Social Distancing Cap

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Social Distancing Cap

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In

Partial Fulfillment of the Requirements for the

Bachelor's/ Master Degree in Computer Science

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This is to certify that the project titled "**Social Distancing Cap"** is the genuine work carried out by **Faraz Mahmood, Majid Ali,** student of BSCS of Computer Science Department, Lahore Garrison University, Lahore during the academic year 2015-19, in partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Science and that the project has not formed the basis for the award previously of any other degree, diploma, fellowship or any other similar title.

Majid Ali _____

Faraz Mehmood _____

DECLARATION

This is to declare that the project entitled "**Social Distancing Cap**" is an original work done by undersigned, in partial fulfillment of the requirements for the degree "Bachelor of Science in Computer Science" at Computer Science Department, Lahore Garrison University, Lahore.

All the analysis, design and system development have been accomplished by the undersigned. Moreover, this project has not been submitted to any other college or university.

Majid Ali _____

Faraz Mehmood _____

ACKNOWLEDGEMENTS

Up and above everything, all glory to the **"ALMIGHTY ALLAH"**. The Benevolent, the most Gracious and the Most Sympathetic, who made man and taught him ethics and is the source of outright knowledge and wisdom enriched to mankind and "Darood-O-Salam" on the **Holy Prophet Muhammad (P.B.U.H)**.

Without this, we could not complete our work accurately and we are also grateful to our Supervisor **Engr. Muhammad Nadeem Ali** for his kind advise. He led us very well without his help we could not have performed this. We are very grateful to all of the staff in the computer science department. This acknowledgment will remain deficient without granting gratitude to all other respectful instructor and much cooperative friend's words seems small to their praise.

DEDICATION

This project is dedicated to The Great Planner, The Creator of the entire Universe; The Merciful ALLAH SWT, and his loving messenger **Hazrat Muhammad (Peace Be upon Him)**. ALLAH has given me the power to perform this task and facilitating every possible means to complete this project After that, we dedicate this project to our parents, who instructed us that the best sort of knowledge to have is which is learned out for the good of its own. It is additionally devoted to our teachers, who instructed us that even the biggest undertaking can be accomplished if it is completed with one step at a time.

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ABSTRACT

The current outbreak of the new corona-virus also known as COVID-19 was declared as a public health emergency by the WHO where over a million people have been affected by the disease with over 100000 deaths till date. Social distancing is a method to minimize crowd interactions and prevent the spread of disease within groups of people. This is a common practice which has been carried out over generations to minimize the spread of virus by limiting its reproduction rate (R0) among communities. This cap is basically for practicing the social distancing in school, colleges and other areas like shopping centers, and many busy areas, as the social distancing is one of the main key points to save from this virus so we decided to make this cap to get common in Pakistan.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Chapter 1

Introduction

1.1 Introduction

As we know that World is going to advance these days. Everyday a new gadget is introduced. My project is called the Social Distance Detector! The perfect device for keeping safe during these difficult times. The Social Distance Detector's purpose is to give a gentle yet obvious reminder if you are not social distancing. This project is great if you are having some friends over or you tend to get a little close sometimes. [1] The Social Distance Detector has two styles, one will clip onto your hat and the other hangs from a lanyard around your neck. The Social Distance Detector will simply beep if you are too close to someone or they are too close to you.

In these days of pandemic, we should have to maintain distance from each other. During Covid19 pandemic situation, When I was buying groceries and standing in queue. I was cautious about maintaining social distancing and I am strictly maintaining 1.5 meters gap in front and sideways too. But later I found, the person behind me doesn't follow the social distancing and comes closer to me, Which I was not aware.

1.1 Background

The aim of this project is to develop a Social Distancing Cap. Given the current situation, the COVID-19 has spread over the globe. We must work to keep the infection from spreading throughout the neighborhood. To accomplish this, we must ensure that an appropriate social distance between individuals is maintained. We've come up with the idea of a social distancing cap to ensure that an appropriate social distance is maintained from one person to the next. To address the aforementioned issue and reduce viral spread at the community level, we developed the social distancing cap, which serves as a reminder of social distance.

The main goal of the cap is to maintain a proper distance between persons in order to reduce the transmission of virus in the community. Ultrasonic sensors are mounted on three sides of the cap, allowing it to measure the shortest variance that the individual

must maintain A buzzer is also installed, which informs the individual by sounding a siren if the minimum distance is not maintained. The reason for designing this social distance reminder in the shape of a cap rather than a band or a belt is that it is easier to utilize. Every person, whether a youngster or an adult, uses a hat on a regular basis. In the case of a band, the distance may not be measured. And the sensors should be uncovered, so that if the individual wears a belt, he must tuck his shirt in, which may not be comfortable for everyone.

As illustrated in the cad design, three ultrasonic sensors are mounted on three sides of the cap. As a result, we may maintain correct social distance between persons utilizing this method. This cap will inform the person if the necessary social distance is not maintained in three directions.

1.2 Purpose

Considering the current circumstance, the COVID-19 has gotten universal in each edge of the world. We should target forestalling the network spread of the infection. To accomplish this, we should ensure a legitimate social distance is kept up from individual to person. To ensure that a legitimate social distance is kept up from individual to singular we are thinking of the possibility of social separating cap. The impact of the COVID-19 pandemic is drastically changing the lives of people, including the lives of young people. Schools and universities have closed, exams and events postponed, the usual health information services are limited, socializing with friends and wider family is highly discouraged and, in some places, even punishable. Living in these circumstances can be tough for young people for their social, physical and mental well-being. This new COVID-19 Youth Guide is a collection of information, links, and resources that can support young people to navigate their lives in these challenging times as well as inspire them to become leaders in dealing with the uncertainty of the COVID-19 pandemic.

1.3 Product Scope

To finish the above issue and lessen the spread of the infection at the network level we are creating the social distancing cap which is a token of social separating. The

principal point of the cap is to ensure a legitimate distance is kept up among people so the network spread of the infection can be decreased. Here ultrasonic sensors are introduced on three sides of the cap so it that measure the base distance to be kept up by the person from front. Additionally, a ringer is introduced which cautions the person by giving a signal upon not keeping a base distance. The motivation to plan this social separating update in type of a cap is that contrasted with a band or a belt this would of simple use. A cap is a generally utilized thing by each individual be it a kid or a grown-up. On account of a band, the band may not gauge the distance in. What's more, the sensors should be uncovered along these lines, in the event of a belt the individual should fold his shirt which may not be agreeable to everybody. [2]

1.5 Software Requirement Specification

In this project the relation between the system and the users is friendly. The app interface is so simple and all the attributes and entities are defined by the user while wearing a cap user just need to switch on the cap that is on front of cap user don't need any high level to knowledge to understand the working of a cap it's too easy to wear and use.

1.6 Tools/ Technology Used

We use hardware and software tools and technology given below:

1.6.1 Hardware Specification

- ESP8266 Microcontroller (Arduino)

- Ultrasonic Sensor - HC-SR04 (Generic)

- Piezo Buzzer

- 9v Battery (Generic)

- 9v Battery Clip

- Male/Female Jumper wires

- Solderless Breadboard Half Size

1.6.2 Software Specification

- Arduino IDE

1.6.3 Semantic Technology

We have built up a system which is the common need now a days everyone is want to keep themselves save and for this we are building perfect gadget for you that is social distancing cap which is used to maintain distance now a days. This cap is very helpful to maintain social distance it uses Arduino Uno micro controller and ultrasonic sensor which detect the distance if the person is close to someone, we use buzzer and led light to inform the person that you are in danger Arduino is the main part of this project which control all the functionality of the system and able to start buzzer and led light on detection of distance.

