# Anti-Suicide Alert System

A FINAL PROJECT REPORT SUBMITTED IN PARTIAL FULLFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
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TO

AKTU LUCKNOW

BY

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# DECLARATION

We, **Imtayaz Ahamad, Aprajita Singh** and **Swatantra Kumar Singh** here by certify that the work, which is being presented in the project entitled **"Anti-Suicide Alert System"** by us, in partial fulfillment of the requirement of the award of Bachelor of Technology in Electronics Engineering from **Dr. APJ Abdul Kalam Technical University, Lucknow** is an authentic record of my original work carried out under the supervision of **Mr. Arvind Kumar**,**Assistant Professor**, Department of Electronics And Communication Engineering.

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# CERTIFICATE

This is to certify that the work entitled "**Anti-Suicide Alert System**" the work done by **Aprajita Singh**, **Imtayaz Ahamad**, and **Swatantra Kumar Singh** submitted in partial fulfillment for the award of **BACHELOR OF TECHNOLOGY** in **Electronics and Communication Engineering** from **ASHOKA INSTITUTE OF TECHNOLOGY & MANAGEMENT**, **Varanasi**, affiliated to **Dr. APJ Abdul Kalam Technical University, Lucknow.**

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## ABSTRACT

Suicide occurs more often in older than in younger people but is still one of the leading causes of death in late childhood and adolescence worldwide. This not only results in a direct loss of many young lives, but also has disruptive psychosocial and adverse socio-economic effects. From the perspective of public mental health, suicide among young people is a main issue to address. Therefore, we need good insight in the risk factors contributing to suicidal behavior in youth. This mini review gives a short overview of the most important risk factors for late school-age children and adolescents, as established by scientific research in this domain. Key risk factors found were mental disorders, previous suicide attempts, specific personality characteristics, genetic loading, and family processes in combination with triggering psychosocial stressors, exposure to inspiring models and availability of means of committing suicide. Further unraveling and knowledge of the complex interplay of these factors is highly relevant with regard to the development of effective prevention strategy plans for youth suicide.

# CHAPTER 1

# INTRODUCTION

## 1.1 Suicide

Every year 703 000 people take their own life and there are many more people who attempt suicide. Every suicide is a tragedy that affects families, communities and entire countries and has long-lasting effects on the people left behind. Suicide occurs throughout the lifespan and was the fourth leading cause of death among 15–29-year-olds globally in 2019.

Suicide does not just occur in high-income countries but is a global phenomenon in all regions of the world. In fact, over 77% of global suicides occurred in low- and middle-income countries in 2019.

Suicide is a serious public health problem; however, suicides are preventable with timely, evidence-based and often low-cost interventions. For national responses to be effective, a comprehensive multisectoral suicide prevention strategy is needed.

Suicide is the taking of one's own life. It is a death that happens when someone harms themselves because they want to end their life. A suicide attempt is when someone harms themselves to try to end their life, but they do not die.

Suicide is a major public health problem and a leading cause of death in the United States. The effects of suicide go beyond the person who acts to take his or her life. It can also have a lasting effect on family, friends, and communities.

Suicide is a major public health concern. In 2019, suicide was the 10thleadingcause of death overall in the United States, claiming the lives of over 47,500 people. Suicide is complicated and tragic, but it is often preventable. Knowing the warning signs for suicide and how to get help can help save lives.

## 1.2 Key facts

- More than 700 000 people die due to suicide every year.
- For every suicide there are many more people who attempt suicide. A prior suicide attempt is the single most important risk factor for suicide in the general population.
- Suicide is the fourth leading cause of death in 15-19-year-olds.
- 77% of global suicides occur in low- and middle-income countries.

- Ingestion of pesticide, hanging and firearms are among the most common methods of suicide globally**.**

## 1.3 Who is at risk?

While the link between suicide and mental disorders (in particular, depression and alcohol use disorders) is well established in high-income countries, many suicides happen impulsively in moments of crisis with a breakdown in the ability to deal with life stresses, such as financial problems, relationship break-up or chronic pain and illness.

