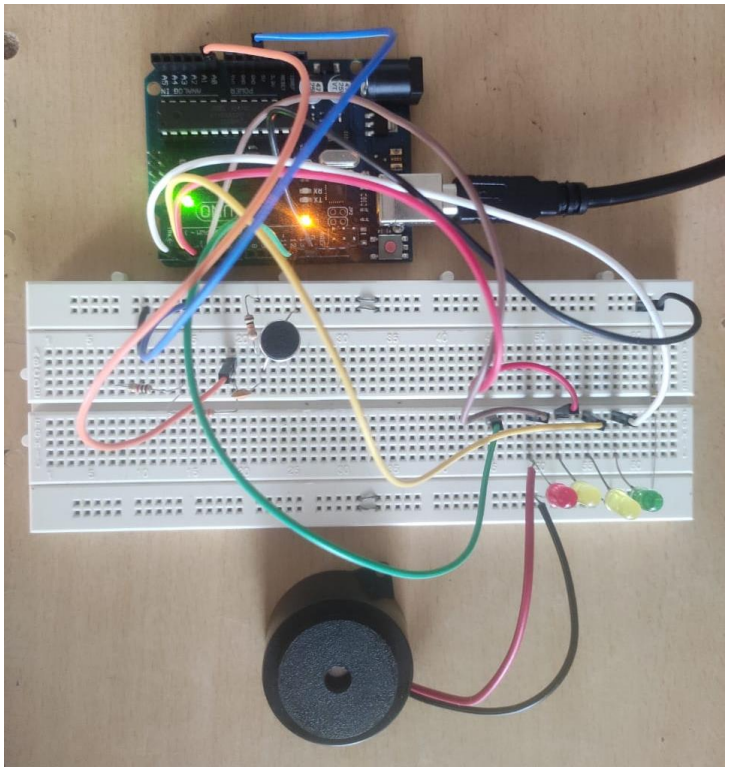


Fig 2. *Working Model*

D. CODE EXPLAINATION

```
#define MIC A0 //The A0 pin gets the analog read
values(voltage)
int sig = 0;
void setup() //4 LEDS are glown based on decibel
{ pinMode(2, OUTPUT);
pinMode(3, OUTPUT);
pinMode(4, OUTPUT);
pinMode(5, OUTPUT);
}
void led() {
sig = analogRead(MIC)*50;//amplifying the analog read
values(voltage)
if (sig>1) {digitalWrite(2, HIGH);} else {digitalWrite(2, LOW);}
//1 volt =0 dB, if the incoming signal is greater than 0dB then
the pin 2 will be glown
if (sig>300) {digitalWrite(3, HIGH);} else {digitalWrite(3,
LOW);} //300 volt =49.5dB, if the incoming signal is greater
than 49.5dB then the pin 3 will be glown
if (sig>800) {digitalWrite(4, HIGH);} else {digitalWrite(4,
LOW);} //800 volt =58.1db ,if the incoming signal is greater
than 58.1dB then the pin 4 will be glown
if (sig>950) {digitalWrite(5, HIGH);} else {digitalWrite(5,
LOW);} //950 volt =59.6db, if the incoming signal is greater
than 59.6dB then the pin 5 will be glown
```

```
//for the protection of mammals,200dB should be given to the condition loop ie.
if (sig>10000000000) {digitalWrite(5, HIGH);} else {digitalWrite(5, LOW);} //10000000000volt =200db, if the incoming signal is greater than 200dB then the LED will be glown
}
void loop()
{
led();
 }
```