1.7 Report Organization

This report is divided into a set of chapters and each chapter is dedicated for each phase of the project. Below is the detail of the chapters:

Chapter 1 describes the introduction of the project, background, software specifications, tool and technology in details.

Chapter 2 describes the problem definition, objectives and with the Gantt chart details.

Chapter 3 describes the software requirement specification discuss the functional and nonfunctional requirements and other general consideration.

Methodology is described in chapter 4 Detailed Design and Architecture in described with system architecture and system design in detail with use case diagram, block diagram, circuit diagrams, component diagram, activity diagram, and data flow diagram that is related to project is described in Chapter 5.

In Chapter 6, discuss the methods, tools and techniques used to develop the project. And explained the implementation and testing methodologies of the given project.

Chapter 7 presents all the results and discussion with the project.

Chapter 8 included the conclusion and future work related we can do for project in later Chapter 9 is the last chapter in which we provide the references of about 6 articles which helps us to make our project successful.

Chapter 2

Problem Description

2.1 Introduction

Limiting our interaction with other individuals will delay virus transmission and flatten the epidemic curve, reducing the number of cases at the epidemic's peak. The goal is to reduce the burden on the health system when the epidemic is at its highest, so that everyone who needs treatment can get it and lives can be saved.

Distancing yourself from others, also known as social distancing or physical distancing, isn't always easy, and you're not alone if you're unsure. Even though I've worked in infectious disease prevention and control, I still have doubts about how to use what I've learned about social distance in everyday life.

Limiting our interaction with other individuals will delay virus transmission and flatten the epidemic curve, reducing the number of cases at the epidemic's peak. The goal is to reduce the burden on the health system when the epidemic is at its highest, so that everyone who needs treatment can get it and lives can be saved.

Distancing yourself from others, also known as social distancing or physical distancing, isn't always easy, and you're not alone if you're unsure. Even though I've worked in infectious disease prevention and control, I still have doubts about how to use what I've learned about social distance in every day. [3]

Two principles must be followed in order to put the theory into practice. To begin, assume that everyone we meet has coronavirus, no matter how they appear or who they are. Second, imagine that we already have coronavirus and that we could spread it to others. It's critical that we all operate as if we could be infected with the virus.

The following people are at a higher risk of complications:

 • Senior citizens.

• People who suffer from major chronic illnesses such as heart disease, diabetes, or lung disease.

2.2 Objectives

The main goal behind this project is to keep social distancing practice everywhere in the schools and shopping centers. Children are not much intelligent and they don't know good and bad for them, so if any person come close to them a beep alert generated that keep them active every time. It is a life saving device that you need to everywhere. As we know corona virus is reason for many peoples caused death and this device can keeps you save from this virus. And there is a machine always with you to keep to alert every time.

In spite of the fact that there might be different elements that might be significant for somebody while looking for a device, that he can use to save his/her life.

2.3 Project Management

This project contributes development of application as its major part as well as the hardware to control home appliances. Management of any project has several steps or process in it. So, our projects can be described under the following steps:
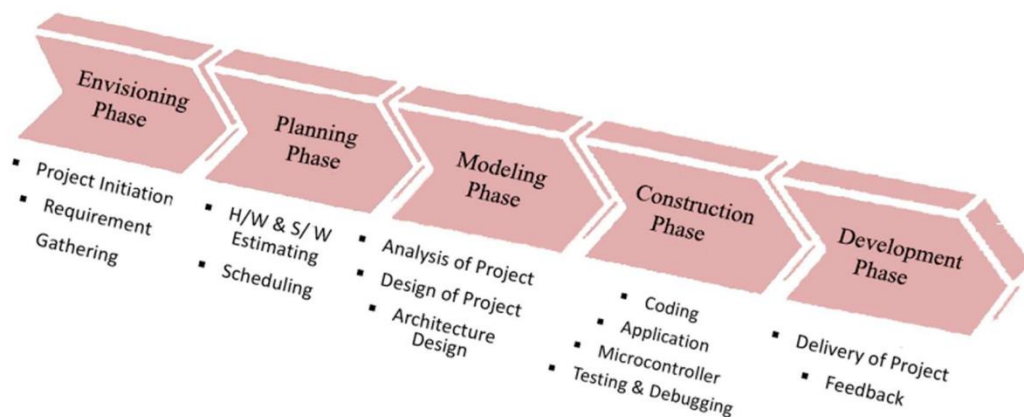

Figure 1 Waterfall Model

This project contributes development of application as its major part as well as the hardware to control office appliances. We selected different devices and coded on it. Management of any project has several steps or process in it. So, our projects can be described under the following steps:

- Project Initiation.

- Project Planning.

- Project Execution.

- Project Monitoring and Controlling.

- Project Closing.

2.3.1 Experimentation

In this step, we are discussing about the necessary equipment's and materials. We were studying about similar projects, gathering the information of programming languages to be used. We are developing simple algorithms and flowcharts.

2.3.2 Design

In this phase, we were designing the application. The necessary features to be included. We are designing that how this device can be fit on a cap and what are the safety measure to that is used to not harm that device during walking around.

2.3.3 Development and Testing

In this phase, the development of application was performed. The bugs were identified and removed. We consulted many software experts for the evaluation of our application. Hardware design includes the design of circuit.

2.3.4 Real World Testing

Finally, our system was ready to be tested in the real electrical appliances.

2.4 Gantt Chart

Gantt chart bars describes our project tasks step by step with the date or time interval as described below:

Task1: Identify task, establish strategy to perform tasks.

Task2: Discuss needs and expectations, establish project scope and timeline, Gather information.

Task3: Brain storming, Start from initial phase.

Task4: Identify risk, access and control.

Task5: Execution of the project.

Task6: Analyze the project, documentation.

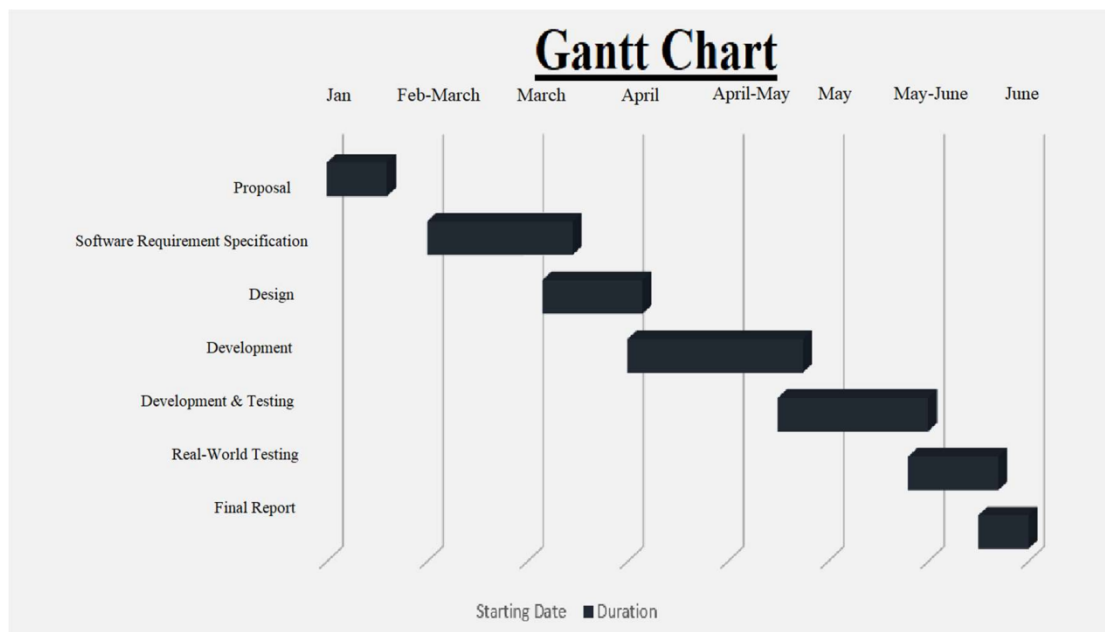**Task7:** Deployment, result and conclusion.