In addition, experiencing conflict, disaster, violence, abuse, or loss and a sense of isolation are strongly associated with suicidal behavior. Suicide rates are also high amongst vulnerable groups who experience discrimination, such as refugees and migrants; indigenous peoples; lesbian, gay, bisexual, transgender, intersex (LGBTI) persons; and prisoners. By far the strongest risk factor for suicide is a previous suicide attempt.

## 1.4 Methods of suicide

It is estimated that around 20% of global suicides are due to pesticide self-poisoning, most of which occur in rural agricultural areas in low- and middle-income countries. Other common methods of suicide are hanging and firearms.

Knowledge of the most commonly used suicide methods is important to devise prevention strategies which have shown to be effective, such as restriction of access to means of suicide.

## 1.5 Prevention and control

Suicides are preventable. There are a number of measures that can be taken at population, sub-population, and individual levels to prevent suicide and suicide attempts. LIVE LIFE, whose approach to suicide prevention, recommends the following key effective evidence-based interventions:

- limit access to the means of suicide (e.g., pesticides, firearms, certain medications);
- interact with the media for responsible reporting of suicide.
- foster socio-emotional life skills in adolescents.
- early identify, assess, manage and follow up anyone who is affected by suicidal behaviors.,

These need to go together with the following foundational pillars: situation analysis, multisectoral collaboration, awareness raising, capacity building, financing, surveillance and monitoring and evaluation. Suicide prevention efforts require coordination and collaboration among multiple sectors of society, including the health sector and other sectors such as education, labour, agriculture, business, justice, law, defense, politics, and the media. These efforts must be comprehensive and integrated as no single approach alone can make an impact on an issue as complex as suicide.

## 1.6 Challenges and obstacles

(a) Stigma and taboo

Stigma, particularly surrounding mental disorders and suicide, means many people thinking of taking their own life or who have attempted suicide are not seeking help and are therefore not getting the help they need. The prevention of suicide has not been adequately addressed due to a lack of awareness of suicide as a major public health problem and the taboo in many societies to openly discuss it. To date, only a few countries have included suicide prevention among their health priorities and only 38 countries report having a national suicide prevention strategy.

Raising community awareness and breaking down the taboo is important for countries to make progress in preventing suicide.

(b) Data quality

Globally, the availability and quality of data on suicide and suicide attempts is poor. Only some 80 Member States have good-quality vital registration data that can be used directly to estimate suicide rates. This problem of poor-quality mortality data is not unique to suicide but given the sensitivity of suicide – and the illegality of suicidal behavior in some countries – it is likely that under-reporting and misclassification are greater problems for suicide than for most other causes of death.Improved surveillance and monitoring of suicide and suicide attempts is required for effective suicide prevention strategies. Cross-national differences in the patterns of suicide, and changes in the rates, characteristics and methods of suicide, highlight the need for each country to improve the comprehensiveness, quality and timeliness of their suicide-related data. This includes vital registration of suicide, hospital-based registries of suicide attempts and nationally representative surveys collecting information about self-reported suicide attempts.

## 1.7 WHO response

WHO recognizes suicide as a public health priority. The first WHO World Suicide Report “Preventing suicide: a global imperative”, published in 2014, aims to increase the awareness of the public health significance of suicide and suicide attempts and to make suicide prevention a high priority on the global public health agenda. It also aims to encourage and support countries to develop or strengthen comprehensive suicide prevention strategies in a multisectoral public health approach.

Suicide is one of the priority conditions in the WHO Mental Health Gap Action Programmed (MH GAP) launched in 2008, which provides evidence-based technical

guidance to scale up service provision and care in countries for mental, neurological and substance use disorders. In the *WHO Mental Health Action Plan 2013–2030*, WHO Member States have committed themselves to working towards the global target of reducing the suicide rate in countries by one third by 2030.