4) DETAILS OF THE COMPONENTS

A. ELECTRET MICROPHONE

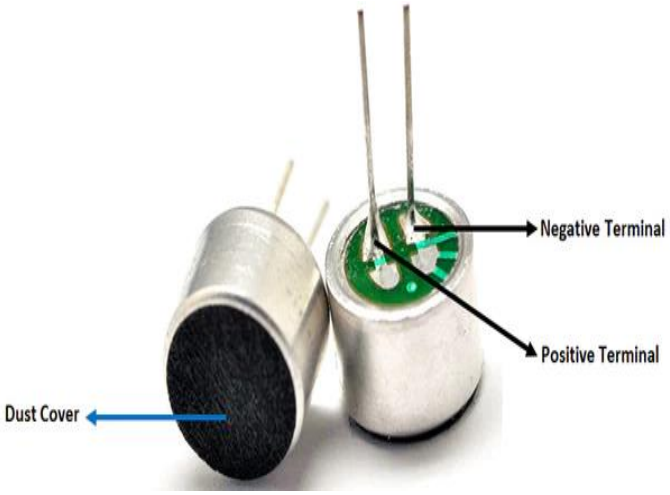


Fig 3. *Electret Microphone*

Electret condenser microphones are used to convert sound into an electrical signal and are used in a wide variety of consumer electronic products, including mobile phones, GPS devices, and speech recognition equipment.

B. Arduino UNO

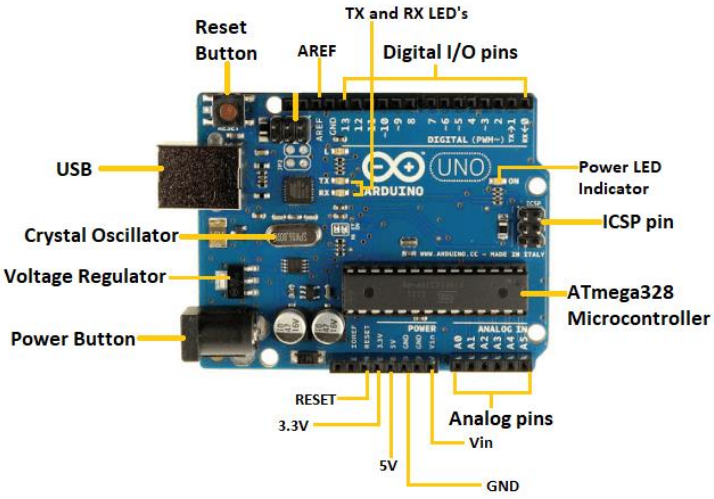


Fig 4. *Arduino Uno*

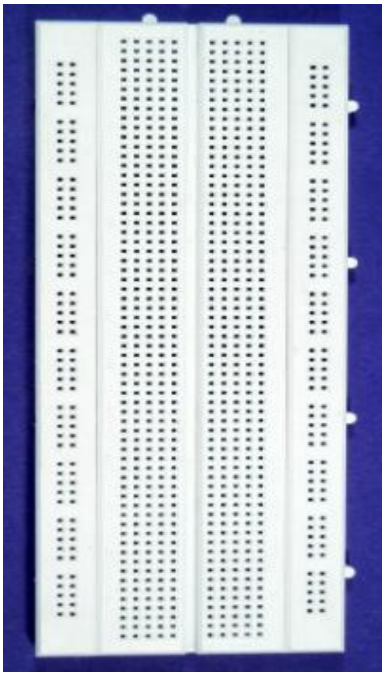
The Arduino Uno is an open-source microcontroller s. board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input / output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins , 6 analog I/O pins, and is programmable with the Arduino IDE, via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volt

C. Buzzer

Fig 3. *Electret Microphone*

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

D. Bread Board



A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

5) IMPLEMENTATION

This section contains the implementation of the proposed model. Once we are ready with our circuit we can connect the Arduino to computer and upload the "Analog Read Serial" Example program from Arduino to check if we are getting valid ADC values from our microphone. Now we have to convert this ADC values to dB.
Converting Analogread values from microphone to Decibel: sensorValue = analogRead(A0); //where A0 is the analoginpin
double db = 20.0 * log10 (sensorValue + 1); //this is the basic formula to convert analog read values to decibel
Once the installation and the code uploaded to the arduino then we can use external power cable to power it . It detects the sound and gives signals to captain by buzzing sound light indicators.

6) CONCLUSION

The proposed system will save the mammals from getting injury or death by high frequency sounds made by ships in the ocean.With this system, the probability of mammal deaths can be decreased by reducing ship speed using the indicator alert to the ship captian. It is a major step closer to that the reduction of mammals extinction.

ACKNOWLEDGEMENT

We have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and articles. I would like to extend my sincere thanks to all of them.

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