An embedded system for the visually impaired people

BY

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

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APPROVAL

This Project/internship titled **"An embedded system for the visually impaired people"**, submitted by Golam Mahmud Roman, ID No: 161-15-7631 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 B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on .

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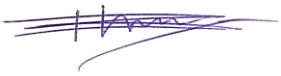

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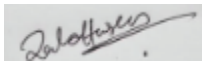

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mr. Aniruddha Rakshit, Sr. Lecturer, 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 or diploma.

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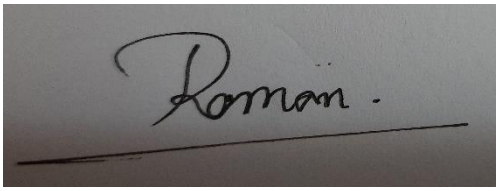

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Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

Human learn from his birth till death.Walking , eating are the examples of what a human must learn.But it is not same for all.Because if someone has no eyesight from birth then the question arises “how do they learn?”.The answer is simple - of course the speed of learning is less if compared to the other ones.Recognition, visualization, finding are not easy task for them as they are deceived from eyesight.And having some portion of sight also has some difficulties in real life.That’s why for them walking is a great problem as they can not locate the obstacles around them.And it makes them confuse and they get trouble during their movement.Not only they face the difficulty rather other people surrrounded by them also face the difficulty if they fail to detect the obstacles or the people around them.A simple solution can be to alert these two kind of people to avoid collision between them and to detect the obstacle is to make such a device that is capable of produce sound if any object comes nearer to them.The blind people or the visually impaired people can use it with the stick they use while walking or this device can be used as a handheld item.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This device is made for the visually impaired people.The device is capable of producing sound wave that can help the both – blind and the people around them.The function is very simple and the approach behind this device is not very critical or hard.It is made in amanner that when an obstacle or human comes in too close of this device it gives signal by producing a sound or buzz so that both the people can become alert and can avoid an absolute collision between them.And the same goes for an obstacle also.If it comes along the device's path it starts to buzz and make alert the blind or visually impaired user.This introductory idea gives a simple demo on how actually the device works.Now the question arises what was the motivation of this kind of project and why the project is so simple.The answer will be in the other parts of this report.

1.2 MOTIVATION

The motivation or the idea behind this project actually came from an animal that is bat.Though having no vision doesn't bother them so much.They fly around and do not get collided by any object by continuously producing ultrasonic sound wave.When an obstacle comes in front of them the ultrasonic sound reflect back to bat and the flight timeof the ultrasonic sound wave let the bat knows that how far the object is and how to fly toavoid that obstacle.This whole process is called echolocation.With this technique bats fly and live their whole life without having no vision.

Figure1.1.1:Highly Vasculated Membrane of a Bat

There are some other animals those have the same capability for an example- dolphin.

1.3 OBJECTIVE

The main objective was to make such a device that will have the same capability that the bat has.So to make the whole thing come alive the first approach was to find out how the ultrasonic sound can be created and how the reflected sound can be fetched or detected in real time.To do that it was mendatory to know the wave and the property of ultrasonic sound wave.And lastly it is to know how the process can be implemented in an electronic device.

1.4 EXPECTED OUTCOME

The outcome of this specific project is that the visully impaired will be able to detect obstacle or people near to them and avoid them to avoid collision.As this project particularly made for the visually impaired but one thing again comes in mind that is this type of prototype can be only used for this specific purpose?The answer is simply-no!Rather the type of mechanism actually has more application in robotics,iot,embedded systems.And that is “obstacle detection”.

1.5 CUSTOMER

Fully or partially visually impaired people will be the customer of it.

1.6 SERVICE PROVIDER

If it become popular to the user or the customer then it can be made more in amount.The company for making this product will be the service provider.

1.7 REPORT LAYOUT

Here is the summary of different chapters covered in this report:

Chapter1: Gives an overview of the introduction,motivation,objective and expected outcome.

Chapter2: Gives an idea of the scope of the problem ,challenges from different aspect.

Chapter3:Gives an brief introduction to embedded system,types of it and organizational structure of the compnonents.

Chapter4: With the help of the circuit diagram and programming concept the whole project will be described.

Chapter5: Design implementation and testing.

Chapter6: Discussion and conclusion with limitations.

CHAPTER 2
BACKGROUND

2.1 INTRODUCTION

The definition of embedded system is:

"An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system."

From every aspect of our life there are many different thing those became a part of our life.Among them machine is one of the most fundamental invention that became fundamental to make our lives easier.Without machines modern life can not be imagined.Now a question comes in mind that is the software we are using are not so necessary or do not we need it?Of course the answer is - for every level user software is mandatory.But to make that software work, we need hardware on that platform codes will be written and depending on those code the software will run.Every single technology in this world requires a hardware part.And after that it depends how much and what type of output or service somebody wants from the technology and how to work on that.Tomake a new type of device or gadget there are some basic components or electrical or electronical parts are needed.But before that a strong brainstorming phase should be done by the programmer or the developer.It is a necessary thing because if it is not done by the developer then it can become burden if it doesn't meet the requirement of the specific purpose.And that's why sometimes it can happen that a simple project is enough and better from a critical mechanism to avoid complexity.

2.2 RELATED WORKS

Every project related to this project from the perspective of objective , motivation and outcome one thing is very sure that all the projects were done in a manner that the developer who is trying to develop that thing he or she must have a medium level idea on how to make an embedded system or how to design and implement those in a device.For human there are actually mainly two types of medium through which it is possible to communicate.Those are- non visual and visual.Non visual have some other classification also.And it is very sure, as a visually impaired can not see partially or fully he or she will not be able to sense their respective environment through their eyes.So the device should be developed in a manner that the device should have the capability to make the user alert without making a visual formatted output.Rather the output sould be audio formatted.If that is possible then there comes another quesiton about it's preciousness.That means to have the capability it should work in real time and work for different obstacle having same preciousness.Then another thing that is the cost for making this type of device.All the projects related to this type of project have a common thing that is the hardware part.Because all the components are available in the market are sometimes costly or sometimes is not capable to produce a simple audio formatted output i.e, buzzing sound.