In addition, the suicide mortality rate is an indicator of target 3.4 of the Sustainable Development Goals: by 2030, to reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being.

# CHAPTER 2

# About Own Project

## 2.1 Signs and Symptoms

The behaviors listed below may be signs that someone is thinking about suicide.

- Talking about wanting to die or wanting to kill themselves
- Talking about feeling empty, hopeless, or having no reason to live
- Making a plan or looking for a way to kill themselves, such as searching for lethal methods online, stockpiling pills, or buying a gun
- Talking about great guilt or shame
- Talking about feeling trapped or feeling that there are no solutions
- Feeling unbearable pain (emotional pain or physical pain)
- Talking about being a burden to others
- Using alcohol or drugs more often
- Acting anxious or agitated
- Withdrawing from family and friends
- Changing eating and/or sleeping habits
- Showing rage or talking about seeking revenge
- Taking great risks that could lead to death, such as driving extremely fast
- Talking or thinking about death often
- Displaying extreme mood swings, suddenly changing from very sad to very calm or happy
- Giving away important possessions
- Saying goodbye to friends and family
- Putting affairs in order, making a will

If these warning signs apply to you or someone you know, get help as soon as possible, particularly if the behavior is new or has increased recently.

## 2.2 Here are five steps you can take to #BeThe1to help someone in emotional pain:


Fig.1 Action step for helping someone in emotional pain

**2.2.1** **ASK:** "Are you thinking about killing yourself?" It's not an easy question, but studies show that asking at-risk individuals if they are suicidal does not increase suicides or suicidal thoughts.

**2.2.2** **KEEP THEM SAFE:** Reducing a suicidal person's access to highly lethal items or places is an important part of suicide prevention. While this is not always easy, asking if the at-risk person has a plan and removing or disabling the lethal means can make a difference.

**2.2.3** **BE THERE:** Listen carefully and learn what the individual is thinking and feeling. Research suggests acknowledging and talking about suicide may reduce rather than increase suicidal thoughts.

**2.2.4** **HELP THEM CONNECT:** Save the National Suicide Prevention Lifeline's (**1-800-273-TALK (8255)**) and the Crisis Text Line's number (**741741**) in your phone, so it's there when you need it. You can also help make a connection with a trusted individual like a family member, friend, spiritual advisor, or mental health professional.

**2.2.5** **STAY CONNECTED:** Staying in touch after a crisis or after being discharged from care can make a difference. Studies have shown the number of suicide deaths goes down when someone follows up with the at-risk person.

## 2.3 Risk Factors

Suicide does not discriminate. People of all genders, ages, and ethnicities can be at risk. Suicidal behavior is complex, and there is no single cause. Many different factors contribute to someone making a suicide attempt. But people most at risk tend to share specific characteristics. The main risk factors for suicide are:

- Depression, other mental disorders, or substance abuse disorder
- Certain medical conditions

- Chronic pain
- A prior suicide attempts
- Family history of a mental disorder or substance abuse
- Family history of suicide
- Family violence, including physical or sexual abuse
- Having guns or other firearms in the home
- Having recently been released from prison or jail
- Being exposed to others' suicidal behavior, such as that of family members, peers, or celebrities

Many people have some of these risk factors but do not attempt suicide. It is important to note that suicide is not a normal response to stress. Suicidal thoughts or actions are a sign of extreme distress, not a harmless bid for attention, and should not be ignored.

Often, family and friends are the first to recognize the warning signs of suicide and can be the first step toward helping an at-risk individual find treatment with someone who specializes in diagnosing and treating mental health conditions. See the resources on NIMH's Find Help for Mental Illnesses page if you're not sure where to start.

Suicide is complex. Treatments and therapies for people with suicidal thoughts or actions will vary with age, gender, physical and mental well-being, and with individual experiences. NIMH has focused research on identifying people at risk for suicide and identifying effective interventions.