Figure 2 Gant Chart

Chapter 3

Software Requirement Specification

3.1 Introduction

In this chapter we are discuss about the what requirements we required regarding software purpose. Software requirements specifications establishes the basis for an agreement between customer and contractors or suppliers on how the software product should function (in a market-driven project, these roles may play by the marketing and development divisions). Software requirements specifications is a rigorous assessment of requirements before the more specific system design stages, and its goal is to reduce later redesign. [4]

- First, we have customer requirements.

- Second functional requirements.

- Third Non-functional requirements.

- Fourth software & hardware requirements.

3.2 Intended Audience:

Certainly, even I saw many peoples in basic food item shops, bus stop, crowded place where somebody attempting to keep up social separating however, they missing the to maintain 1 to 2 meters distance. This is a typical issue looked at by us all around the world. It is just an Arduino device with ultrasonic sensor implemented on the cap it can be used for any type of person wanted to keep them safe from this deadly virus.

3.3 User Interfaces

This cap is easy to wear uni-sexual and any age. User can easily operate and take advantage of this cap with just press on/off Switch. The person had to maintain social distance when alarm beeping. The person can also need to check his/her temperature after wearing this cap because this is alarming when temp rising. Its looks

like a simple cap but a little device implemented on the cap. The person wearing this cap don't feel any extra burden.

3.4 Hardware Interfaces

- HC-SR04 Ultrasonic Sensor:
- 9v Battery.
- Arduino Uno.
- Piezo Buzzer.
- Dupont Wires.
- Switch.
- Cap.

3.5 Software Interfaces

We use C language to interact with Arduino Uno, Ultra Sonic Sensor and temperature sensor Arduino is basically our software and it is operated on c language in which we will select that how much distance is to be maintain from one person to another.

3.6 Other Non-functional Requirements:

3.6.1 Performance Requirements

The project performance is too good because it reacts in Uno seconds and beep alarm due to this the person wearing the cap is get active and maintain some distance from the person who is too close from him in this way anyone can keep themselves save from this deadly virus. The cap can work for complete 1 day or 30 hours you need to charge battery on daily bases to get safe from covid-19.

3.6.2 Safety Requirements

The cap is for daily use when you are not in home so in this way you need to take care of the cap in order to keep yourself save don't throw the cap on the floor, keep the cap away from water and use the cap carefully.

3.6.3 Security Requirements

There are no security requirements for the cap because cap is not connected with the internet in this way your cap is already have safe side. You only don't let anyone to

make changes on your Arduino board coding which is the only thing to need to keep safe from hackers.

3.7 Software and Hardware Requirement

The list of hardware and software components are used:

3.7.1 Hardware Requirement

- HC-SR04 Ultrasonic Sensor:

Figure 3 Ultrasonic sensor

The HC-SR04 Ultrasonic Distance Sensor is a sonar-based sensor for determining the distance to an item. The HC-SR04 is a non-contact ultrasound sonar device that consists of two ultrasonic transmitters (essentially speakers), a receiver, and a control circuit for measuring distance to an object.

The HC-SR04 Ultrasonic Distance Sensor is a sensor utilized for distinguishing the distance to an item utilizing sonar. It's ideal for any mechanical technology projects have which expect you to keep away from objects, by recognizing how close they are you can guide away from them!

The HC-SR04 utilizes non-contact ultrasound sonar to gauge the distance to an item, and comprises of two ultrasonic transmitters (essentially speakers), a recipient, and a control circuit. The transmitters discharge a high recurrence ultrasonic sound, which ricochet off any close by strong items, and the receiver tunes in for any bring reverberation back. That reverberation is then prepared by the control circuit to compute

the time contrast between the sign being communicated and gotten. This time can thusly be utilized, alongside some sharp math, to compute the distance.

between the sensor and the reflecting item!

Hardware Overview

At its center, the HC-SR04 Ultrasonic distance sensor comprises of two ultrasonic transducers. The one goes about as a transmitter which changes over electrical sign into 40 KHz ultrasonic sound heartbeats. The collector tunes in for the communicated beats. On the off chance that it gets them it delivers a yield beat whose width can be utilized to decide the distance the beat voyaged. As straightforward as pie! The sensor is little, simple to use in any mechanical technology venture and offers amazing non-contact range identification between 2 cm to 400 cm (that is about an inch to 13 feet) with an exactness of 3mm. Since it works on 5 volts, it tends to be snared straightforwardly to an Arduino or some other 5V rationale microcontrollers Working: It all starts, when a pulse of at least 10 µS (10 microseconds) in duration is applied to the Trigger pin. In response to that the sensor transmits a sonic burst of eight pulses at 40 KHz. [3] This 8-pulse pattern makes the "ultrasonic signature" from the device unique, allowing the receiver to differentiate the transmitted pattern from the ambient ultrasonic noise. 17The eight ultrasonic pulses travel through the air away from the transmitter. Meanwhile the Echo pin goes HIGH to start forming the beginning of the echo-back signal.
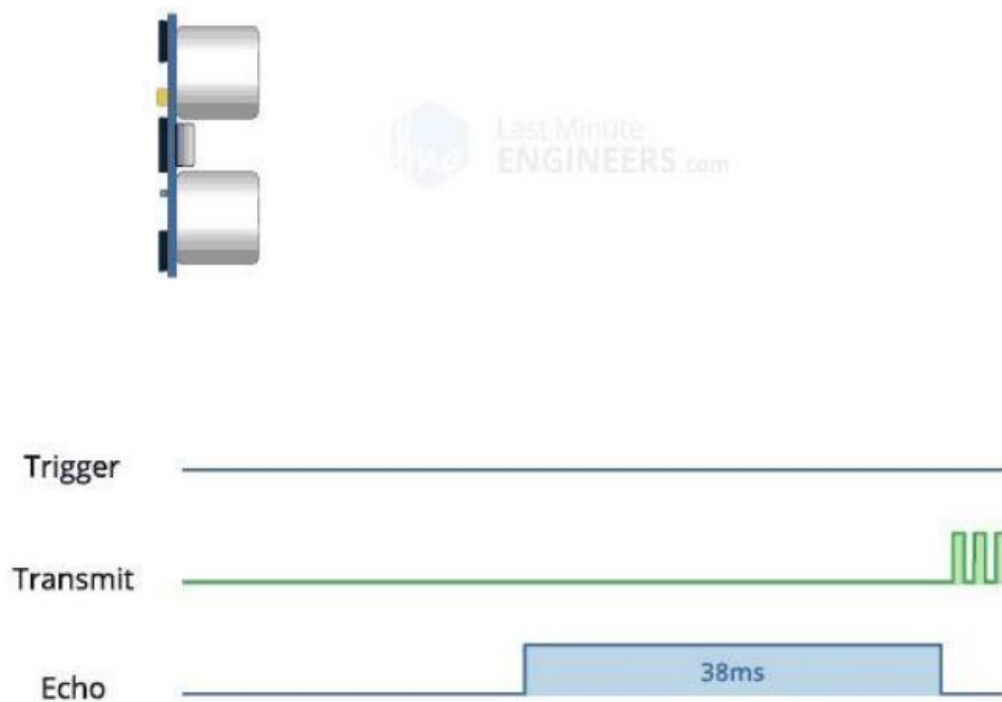
Figure 4 Ultrasonic Sensor Working