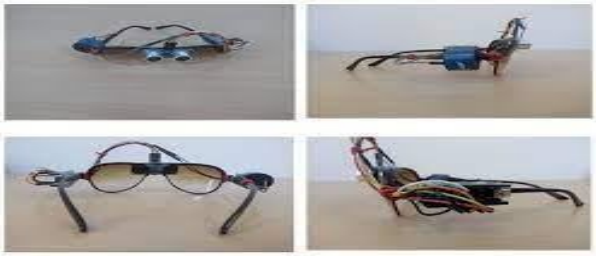

Figure2.2.1:Low Cost Smart Glasses For Blind

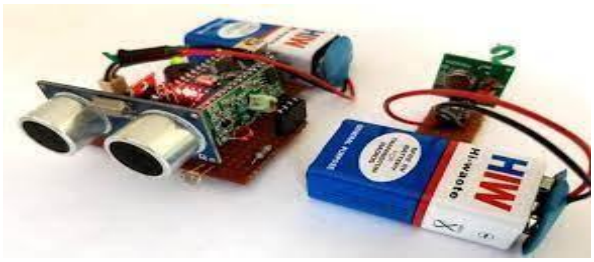

Figure2.2.2:Smart blind Stick Project Using Arduino and Sensors

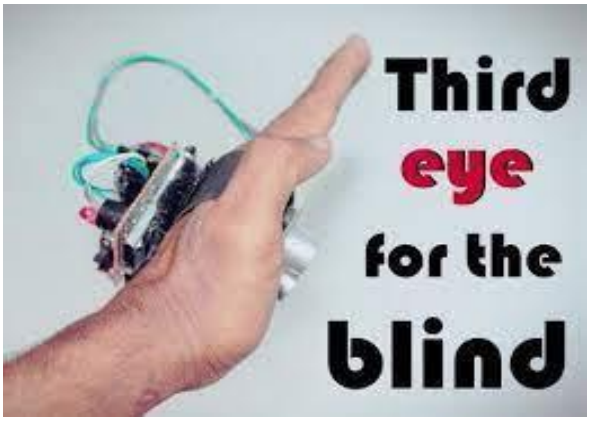

Figure2.2.3:Third Eye for The Blind

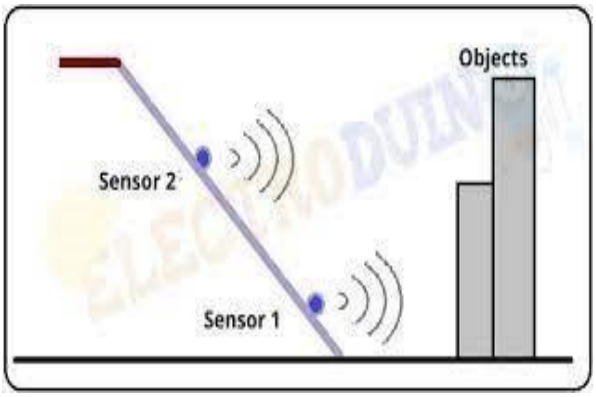

Figure2.2.4:Smart Blind Stick using Two Ultrasonic Sensors

Figure2.2.5:Ultrasonic Sight

All of the pictures or figures from above are collectred from different websites and all the projects with simple description can be viewed by searching their caption from any browser.And all the pictures are related to one another by their same working principle as all of them are made with same sensor-ultrasonic sensor.

2.3 COMPARATIVE STUDIES

Comparing to the other works or research based project there are some basic similarity and dissimilarity with this specific project.In this paricular project the project is done with the available resources in the market.And as all of the works are done with the ultrasonic sensors then it is conifrm that the working principle is same.And that isnothing but producing the ultrasonic sound wave and from the reflected back sound wavethe flight is measured and then with the help of the microprocessor located in it ,the decision is taken that the buzzer or vibration motor in it will be activated or not.Now if compared to those work that are more advance like those have the GPS module attached to it or have object detection technology with the help of the camera then this device should be less advanced device.Because those have location tracking,object tracking or detection technology and some have voice recogniton and voice based cooperation technology.Now again another question comes in mind that having such technology why should we go for this type of device?The answer is very simple to understand.This device has some key features compared to those devices.

They are-

1.Less expensive
2.Simple mechanism
3.Available resources are good for maintenance
4.Light weighted
5.Easy to carry
6.Easy to understand that how to use
7.The output is generated fast with respect to time that's why most of the time ,precious obstacle detection can be acquired.

2.4 SCOPE OF THE PROBLEM

To determine problems or the blockage of this project ,one thing to keep in mind that every single project can have various type of problem.And all the problems are to be solved after manufacturing of that specific product or device.From the experience of the user of that specific product the information to make the product better can be gathered.As the product to make this type of project has gained so much popularity already we have many type of components available in our hand.We do not need to study further more to make the sensors from scratch.Only it is required to make the product better with the latest technology.Like in this project some things can be attached to it.Like-GPS module.Which enables the precious locaiton tracking and if it is attached t a device and proper program/code is uploaded through a open source hardware platform like arduino ,the device can become a online device and can be called as a project of IOT project.But to do that a deep knowledge on programming and machine learning is required to do so.But only thinking from a "simple" mind sometimes does not give the proper solution.

And that's why after a approach the drawbacks or the problems can be listed as below-

1. Offline device
2. No object identification is available
3. No voice recognition technology attached

2.5 CHALLENGES

To overcome every aspect of problem is a fundamental issue for evvery project.But as this project does not carry out any kind of big solution to a specific type of problem that's why the challenges are not faced from the perspective of 'hard labour'.But one question was raised that this type of project will be a good one or it will become a loss project because of it's simplicity.But one thing is sure that since humankind faced COVID-19 pandemic it was a common problem for all that all got detached and things were getting harder because of hard lockdown.As this project was undergoing that time , it was not possible to buy the products or the components during that period.

CHAPTER 3
REQUIREMENT SPECIFICATION

3.1 INTRODUCTION

Getting started with the main with the hardware there was a confusion between two option.The options are-

1. Arduino
2. Raspberry Pi

These are the two types of open source platform on which one can work.But for a specific device or gadget it is not possible to use both at the same time.It is mandatory to work with the one at a time.To choose which platform is perfect it necessary to watch out the specification between them.The arduino platform is less costly.Though it depends when the purpose changes.Because arduino is the hardware that is attached to a microcontroller and capable of doing computation but to make it work for a particular joblike this project one has to decide first what he or she must do.Then if it is a project that should sense the environment then it is to be identified that what type of job he or she wants to take out from that device.There are many kind of sensors and componentavailable in the market.It is just necessary to select out all those components with the proper specification.And here as the work will going on about obstacle or object detection to guide the visually impaired.Now if object detection is the only target then after connecting all the component through the wires it is necessary to upload code and testify the whole device.