## 2.4 Identifying People at Risk for Suicide

- **Universal Screening:** Research has shown that a three-question screening tool helps emergency room personnel identify adults at risk for suicide. Researchers found that screening all patients – regardless of the reason for their emergency room visit – doubled the number of patients identified as being at risk for suicide. The researchers estimated that suicide-risk screening tools could identify more than three million additional adults at risk for suicide each year.
- **Predicting Suicide Risk Using Electronic Health Records:** Researchers from NIMH partnered with the VA and others to develop computer programs that could help predict suicide risk among veterans receiving VA health care. Other healthcare systems are beginning to use data from electronic health records to help identify people with suicide risk as well.

### 2.4.1 Brief Interventions

- **Safety Planning:** Personalized safety planning has been shown to help reduce suicidal thoughts and actions. Patients work with a caregiver to develop a plan that describes ways to limit access to lethal means such as firearms, pills, or poisons. The plan also lists coping strategies and people and resources that can help in a crisis.
- **Follow-up phone calls**: Research has shown that when at-risk patients receive further screening, a Safety Plan intervention, and a series of supportive phone calls, their risk of suicide goes down.

## 2.4.2 Psychotherapies

Multiple types of psychosocial interventions have been found to help individuals who have attempted suicide (see below). These types of interventions may prevent someone from making another attempt.

- **Cognitive Behavioral Therapy (CBT)** can help people learn new ways of dealing with stressful experiences through training. CBT helps individuals recognize their thought patterns and consider alternative actions when thoughts of suicide arise.
- **Dialectical Behavior Therapy (DBT)** has been shown to reduce suicidal behavior in adolescents. DBT has also been shown to reduce the rate of suicide in adults with borderline personality disorder, a mental illness characterized by an ongoing pattern of varying moods, self-image, and behavior that often results in impulsive actions and problems in relationships. A therapist trained in DBT helps a person recognize when his or her feelings or actions are disruptive or unhealthy, and teaches the skills needed to deal better with upsetting situations.

NIMH's Find Help for Mental Illnesses page can help you locate a mental health provider in your area. Here are tips to help prepare and guide you on how to talk to your health care provider about your mental health and get the most of your doctor's visit.

## 2.4. Medication

Some individuals at risk for suicide might benefit from medication. Doctors and patients can work together to find the best medication or medication combination, as well as the right dose. Because many individuals at risk for suicide often have a mental illness and substance use problems, individuals might benefit from medication along with psychosocial intervention.

Clozapine is an antipsychotic medication used primarily to treat individuals with schizophrenia. To date, it is the only medication with a specific U.S. Food and Drug Administration (FDA) indication for reducing the risk of recurrent suicidal behavior in patients with schizophrenia or schizoaffective disorder.

If you are prescribed a medication, be sure you:

- Talk with your doctor or a pharmacist to make sure you understand the risks and benefits of the medications you're taking.
- Do not stop taking a medication without talking to your doctor first. Suddenly stopping a medication may lead to "rebound" or worsening of symptoms. Other uncomfortable or potentially dangerous withdrawal effects also are possible.
- Report any concerns about side effects to your doctor right away. You may need a change in the dose or a different medication.
- Report serious side effects to the FDA MedWatch Adverse Event Reporting program online or by phone at 1-800-332-1088. You or your doctor may send a report.

Other medications have been used to treat suicidal thoughts and behaviors, but more research is needed to show the benefit of these options. For basic information about

these medications, you can visit the NIMH Mental Health Medications webpage. For the most up-to-date information on medications, side effects, and warnings, visit the FDA website.

## 2.5 Collaborative Care

**Collaborative Care** has been shown to be an effective way to treat depression and reduce suicidal thoughts. A team-based Collaborative Care program adds two new types of services to usual primary care: behavioral health care management and consultations with a mental health specialist.