The width of the received pulse is then used to calculate the distance to the reflected object. This can be worked out using simple distance-speed-time equation, we learned in High school. In case you forgot, an easy way to remember the distance, speed and time equations is to put the letters into a triangle.

- 9v Battery

Figure 5 9v Battery

I've discovered that 9V works fine. Connect the positive end of your battery to Arduino Vin and the negative end to Arduino ground the green light on the Arduino should turn on, indicating that it is powered.

. 9V batteries are normally made up of six individual cells that are then wrapped toget her to make a block. They come in a variety of chemical types, with the most common being carbon-zinc and alkaline or lithium-iron disulphide batteries.

A 9V battery can often provide the equivalent of six AA cells, however because of its compact size, it may be more practical than utilising many smaller cells. This is particularly true for long-term applications, such as smoke detectors. Duracell, Energizer, Ansmann, Panasonic, RS PRO, and Varta are among the well-known brands included in our 9V battery selection. If you're seeking for 9V rechargeable batteries, look no further.

Because of their enormous energy capacity, these batteries are very effective in long-life applications that require a lot of power.

Their uses vary, but they can be used in a wide range of industries, including medical and security.

9V batteries were originally designed for transistor radios, but they are still used in ha ndheld versions today, as well as other handheld devices like test and instrumentation instruments, particularly those with backlit LCD displays.
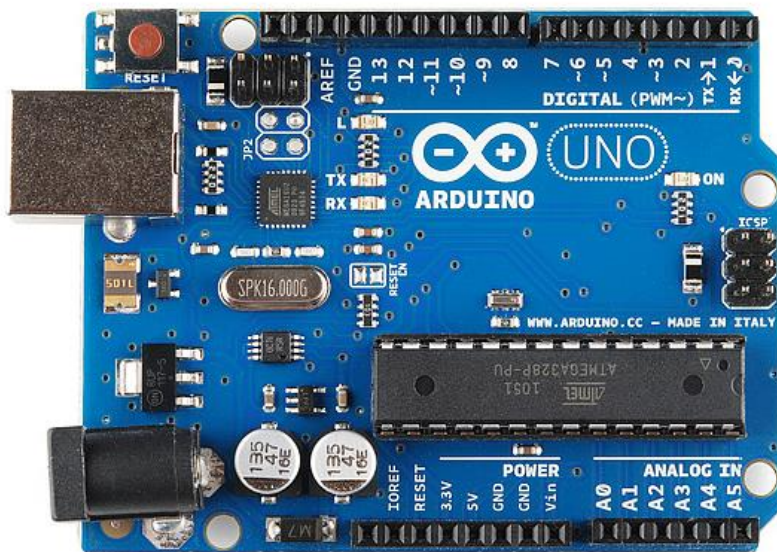
- Arduino Uno

Figure 6 Arduino Uno

I've discovered that 9V works fine. Connect the positive end of your battery to Arduino Vin and the negative end to Arduino ground. The green light on the Arduino should turn on, indicating that it is powered.

The **Arduino Uno** is an open-source microcontroller board based on the Microchip ATmega328P micro-controller and developed by Arduino.cc.[2][3] 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.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), 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 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards it and version 1.0 of the Arduino IDE were the reference versions of Arduino,

which have now evolved to newer releases. The ATmega328 on the board comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.
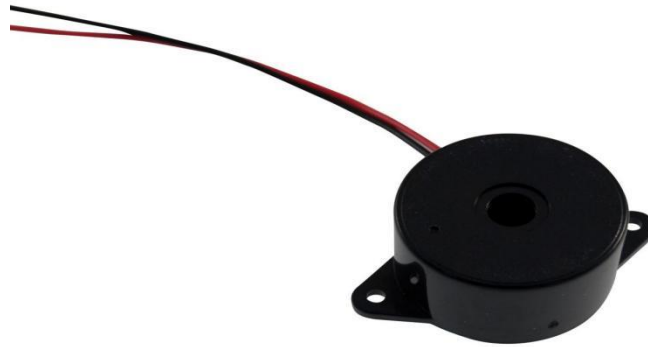
- Piezo Buzzer

Figure 7 Piezo Buzzer

Piezo buzzers are inexpensive gadgets that produce basic beeps and tones.
They use a piezo crystal, which is a type of material that changes shape when electricity is given to it.
When a crystal collides with a diaphragm, such as a miniature speaker cone, a pressure wave is generated, which the human ear detects as sound.
Simply alter the frequency of the voltage applied to the piezo, and it will begin to generate noises by rapidly changing shape!
In simplest terms, a piezo buzzer is a type of electronic device that's used to produce a tone, alarm or sound. It's lightweight with a simple construction, and it's typically a low-cost product. Yet at the same time, depending on the piezo ceramic buzzer specifications, it's also reliable and can be constructed in a wide range of sizes that work across varying frequencies to produce different sound outputs.

For instance, at APC International, Ltd., we offer piezo buzzers without signal generators, self-oscillating buzzers that have signal generators and even multi-tone sound generators — often used in alarms and sirens. Regardless of the model you

choose, our piezo buzzers offer high sound outputs. Plus, since they can be mounted on circuit boards, they're highly useful in a wide range of applications and assemblies.

- Dupont Wires

Figure 8 Dupont Wires

Dupont wires, or DuPont, is the company's name. The manufacturer of the connector types they mount, both male and female ends, gave them this name. In fact, having/using wires with a DuPont male end would be preferred.

Jumper wires are used for making connections between items on your breadboard and your Arduino's header pins. Use them to wire up all your circuits!

Jumper wires typically come in three versions: male-to-male, male-to-female and female to female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need.

3.8 Compiler Platform:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a substance supervisor for making code, a message area, a substance bolster,

a toolbar with gets for consistent limits and a movement of menus. It interfaces with the Arduino and Genuine gear to exchange programs and talk with them.

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Chapter 4

Methodology

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4.1 Introduction:

In this chapter we discuss about the project methodology section of our hardware program that also include approaches, tools, techniques, algorithms, or other aspects of the solution. For coding purpose, we connect the Arduino by the laptop and upload all the code in Arduino attach ultrasonic sensor, led light, and buzzer with the Arduino and cap is going to starts working. [5]

4.2 How it works:

I'm measuring distance with an ultrasonic sensor, and Arduino is continuously analyzing that distance. The Arduino will activate the buzzer when the distance is less than 1 meter.

Before we begin, we must first comprehend some of the circuit's components.