Figure3.1.1:Logo for Arduino Open Source Community

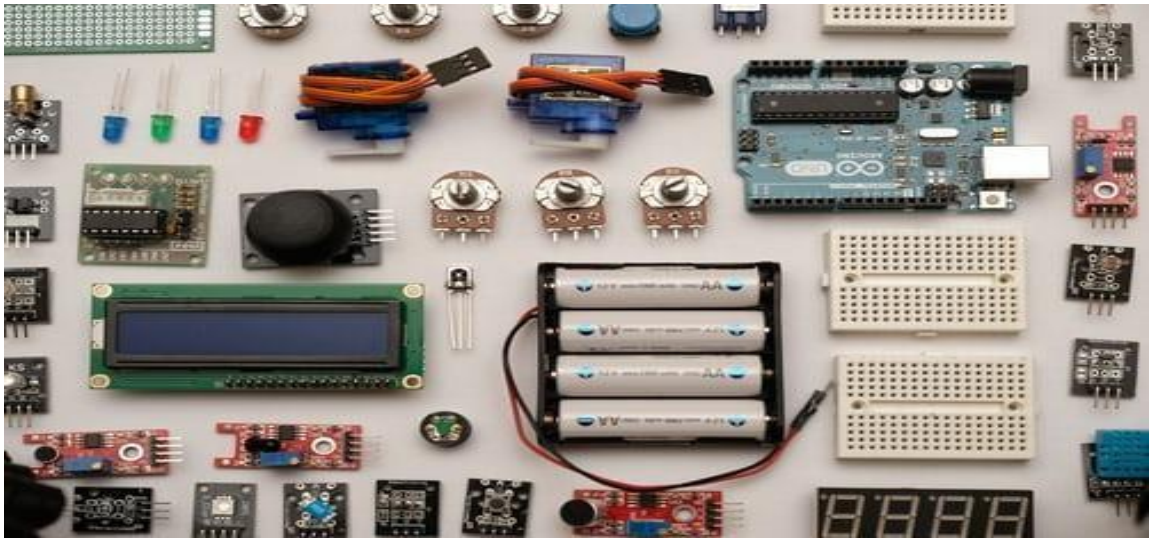

Figure3.1.2:Arduino Starter Kit

Though it is possible to work with arduino or raspberry pi but it is also possible to work on a project like this without arduino or raspberry pi.But for that elelctrical and electronical concept is needed to make such devices without the help of the arduino or raspberry pi.And some of the devices or machines actually surrounded around us.Like- MicroWave oven,MP3 player,Digital cameras,DVD Player,Washing Machines etc.

Figure3.1.3:Examples of Embedded Systems

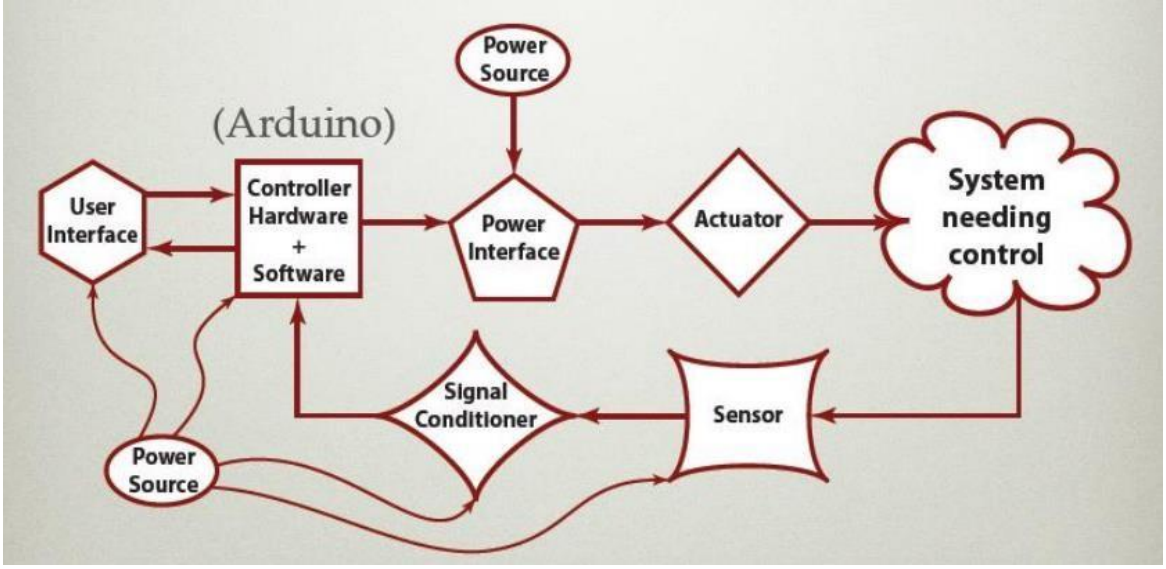

Figure3.1.4:Embedded System Concept Map

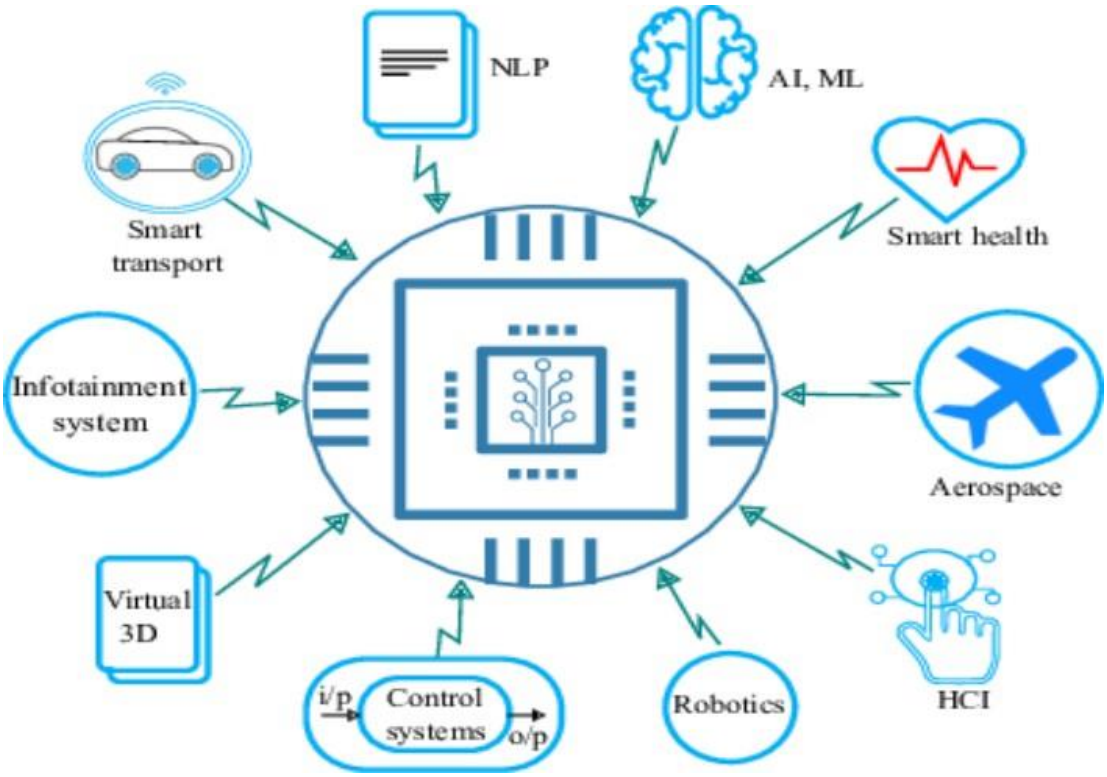

Figure3.1.5:Current domain of Embedded System

3.2 ARCHITECTURE OF ARDUINO BOARD

Arduino has a microcontroller to take decision and do the specified job from its input signal.The board has some pin and port through the other component can be connected.The figures below are self explanatory.