The behavioral health care manager becomes part of the patient's treatment team and helps the primary care provider evaluate the patient's mental health. If the patient receives a diagnosis of a mental health disorder and wants treatment, the care manager, primary care provider, and patient work together to develop a treatment plan. This plan may include medication, psychotherapy, or other appropriate options.

Later, the care manager reaches out to see if the patient likes the plan, is following the plan, and if the plan is working or if changes are needed to improve management of the patient's disorders. The care manager and the primary care provider also regularly review the patient's status and care plan with a mental health specialist, like a psychiatrist or psychiatric nurse, to be sure the patient is getting the best treatment options and improving.

## 2.6 Ongoing Research

To know who is most at risk and to prevent suicide, scientists need to understand the role of long-term factors (such as childhood experiences) as well as more immediate factors like mental health and recent life events. Researchers also are looking at how genes can either increase risk or make someone more resilient to loss and hardships.

Recent findings from NIMH-funded research are listed in the *Research and Statistics* section below, and NIMH along with other NIH Institutes are funding a number of ongoing studies related to suicide.

## 2.7 Suicide bridge

A **suicide bridge** is a bridge used frequently to die by suicide, most typically by jumping off and into the water or ground below. A fall from the height of a tall bridge into water may be fatal, although some people have survived jumps from high bridges such as the Golden Gate Bridge. Medical examiners at the Golden Gate Bridge state that jumpers suffer a gruesome death as their bodies hit the water at about 75 mph (120 km/h), with severe organ damage (multiple ruptured organs and broken necks, pelvises, etc.). However, significant injury or death is far from certain; numerous studies report minimally injured persons who succumbed to drowning.

Fig. 2 Anti suicide alert system of bridge.

To reach such locations, those with the intention to die by suicide must often walk long distances to reach the point where they finally decide to jump. For example, some individuals have traveled over the San Francisco–Oakland Bay Bridge by car in order to jump from the Golden Gate Bridge

When someone dies by jumping from a high place – a building, a cliff, a bridge – it is by its nature a public action. Their secret is out, and the image of the tragedy is an open blemish for all to see.

Suicide by jumping is extremely lethal as 85% of people who jump from high places will die. Jumping also has the added potential to traumatize those who witness it and endanger the lives of passerby (Beautrais, 2007; National Institute for Mental Health, 2006; Pirkis, 2013).

Jumping as a means of suicide is rare in the West, though in some parts of Asia – Singapore for example – it accounts for as many as 60% of all deaths by suicide. In North America it is only about 5%, while in the UK it is 3% the (Beautrais, 2009; National Institute for Mental Health, 2006).

When someone dies by jumping, it is usually from a residential building. These individuals tend to be older and male, and choose to jump from their residences because of easy accessibility and proximity.

Most suicides that occur from more public areas such as bridges or cliffs tend to be done by younger males. They are attracted by the notoriety and reputation of a site; these are known as suicide hotspots and are described below. Often, these young men also suffer from severe psychiatric illnesses (Beautrais, 2007).

Despite the rarity of jumping, the image of someone killing him or herself by jumping from a bridge or another high place is a powerful one. It resonates profoundly in the public consciousness.

I want to look at why people choose to die by jumping, and the struggles that have arisen in trying to prevent these deaths.

## 2.8 Iconic Sites

A suicidal hotspot, also *known* as an "iconic site" or "suicide magnet," is almost always a jumping site. It is "A specific, usually public, site which is frequently used as a location for suicide, and which provides either means or opportunity for suicide". The Golden Gate Bridge, the Eiffel Tower, and Niagara Falls are the world's most infamous hotspots (National Institute for Mental Health, 2006).

Perron (2013) describes what makes a site "iconic". He lists qualities such as ease of access, perceived lethality of the jump, media attention, and unique features such as overlooking water.