4.3 Hardware

4.3.1 Arduino Uno
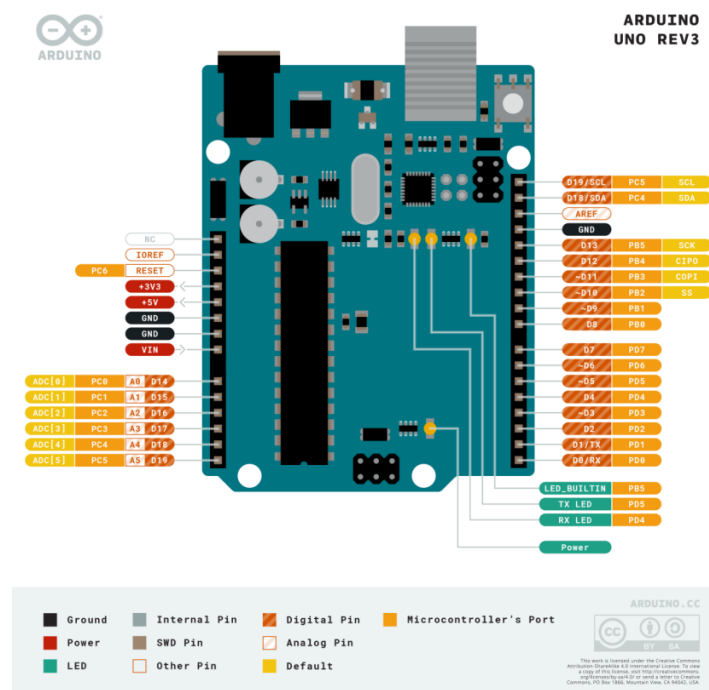

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Figure 9 Arduino Uno Description

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The Arduino Uno is a microcontroller board that uses the ATmega328P microcontroller (datasheet). It contains 14 digital input/output pins, 6 analogue inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header, and a reset button. It comes with everything you'll need to get started with the microcontroller; simply plug it into a computer with a USB cable or power it with an AC-to-DC adapter or battery.

4.3.2 Arduino Software coding

Here are the methodologies of coding and selecting various things:

Open Arduino software and click on Tools, after this you need to select your board and port from tools.

Figure 10 Select board and port

After selecting board and port then we upload our code in Leonardo.

Figure 11 Code is uploading in our hardware.

4.3.3 HC-SR 04

It's a distance sensor that uses ultrasonic sound. It comes with both a transmitter and a receiver. This component was previously discussed in depth in one of my earlier articles. For a better understanding of the HC-SR 04, please read this article.

The HC-SR04 Ultrasonic Distance Sensor is a sensor utilized for distinguishing the distance to an item utilizing sonar. It's ideal for any mechanical technology projects have which expect you to keep away from objects, by recognizing how close they are you can guide away from them!

4.3.4 Piezo Buzzer

A piezo buzzer is a sound-producing gadget that can produce sound at certain frequencies. It is mostly constructed of piezoelectric material. It just has two terminals. It's also available in a variety of operating voltages. I'm using the 5V model here.

For instance, at APC International, Ltd., we offer piezo buzzers without signal generators, self-oscillating buzzers that have signal generators and even multi-tone sound generators — often used in alarms and sirens. Regardless of the model you choose, our piezo buzzers offer high sound outputs. Plus, since they can be mounted on circuit boards, they're highly useful in a wide range of applications and assemblies.

4.3.5 9v battery

This "Social Distancing Reminder" is designed as a portable gadget here. As a result, having a battery backup is critical. A 9V rechargeable battery can be used. This is a USB battery that can be recharged. Alternatively, a 9v battery can be used. However, I strongly advise you to use a rechargeable battery. Because I'm more than a programmer. In addition, he is an environmentalist.

Let's get started!!!!!

1st step

I'm going to start by making an Arduino sketch. The Arduino IDE should now be open. Set the echoPin to pin 4 and the trigPin to pin 3. Then you'll need to define two variables. The first variable is duration, while the second is distance.

2nd step

After that, code the setup section. Set the echoPin to "INPUT" and the trigPin to "OUTPUT." Because I'm connecting the buzzer to pin 13, we'll need to set pin 13 to "OUTPUT."

Setup is completed.

After that, programmed the loop. The loop may be divided into two halves. Part 1 is the first. Portion 2 is the second part.

3rd part

This section is used to calculate the distance between the sensor and the item or person being measured.

For 2 microseconds, set the trigPin to "LOW." Then, for 10 microseconds, set it to "HIGH." Set the trigPin to LOW once more. Then, using the function "pulseIn()," save the complete travel time of the ultrasonic sound wave to the variable duration. Then divide by 2 after multiplying the time by 0.034. Then save the result to the variable "distance." The actual distance between the sensor and the object is now stored in the variable "distance."

4th part

When the distance between the buzzer and the user is less than 1 meter or 100 cm, this component is utilized to turn it on.

Set pin 13 (Buzzer pin) to "HIGH" for 500 milliseconds and then "LOW" for 500 milliseconds if the distance is less than 100 cementers.

Otherwise, keep pin 13 set to "LOW."

The code is now finished. Upload the entire programmed to the Arduino Uno.

Connection

Arduino Uno D4 - HC-SR 04 Echo.

Arduino Uno D3 - HC-SR 04 Trig.

Arduino Uno GND - HC-SR 04 GND.

Arduino Uno 5V - HC-SR 04 Vcc.

Arduino Uno GND - Buzzer Negative (-).

Arduino Uno D13 - Buzzer Positive (+).

Arduino Uno GND - 9V Rechargeable battery Negative (-).

Arduino Uno Vin - 9V Rechargeable battery Positive (+).

Chapter 5

Detailed Design and Architecture

5.1 Introduction

In this chapter as you see we discuss about the software design process, the design of the app, architecture and the interface of the software in detail which we use.

5.2 System Architecture

To address the aforementioned issue and reduce viral propagation at the community level, we developed the social distancing cap, which serves as a reminder of social distance.