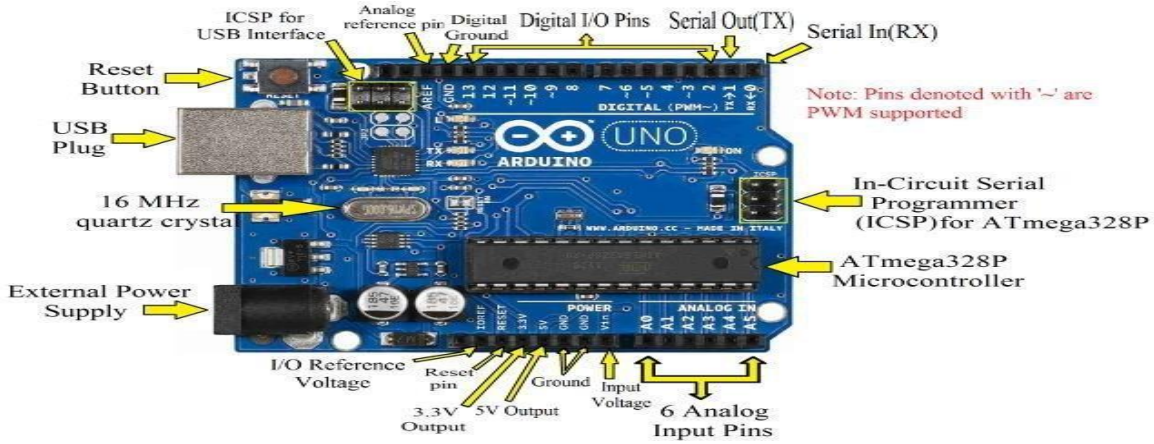

Figure3.2.1:Introduction to Arduino by respective configuration of it's different parts.

Actually without the external power supply and USB plug all are pins that specifies the structure of a system and determine the mechanism of that specific project i.e. how the device will work or run. The arduino has some classification depending upon the size of it's memory ,processor power,digital I/O and analog I/O.

Table3.2.1:Arduino Uno Specification

Microcontroller	**ATmega328**
Operating Voltage	5V
Input Voltage (**recom**)	7-12V
Input Voltage (**limits**)	6-20V
Digital I/O Pins	**14 (6 PWM)**
Analog Input Pins	**6**
DC Current per I/O Pin	**40 mA**
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (0.5 KB boot loader)
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

3.3 ARCHITECTURE OF ATEMEL ATMEGA328 MICROPROCESSOR

The ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC (reduced instruction set computer) architecture. In Order to maximize performance and parallelism, the AVR uses Harvard architecture – with separate memories and buses for program and data.

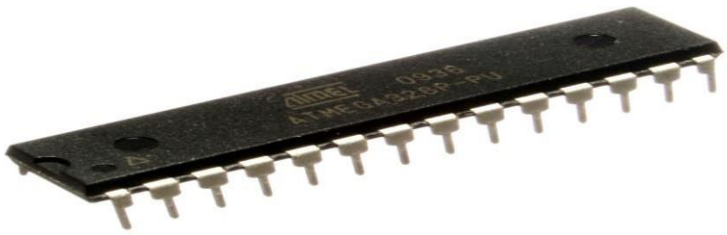

Figure3.3.2: Atmega328 Microprocessor

A microcontroller is an integrated chip that is a part of an embedded system.And this type of microprocessor is attached with the arduino board.

The microcontroller includes a CPU, RAM, ROM, I/O ports and timers like a standard computer, but because they are designed to execute only a single specific task to control a single system, they are much smaller and simplified so that they can contain all the functions required on a single chip.

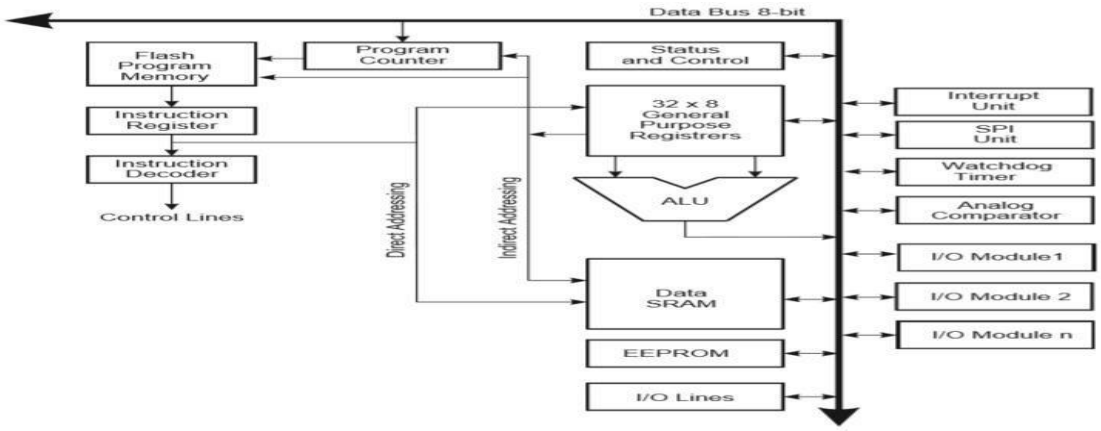

Figure3.3.3:Architecture of Atmel Atmega328 Microprocessor

Key Features of Atmega328:

1. High endurance non-volatile memory segments.
2. In system self-programmable flash program memory.
3. Programming Lock for software security.

Peripheral features:

1. Two 8-bit Timer/Counter with separate prescaler, compare mode.
2. One 16-bit Timer/Counter with separate prescaler, compare mode,and capture mode.
3. Temperature measurement.
4. Programmable serial USART and watchdog timer with separate onchip oscillator.