Suicides at these iconic sites are far from common, yet they receive a disproportionate amount of media attention and coverage. In 1995, as the 1000th suicide at the Golden Gate Bridge approached, the local media had to be asked to refrain from reporting and commenting on this phenomenon. Rather callously, some radio stations were actually "counting down" in anticipation of the "milestone". One station went to the crude extreme of offering a case of Snapple to the family of the 1000th jumper! (Friend, 2003). This bridge has been the world's most frequented suicide location since its construction in 1937. To date, there have been over 1600 suicides.

## 2.9 Hanging by Ceiling Fan

Due to the sensitive nature and judicial requirements of reporting suicides, specific details about hanging suicides are not routinely available. Both suicides by hanging and suffocation are coded as X70 by ICD-10 and are traditionally analyzed together without stating the ligature point or further details. An extensive analysis of suicides by hanging in 16 US States between 2005 and 2014 found that ligature point was reported for only 30% of hanging suicides by corners or medical examiners. Lack of details makes further consideration for target prevention activities, including innovations that could address suicide by different types of hanging challenging.

The suicide mortality of hanging by ceiling fan has been rarely studied and reported. Limited evidence suggests that a household ceiling fan is a standard device used for hanging in dwellings of some countries in the Eastern Mediterranean Region (EMR) of WHO (i.e., Pakistan and Bahrain). In some countries, for example Bahrain, India and Pakistan, suicide by ceiling fan is reported to be one of the most common

methods of hanging. Some studies have reported that the proportion of hanging by ceiling fan in India is 10% and more common among females than males; whereas, in the United States—where ligature point is recorded for only about one-third of hanging suicides—hanging by ceiling fan is reported to be relatively uncommon

Fig.3 Hanging by Ceiling Fan.

Fig.4 Anti Suicide Alert System for Fan.

**Perron (2013) describes what makes a site “iconic”. He lists qualities such as ease of access, perceived lethality of the jump, media attention, and unique features such as overlooking wate**

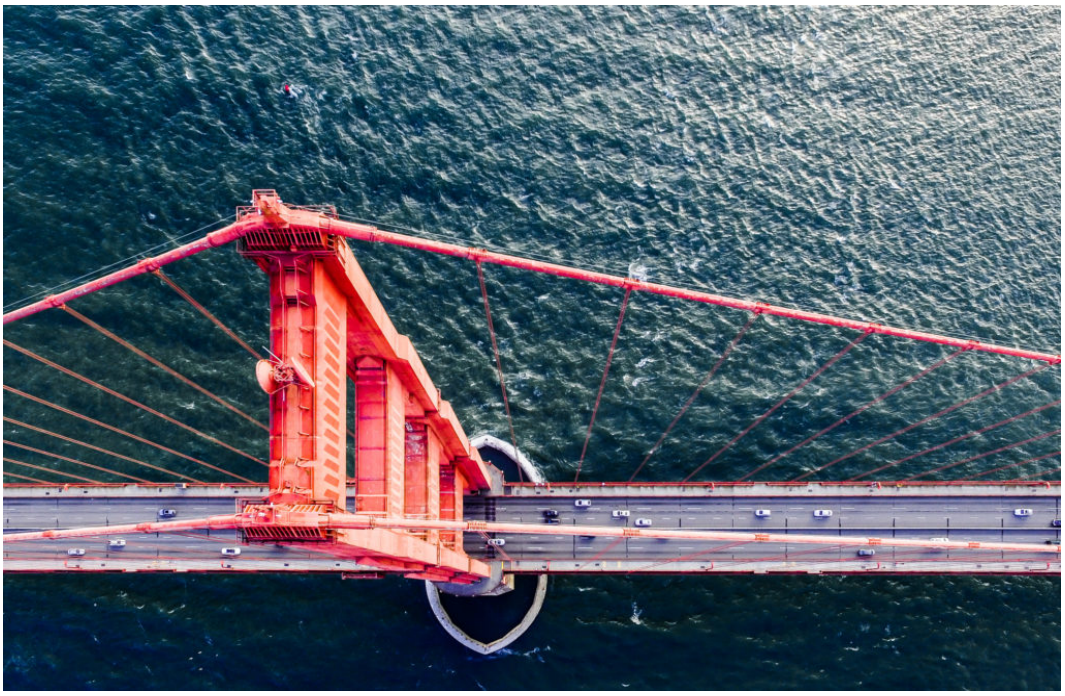


Fig.5 Suicide Bridge

# CHAPTER 3
# COMPONENTS

## 3.1 IR SENSOR

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Hershel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots)