The main goal of the cap is to maintain a sufficient distance between persons in order to reduce the transmission of virus in the community. Ultrasonic sensors are mounted on three sides of the cap, allowing it to measure the minimum distance that the user must maintain. A buzzer is also fitted, which warns the user by sounding a siren if the required distance is not maintained. The reason for designing this social distance reminder in the shape of a cap rather than a band or a belt is that it is easier to utilize. Every individual, whether a toddler or an adult, uses a hat on a regular basis.
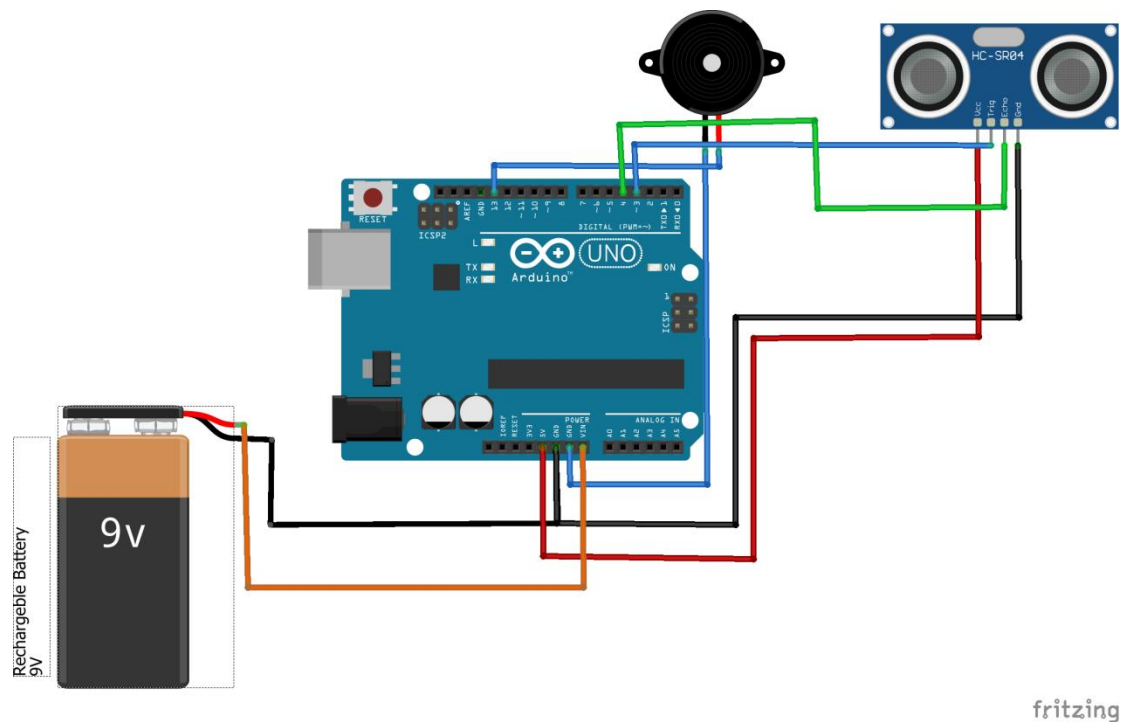
Figure 12 Circuit Diagram

5.2.1 Architecture Design Approach

The Harvard architecture is used by Arduino's CPU, which means that the programmed code and programmed data are stored in distinct memory. It is made up of two types of memories: programmed memory and data memory. The data is saved in the data memory, while the code is kept in the flash programmed memory. The Atmega328 is a 16MHz micro-controller having 32 Kb for store code (0.5 KB of which is utilize for the boot-loader), 2 KB of SRAM, and 1 KB of EEPROM.

5.2.2 Architecture Design

1. Adding the HC-SR04 Ultrasound Sensor to the Arduino Board

Connect the Ultrasound Sensor's 'echo' and 'trig' pins to the Arduino Board's corresponding pins (specified in the code) (here in this code, pins 2 and 3). Then, connect the sensor's Vcc and ground pins to the Arduino Board's 5V and Ground pins, respectively. Step 1 is now complete.

2. Connecting a Buzzer to the Arduino Board

The Buzzer is linked to the positive terminal at pin 11 and the negative terminal at ground since I assigned output to pin 11 in the code.

3. Connecting a power source (9V battery) to the Arduino Board

Connect a 9V battery to the Arduino Board, with the positive terminal connected to 5V and the negative terminal connected to ground.

4. The Final Packaging

In is the last step in which you can easily attach the device with cap using glue or any other material you want to use.

5.2.3 Subsystem Architecture

- HC-SR04 Ultrasonic Sensor:

The HC-SR04 Ultrasonic Distance Sensor is a sonar-based sensor for determining the distance to an item. The HC-SR04 is a non-contact ultrasound sonar device that consists of two ultrasonic transmitters (essentially speakers), a receiver, and a control circuit for measuring distance to an object. [6]

- 9v Battery

I've discovered that 9V works fine. Connect the positive end of your battery to Arduino Vin and the negative end to Arduino ground the green light on the Arduino should turn on, indicating that it is powered.

- Arduino Uno

I've discovered that 9V works fine. Connect the positive end of your battery to Arduino Vin and the negative end to Arduino ground (fig 1). The green light on the Arduino should turn on, indicating that it is powered.

- Piezo Buzzer

It is a small device that can be integrate in Arduino Uno and it is used for developing a minor cute sound that can alert a person in some way that is someone near to that person.

- Dupont Wires

Dupont wires, or DuPont, is the company's name. The manufacturer of the connector types they mount, both male and female ends, gave them this name. In fact, having/using wires with a DuPont male end would be preferred.
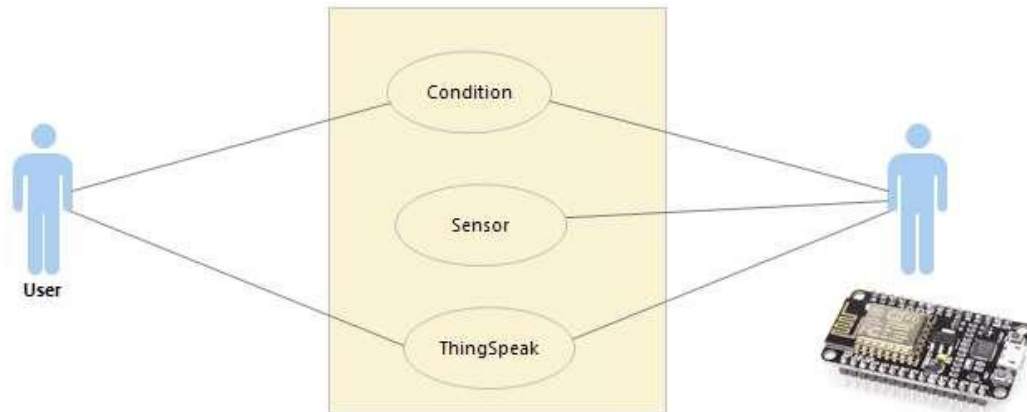
5.3 Use case diagram

Figure 13 Usecase Diagram

The server module gets control orders either from customers or specifically from its own interface. The time-construct profiles are arranged with respect to the server interface. It inside checks whether it's a great opportunity to actuate a period-based profile. It engenders the status of the apparatuses to every single associated customer.

5.4 Block diagram

It provides a functional view of a system. Block diagrams give us a better understanding of a system's functions and help create interconnections within it. ... They are used to describe hardware and software systems as well as to represent processes.
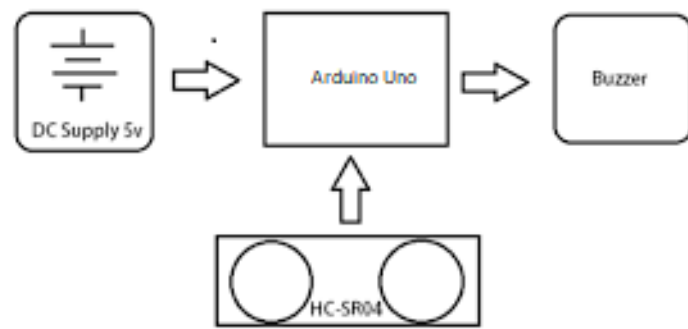
Figure 14 Block Diagram

Chapter 6

Implementation and Testing

6.1 Introduction

System analysis and design process including requirement analysis business solution options feasibility study architectural design was discussed in the previous chapter.

Generally, software bugs will almost always exist in any software module. But it is not because of the carelessness or irresponsibility of programmer but because of the complexity h8man have only limited ability to manage complexity. [7]
In this chapter we will discuss about implementation, method and tools. We have a detailed description about tools and technology implementation and methods we used in this project there are some of the key points of this chapter which are given below. [8]

6.2 Implementation

In project implementation we have following guide lines:

- First, we check the project requirements

- Second, we mark the list of the data we required

- The data required is mentioned in previous chapter

- Third we estimate the cost the amount we require.