Unique features compared to other microcontrollers (ARM, 8051,PIC):

1. Power-on reset and programmable brown-out detection.
2. Internal calibrated oscillator.
3. External and Internal interrupt sources.
4. Six sleep modes: Idle, ADC noise reduction, power-save, powerdown, standby and extended standby.

There are some basic advantages of this microprocessor:

1. Processors are simpler to use, with the usage of 8bit and 16bit instead of 32/64bit which are more complex.
2. Readily usable without additional computing components with 32k bytes of onboard self-programmable flash program memory as well as 23 programmable I/O lines.
3. Code Efficient, all 31 registers are directly connected to the arithmetic logic unit (ALU), making it 10 times faster than conventional CISC microcontrollers.
4. Optimized for AVR enhanced RISC instruction set.

The only disadvantage of this microprocessor:

Lacks performance compared to higher bit microcontrollers.

3.4 HOW ULTRASONIC SENSOR WORKS

An ultrasonic sensor is a sensor that can produce a wave having a frequency greater than 40kHz.Which is actually nothing but ultrasonic sound wave.And if finds any object along it's path it can receive the reflected sound and from calculating the flght time travelled thorugh air and speed of sound the distane from between the obstacle and the sensor can be calculated.

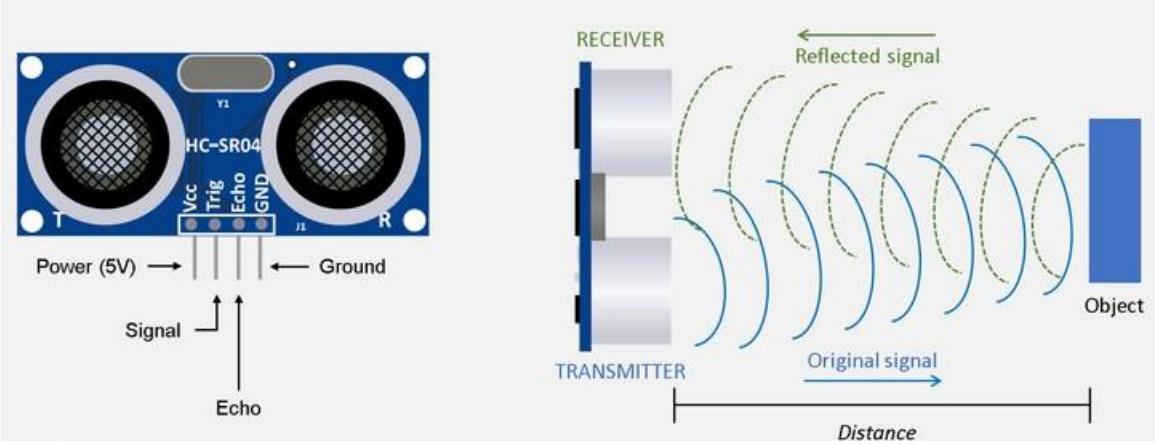

Figure3.4.1:How ultrasonic sensor works

The specification of HC-SR04(Ultrasonic Sensor):

1. Operating voltage: +5V
2. Theoretical Measuring Distance: 2cm to 450cm
3. Practical Measuring Distance: 2cm to 80cm
4. Accuracy: 3mm
5. Measuring angle covered: <15degree
6. Operating Current: <15mA
7. Operating Frequency: 40Hz

The formula behind calculating the distance between the obstcle and the sensor:

We know,

Distance=speed*time or, s = v * t

First convert the speed of soud in centimeter/second

Then convert seconds to microseconds,since the received value is in microseconds.

To convert from meters/second to cemtimeters/second to ,we need to multiply the quantity by 100.So we get 343*100 centimeter/second.

To convert seconds to microseconds ,we will multiply the quantity with 0.000001.Therefore,we get 343*100*.000001 =.0343 centimeters/microseconds.

Now this is to be multiplied received t with 0.5 (divideing the total time taken by 2) with 0.0343 centimeters/microseconds,then the acquired number is the distance between the obstacle and the sensor.

So,the formula is:

Distance=Duration*0.0343/2

3.5 WORKFLOW MODEL

As the device is very simple that's why a simple "algorithm" is enough to describe the working principle of that device.

1. Loop continues until the device is powered off :
2. Clears the trigger pin
3. Delay for 2 microseconds
4. Set the trigger pin on HIGH state for 10 microseconds
5. Reads the echopin which returns the sound wave travel time
6. Calculate the distance
7. If the distance is less than or equal to 50 cm
   then buzzer will go HIGH state
8. Else the buzzer will go LOW state.

3.6 ARDUINO IDE

To communicate with the hardware components or to give instruciton on how to work on the basis of a specific task ,it is necessary to program the components.And to do that Arduino open source community has a free software to do the job by connecting the arduino board through a USB cable with a machine that has the previously installed

software.And obviously to do that job it is necessary to install it properly on a particular machine.The step by step process to upload the are:

1.First the Arduino Uno board should to be connected with the lapatop or pc through the USB cable.

2.The code should be written in the editor of the IDE.

3.The board and port should be selected.

4.Then the code needs to be saved.

5.Then the code needs to be verified by the help of IDE.

6.And lastly it needs to be uploaded to the arduino board.

7.If another code was written in it then the code needs to be deleted first by the reset button on the Arduino uno board and then the code is to be saved,verified and uploaded from the IDE.

Figure3.6.1:Arduino IDE's Editor

CHAPTER 4
IMPLEMENTATION AND TESTING

4.1 IMPLEMENTATION OF CONNECTING THE HARDWARE

The interconnection among the hardware is the most necessary thing to achieve the best performance.Because if the connection doesn't match with the given circuit diagram from the specification of that component the disrupted voltage flow can damage the whole setup.And can damage the the parts used in it or can damage the whole setup.As previously mentioned all the components used in this project are not necessarily so tough to achieve as Arduino has made these kind of project so easy.

All the required hardware parts are:

1.Arduino Uno

2.Ultrasonic Sensor

3.Jumper wires

4.USB cable to upload the code

5.Battery

6.Push button

After gathering all the components with the help of the circuit diagram it is necessary to connect those correctlly.After that the sketch should be uploaded through IDE.