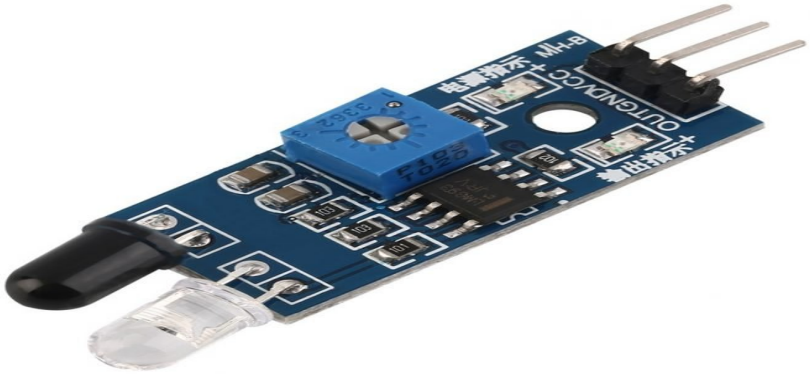



Fig.6 IR Sensor

## 3.2 AVR Atmega8 Microcontroller Architecture & Its Applications

The abbreviation of AVR Microcontroller is “Advanced Virtual RISC” and MCU is the short term of the Microcontroller. A Microcontroller is a tiny computer on a single chip, and it is also termed as a control device. Similar to a computer, the Microcontroller is made with a variety of peripherals like input & output units, memory, Timers, serial data communications, programmable. The applications of Microcontroller involve embedded applications & automatically controlled devices like medical devices, remote control devices, control systems, office machines, power tools, electronic devices, etc. There are **various kinds of Microcontrollers available** in the market like 8051, PIC and AVR microcontroller. This article gives brief information about AVR Atmega8 microcontroller.

Fig.7 AVR Microcontroller

In 1996, AVR Microcontroller was produced by the "Atmel Corporation". The Microcontroller includes the Harvard architecture that works rapidly with the RISC. The features of this Microcontroller include different features compared with other like sleep modes-6, inbuilt ADC (analog to digital converter), internal oscillator and serial data communication, performs the instructions in a single execution cycle. These Microcontrollers were very fast, and they utilize low power to work in different power saving modes. There are different configurations of AVR microcontrollers are available to perform various operations like 8-bit, 16-bit, and 32-bit. Please refer the below link for; Types of AVR Microcontroller