- The estimate cost of this project is 2000/-Rs Only.

- If we commercialize this project the cost will increase.

- Then we gather the things and start up.

- After the system requirements are done, we design the layout and started.

- Implementations.

6.3 Tools

Tools that are used to develop the product include two parts i.e., software and hardware. If we talk about the software aspects, it includes the following:

- **Arduino**
- **Arduino IDE**

Figure 15 Arduino Ide Logo

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main () into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. [7]

The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Equipment's

- Ultrasonic sensor
- Cap
- Buzzer
- Connecting Wires
- LED's
- Battery
- Switch button

6.3.1 Code Walkthrough:

```
const int pingTrigPin = A4;

const int pingEchoPin = A5;


int led=13; //Buzzer to PIN 4

int buz1=9;

void setup() {

Serial.begin(9600);

pinMode(led, OUTPUT);

pinMode(buz1, OUTPUT);

}

void loop()

{

long duration, cm;

pinMode(pingTrigPin, OUTPUT);

digitalWrite(pingTrigPin, LOW);

delayMicroseconds(2);

digitalWrite(pingTrigPin, HIGH);

delayMicroseconds(5);

digitalWrite(pingTrigPin, LOW);

pinMode(pingEchoPin, INPUT);

duration = pulseIn(pingEchoPin, HIGH);

cm = microsecondsToCentimeters(duration);

if(cm<=100 && cm>0)   // distance yaha set krna h
```

```
{

int d= map(cm, 1, 300, 10, 1000);

digitalWrite(led, HIGH);

digitalWrite(buz1, HIGH);


delay(50);

digitalWrite(led, LOW);

digitalWrite(buz1, LOW);

delay(d);

}

Serial.print(cm);

Serial.print("cm");

Serial.println();

delay(40);

}

long microsecondsToCentimeters(long microseconds)

{

return microseconds / 29 / 2;

}
```

6.4 Risk Management Plan

In risk management plan we checked the reliability of the software and the hardware as we use an app and there is a smart id or a reference auth code which is burn in NodeMCU. No other one can connect to your device and you can use your appliances so it's free from this kind of risk but the one problem is the device you want to control you should connect it properly. [8]

6.5 Project Management Plan

In project management plan we check list the all requirements we need and estimate. The estimate cost I mention in previous chapter the basic requirements we need is the NodeMCU the main chip and then the joins wires then burn the code in it. Then start to make the project we perform the 40task first on breadboard then convert to the main wires with 5v it's a main work. At very first time we give power supply to NodeMCU and relay from the battery then we change it and connect it through main wire of charger.

6.6 Testing

The software testing is the process or method of finding errors in a software application or program so that the application functions according to the end user's requirement. Software testing is the process of verifying a system with the purpose of identifying any errors, gaps or missing requirement versus the actual requirement. Software testing is broadly functional testing and non-functional testing. categorized into two types When to start test activities:

Testing should be started as early as possible to reduce the cost and time to rework and produce software that is bug-free so that it can be delivered to the client. However, in Software Development Life Cycle (SDLC), testing can be started from the Requirements Gathering phase and continued till the software is out there in productions. It also depends on the development model that is being used.

For example, in the Waterfall model, testing starts from the testing phase which is quite below in there; but in the V- phase development model, testing is performed parallel to the development phase. [6]

When to stop test activities: An application can never be 100% bug-free. So, to ascertain when one can stop testing is difficult. However, the following things are kept in mind while stopping.

● Testing-deadlines.

● Completion of functional testing and code coverage to an agreed limit.

- NO high-priority bug is found and the rate of finding bug declines after a certain level.

- Management decision A software test process consists of the activities.

Chapter 7

Results and Discussion

7.1 Results

We are happy to take a look at final result of our project. Those were the great moments for us. In this chapter the results of the study are presented and discussed with reference to the aim of the study, which was to determine the influence of using graphic representations of signs in teaching signs to hearing mothers. The two sub-aims - the first to compare the acquisition of signs by teaching signs with and without sign illustrations, and the second to compare these strategies of sign teaching with regard to the assistance provided by the trainer during sign learning - form the main comparisons in the evaluation of the impact of sign illustrations. These aspects were described in the previous chapter that presented the methodology used in the study.

7.2 Final Product

Final product specifications are set to make sure a safe and quality product is consistently made. Specifications set the quality and safety parameters of the finished product along with information regarding packaging and storage. Specifications are used to determine product characteristics that would be out of spec or unacceptable to sell and how that product will be handled.

For attributes that you were unable to measure in the lab, research values for similar products to yours. This will likely be the case for microbiological specifications. These are some images of final product delivered by us:
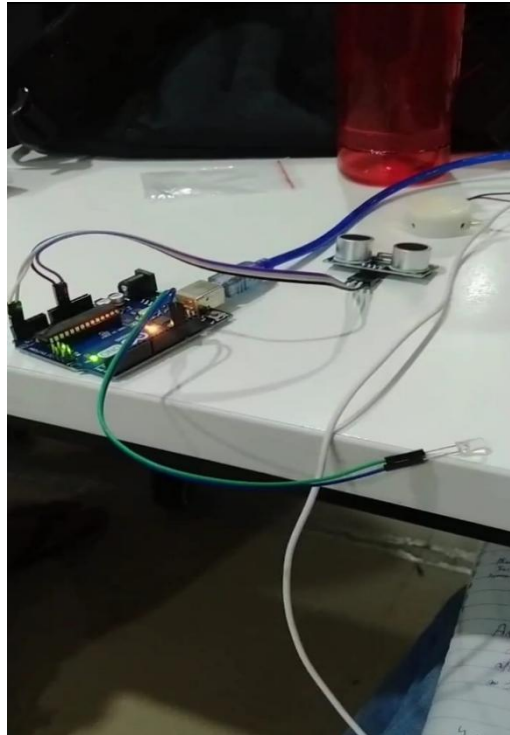
Figure 16 Device in process

After wiring we took a Arduino cable and one side is attached with laptop and other side is attached with Arduino then we open Arduino IDE in the laptop and upload the code in the Arduino and then light is turned on.