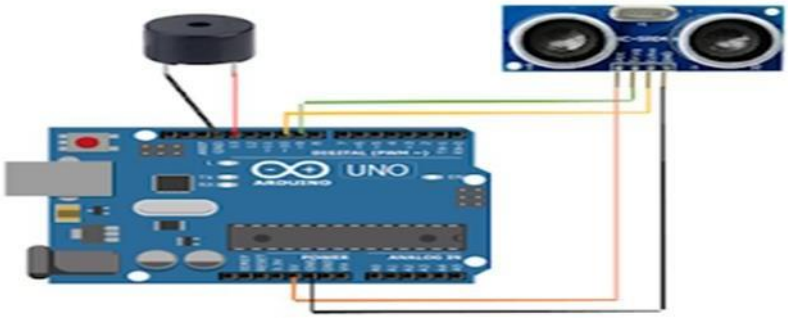

Figure4.1.1:Circuit Diagram of the device

The real pictures of the components used in this project:

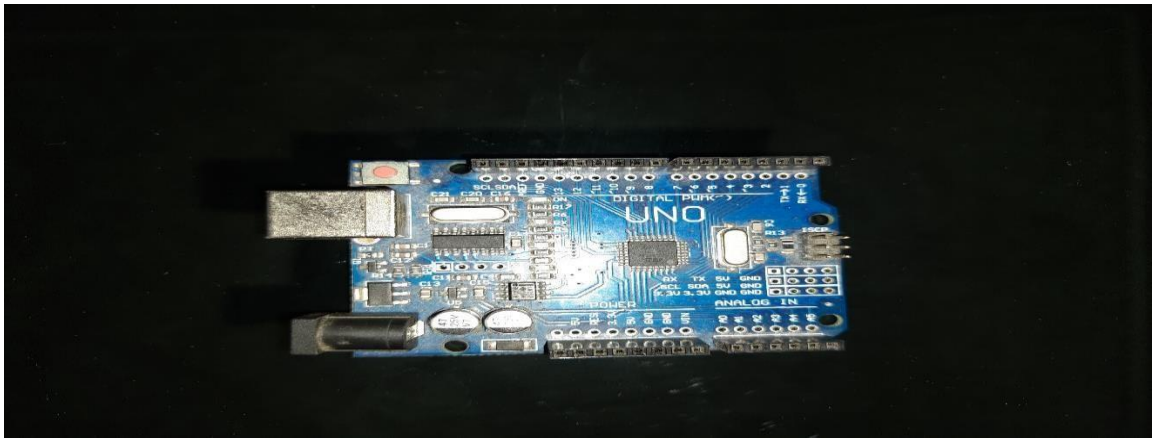

Figure4.1.2:Arduino UNO

Figure4.1.3:Ultrasonic Sensor

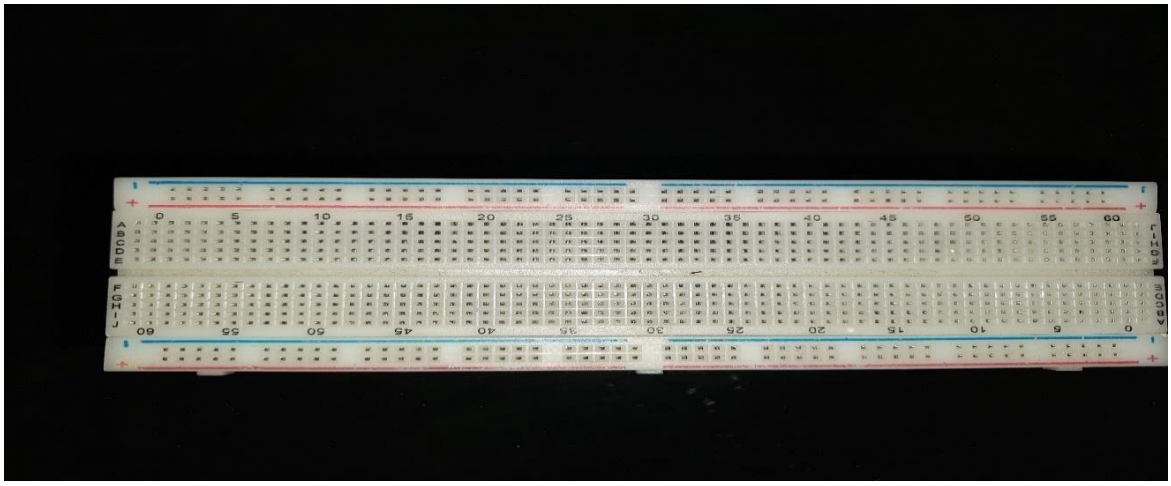

Figure4.1.4:Breadboard

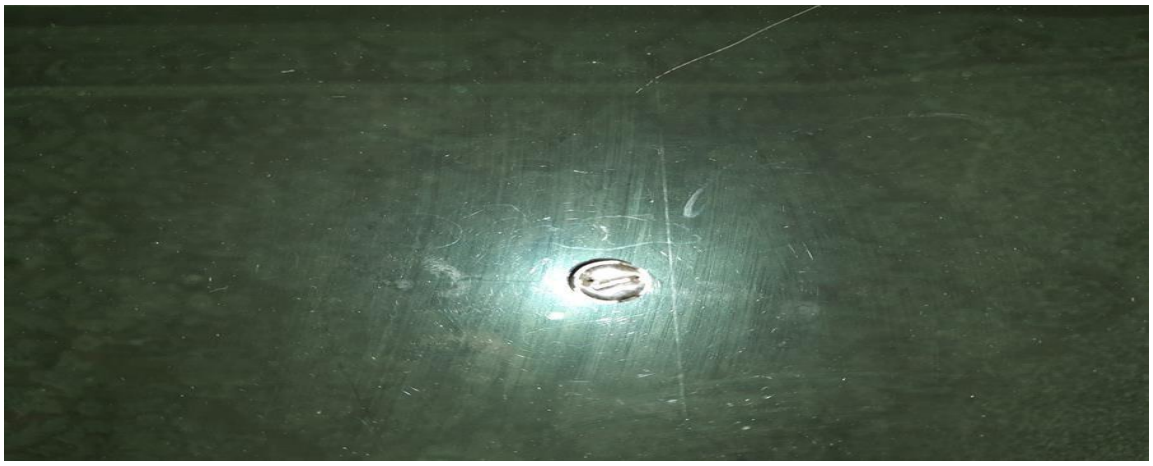

Figure4.1.5:Buzzer

Figure4.1.6:USB Cable

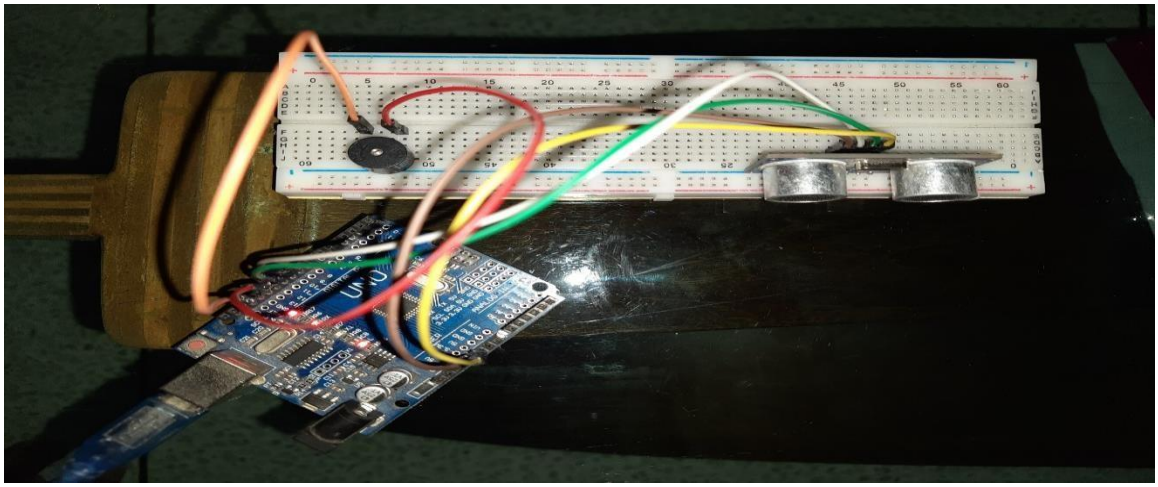

Figure4.1.7:Final Structure

4.2 TESTING PROCESS

If any obstacle comes along it's path it will start to buzz as an alarm.To do the testing phase it is necessary to powerup the board by any supported power supply.Then as 50 cmis considered and defined as safe safe distence then if any obstacle close less than 50 cm then it must starts to buzz.If it does not then it is to be consider that it has fault.As the project demonstration video is self explanatory , some pictures are provided here again.

Figure4.3.1:Before entering in the 50 cm distance from the ultrasonic sensor

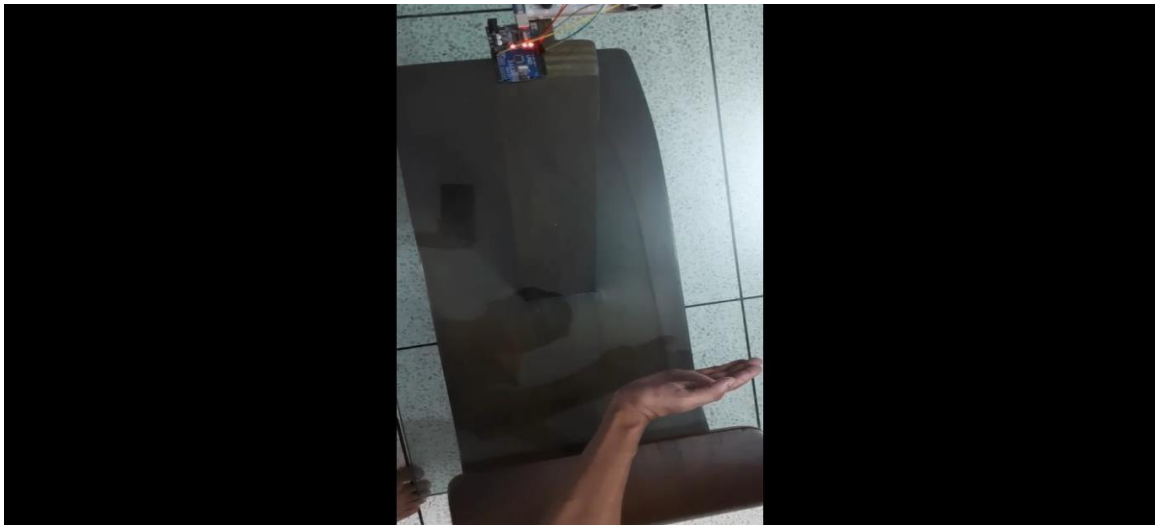

Figure4.3.2:After entering in 50 cm distance from the ultrasonic sensor

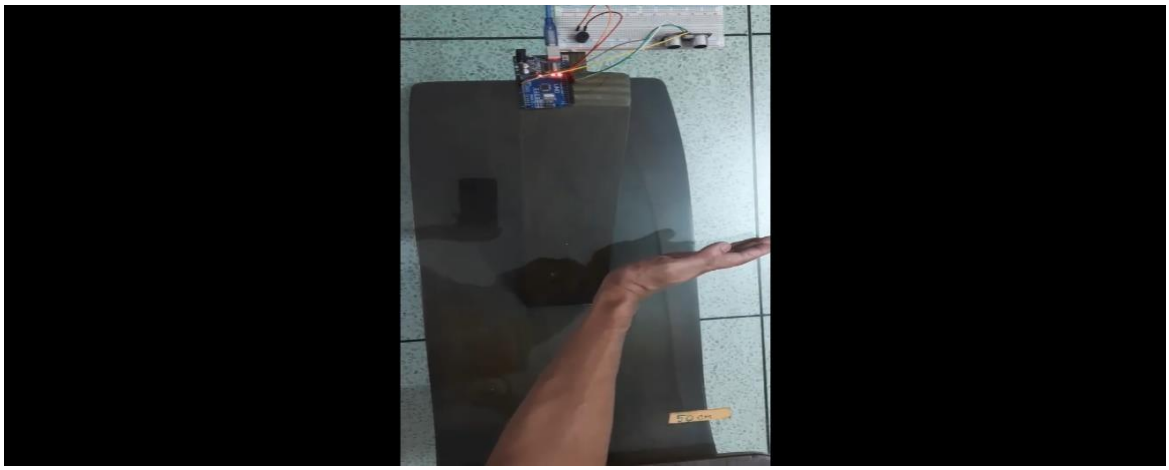

Figure4.3.3:About 25 cm distance from the ultrasonic sensor

For all of the cases i.e.whenever an objecct comes in the specified range the buzzer gets activated and starts to buzz.And therefore it can be said the testing phase is complete with no error.

4.3 TESTING CONDITION

As only the distance is the concern that's why on that basis it is to be calculated that the device is working or not.