Now we connected battery to serial port for power and did some wiring also connected LED bulb. Our project is complete now as any people enter in room our sensors transmit and receive signals then it will turn ON/OFF the light's fans on the bases of people counted.
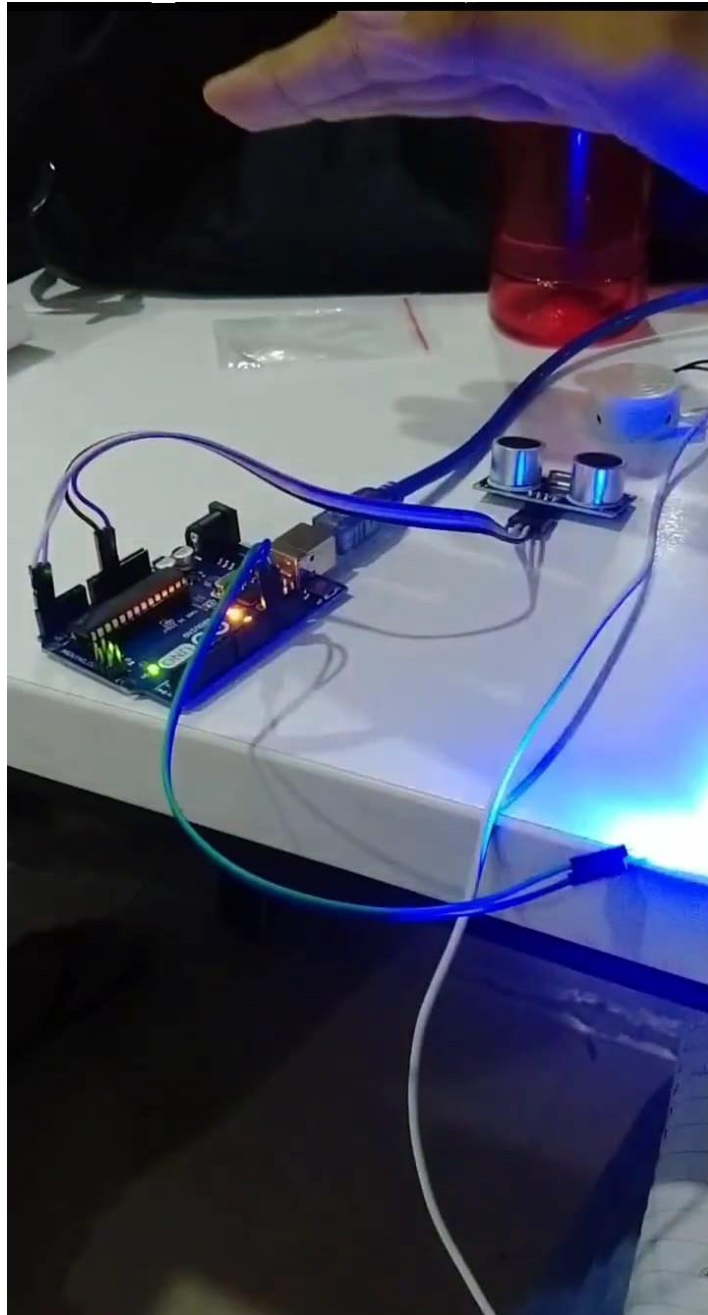
Figure 17 Device Circuit Attached

This is the front face of the cap. When a person wearing a cap, this ultrasonic sensor appears at the top of the cap.

Figure 18 Cap front Image

This is image is the final product delivered by us the light shown in cap is the LED light of Arduino which tell us that the switch is on when we off the switch the light automatically gets off there is also a white buzzer which is used to alert person when someone is too close.
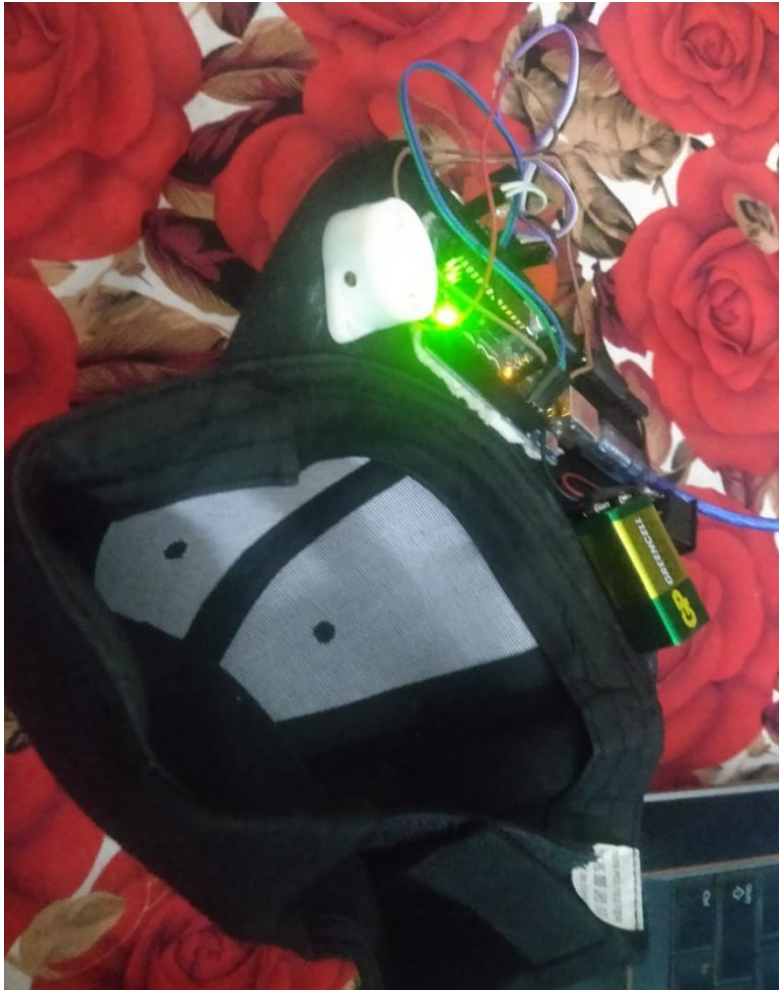
Figure 19 Cap circuit image

We are happy to take a look at final result of our project. Those were the great moments for us. As we can see LED bulb is on. This is the final product given by us is in working condition when someone is near to the ultrasonic sensor the led bulb start to blink by which any person get notify that someone is close.

Chapter 8

Conclusion and Future work

8.1 Introduction

In this chapter we conclude all the work we done and what we do in future our conclusion is simple we give our best to serve a people with great invention of the system all kind of people enjoy it specially the special persons who want to be safe in these difficult times. [10]

8.2 Future Work

Nowadays technology has dominated to a great degree our lives. One of its miracles is the Arduino. Most people probably do not know what Arduino technology is or, even if they do, they have not fully understood its full potential. However, its range of operations makes it a useful tool for the future. As Edward Teller once stated: "the science of today is the technology of tomorrow." Hence the capabilities and the way this small scientific miracle works need to be described and communicated sufficiently. Arduino is open-source PC equipment and Software Company, a task and a client network that framework outlines and making units with an extent of making computerized gadgets and respective items that can detect and control the physical world. [9]

Arduino programming language is fact on Wiring, which contains some data from C and C++ as well. In other words, it is a platform with which the correct programming can contribute in the development of robotics. In order to program Arduino, computer software provided by the company should be downloaded and then users can start creating projects with this platform.

In future we will want to create an application for it in which user can easily switch on and off the cap using application. User can also control the distance of the cap it is easy to maintain it using application and every one can keep himself save in these difficult times. We can use NodeMCU for this it is easily to connect you to the node Arduino micro-controller

8.3 Future Work in Business

In business, Arduino can allow businesses develop more products that are easily upgrade able. For example, there is no way for consumers to alter the functionality of a washing machine or a microwave they purchased. Therefore, if such products used an Arduino board, then consumers would be able to modify the interface in a way to meet their needs. Furthermore, this board could reduce the minimum volume necessary to include a control and sensing system within consumer goods and allow businesses to bring many more unique devices to the market at lower volumes.

The future of semantic technology, that is to control it through GSM. I'm also thinking to control this to using alarm I set time and the home appliances start and connect it with our mobile which shows the status of the appliance on running and their use of electricity [8]

This cap can be too much famous in market and we are planning further to sell it at amazon we think there will be much demand there are lot of people want to get this type of app.

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