Table4.4.1:Test Conditions

Test Cases	Distance between the sensor and obstacle(cm)	Expected Result	Output	Output success (Yes/No)
Test Case 1	45	High(Buzz)	High(Buzz)	Yes
Test Case 2	35	High(Buzz)	High(Buzz)	Yes
Test Case 3	25	High(Buzz)	High(Buzz)	Yes
Test Case 4	10	High(Buzz)	High(Buzz)	Yes
Test Case 5	5	High(Buzz)	High(Buzz)	Yes

CHAPTER 5

IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINIBILITY

5.1 IMPACT ON SOCIETY

The design is very simple that's why maximum time the device not visible to others.But it has an attribute that makes it comes visible to others.And the thing is it's buzzing sound.That means if somebody passes by through it's specified range the device starts to buzz.And the buzzing sound is not just hearable only by the user but it is hearable to other passerby in front of it also.So if we are trying to find out what kind of impact on the society would be then this scenerio should be kept in mind.And as the sound is the only parameter here and no other output from this device can be achieved so the impact on the society is the perspective or the perception created on basis –

1.Seeing a new device

2.Only blind people are using

3.How it works

4.The buzzing sound from it

5.The device is working properly or not

Now it has to be determined what kind of psychology creates in the mind of the people after seeing this.It is not possible that everybody will have the same kind of mind.All the review from the normal people and the user should be collected separately.And after that it can be determmined what type of effect it has created.But there are some parameter on which it is possible to determine that what type of effect this device will create in the society.Like-

1. Is the sound friendly or not
2. Is it creating a positive psychlogy among all kind of people

3. What type of people taking it as negative and what type of people are taking it as positive.

4. The number of people that are taking it positive and the number of people that are taking it negative.

5. The reason behind their psychology

6. A question should be asked – what should be updated in this device

7. Is it cost effective(user opinion should be collected)

8. Is it user friendly(user opinion should be collected)

5.2 IMPACT ON ENVIRONMENT

Environment means simply surroundings.Environment can be defined as a sum total of all the living and non-living elements and their effects that infulence human life.So it can be said that environment includes two types of things mainly- natural and artificial.When it has to be determined what type of impact and how the device will be effected the environent then it should be keep in mind that a positive impact gives a reason to keep a production alive of the device and a negative impact gives a reason to stop the productionof the device or product.But for this particualr project there were no usage of any kind natural resources.Beacuse this project is not huge where the extraction of biotic, abiotic, potential, actual, reserve, stock or any kind of resources directly.Now a question comes in mind how this device should effect the environment as this device does not include anydirect extraction of natural resources.But as it is an arduino based project all the products are actually are artificial and to produce all of them the natural resources like sand ,soil, water, woods and many kind of metals has to be extracted.The thing has to be considered

here is how the extraction of natural resources affetcing the environment.The things are to be considered that will be affected are:

1. Soil Degradation:To extract the soil the ultimate consequence is that it can cause soil degradation.Which means a long term effect can be done if over extraction of soil is done in a particualr area.Sand is the main raw material of many semiconductor.

2. Air Pollution: The gas emission from the production plant can cause the air pollution.Because it contains solid and liquid parts which affect the air very much.

3. Water Pollution: Good quality water shortage can be seen.

4. Biodiversity Loss:As the effect causes damage to air,soil and water ,all of these effect has an effect on the biotic resources of nature.The effect causes damage to the life of different kind living elements like plants or animal.And it is known when one kind of element is affected then it has to be considered that as a huge amount of damage has been done so the whole biodiversity affected.And it is considered to be the main reason behind the extinction.

5. Damage to Ecosystem:When one kind of kingdom of planet is affected it has to be considered that it's spread can cause the whole ecosystem of a specific area.If a dynamite is ready for having a blast the biodiversity of course will be affected and will cause a damage to the ecosystem by having an effect on the biodeiversity.

6. Golbal Warming Exacerbation : Some things that are responsible for global warming:

1. Burning Fossil Fuels : Like coal and gas to create electricity or power up the cars,carbon dioxide is emitted from those.And it causes damage to the atmosphere and a reason behind the global warming.

2. Defrostation and Tree –Clearing : Plants and trees play an important role in regulating the climate because they absorb carbon dioxide from the air and release the oxygen back into it.Forests and bushland act as carbon sinks and are a valuable means of keeping global warming to 1.5 degree celsius. And upto one-fifth of global greenhouse gas

pollution comes from defrostation and forest degradation.

3. Agriculture and Farming : Animals like sheep or cattles produce huge amount of methane gas .Which is another thing that is responsible for global warming because it is another greenhouse gas.

The effect on human :

1. Lack of Food : As the soil lost it's fertility the vegetables and other grain types of foods can not be grown on these affected lands.

2. Lack of Drinking Water : As water gets polluted by the wastage of factory and production plants ,there will be lack of drinking water.

3. Health Issues : The global warming is increasing day by day and due to the climate change the air is losing it's quality.And in some area or region already the breathing is heavy without wearing specified mask.The lack of food can also be a reason for having a less healthy body.And as drinking water is not available in some region the kidney , stomach and other organs can be effected.

4. Natural Disaster : Due to the global warming the ice from antarctica is melting.And which is causing sea level rising.And this is causing the natural disasters like floods ,tidal wave, drought.

5.3 IMPACT ON SUSTAINIBILITY

To make this is project or the device sustainable there are some criteria which has to be maintained.Here one thing has to be clear that as this project is hardware based that's why the sustainibility depends upon the hardware quality of this device.And as this device is made with the help of arduino it has to be considered that it has to be maintained with some rules.

They are:

1.Has to keep a safe distance from water.

2.Has to keep away from children.

3.The battery should be changed regularly otherwise the whole device will be damaged.

4.The usage of this device should be explained to the user properly.

5.To keep this project sustainable a marketing campaign can be done to make the product and the usage familiar to everybody.

CHAPTER 5
CONCLUSION AND FUTURE SCOPE

5.1 DISCUSSION

As the project does not require any other critical module and as it is an offline device it's simplicity makes it better compared to other device similar to it.But if it is possible to develop the sensors from their architectural structure, it will be possible to get such device that is capable of doing something more and the area sensed by the sensor will be incresed.

CONCLUSION

Although everything is described from every aspect and nothing to utter more about this project the conclusion can be ended as saying nothing at all but has to be mentioned as a formality.And lastly the project was implemented successfully.

5.2 SCOPE FOR FUTURE DEVELOPMENT

There are so many scope to develop this project.As mentioned earlier that if machine learning approach is applied to this despite of being a offline device this can become so much realisitc this can give the user a "real time" feelings about the location of objects.But not only as an offline device but also becoming an online device i.e. IOT device will make this more powerfull as this will increase the power to sense the environment and would be capable of storing the data like-location and preciousness.

5.3 BRIEF DESCRIPTION

This hardware based project does not allow the visually impaired to see again .Rather this device is for to give a guidnce to the visually impaired as they sometimes fail to

locate obstacles. To avoid the situation and to get rid of it, the ultimate and easiest solution is to find a way to alert the user and the people of his/her surrounding that a obvious collision can be avoided.As the alarm gets high it alerts the both – the user and the nearer one.And the device can can be held in the hand or can be attacheed to a gloves or can be attached to a stick.

5.4 LIMITATIONS

-> No voice communication system is available.

->No GPS module has been installed so no locating or tracking mechanism will be available.

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