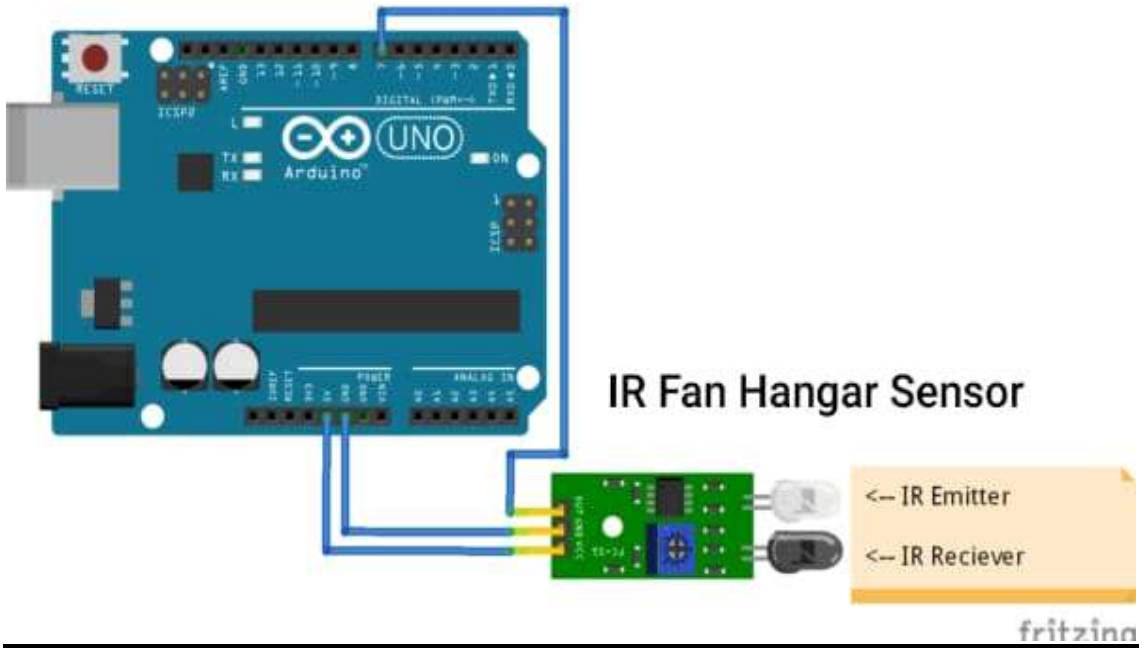



Fig. 8 IR Fan Hanging Sensor

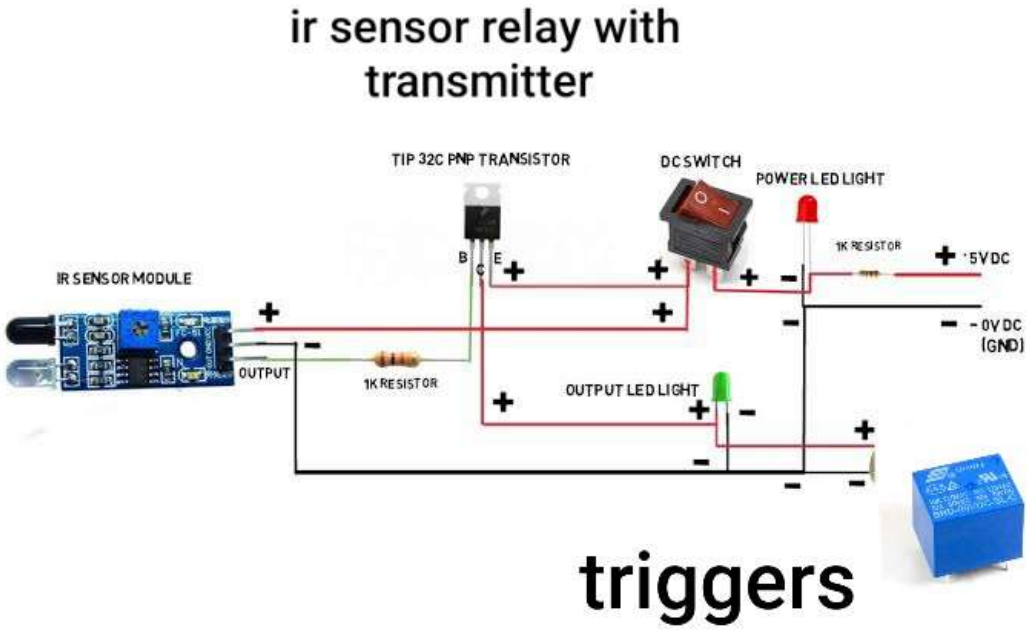



Fig. 9 IR Sensor Relay With Transmitter

## 3.3 ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster

than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is **D = ½ T x C** (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be:

**D = 0.5 x 0.025 x 343**

or about 4.2875 meters.

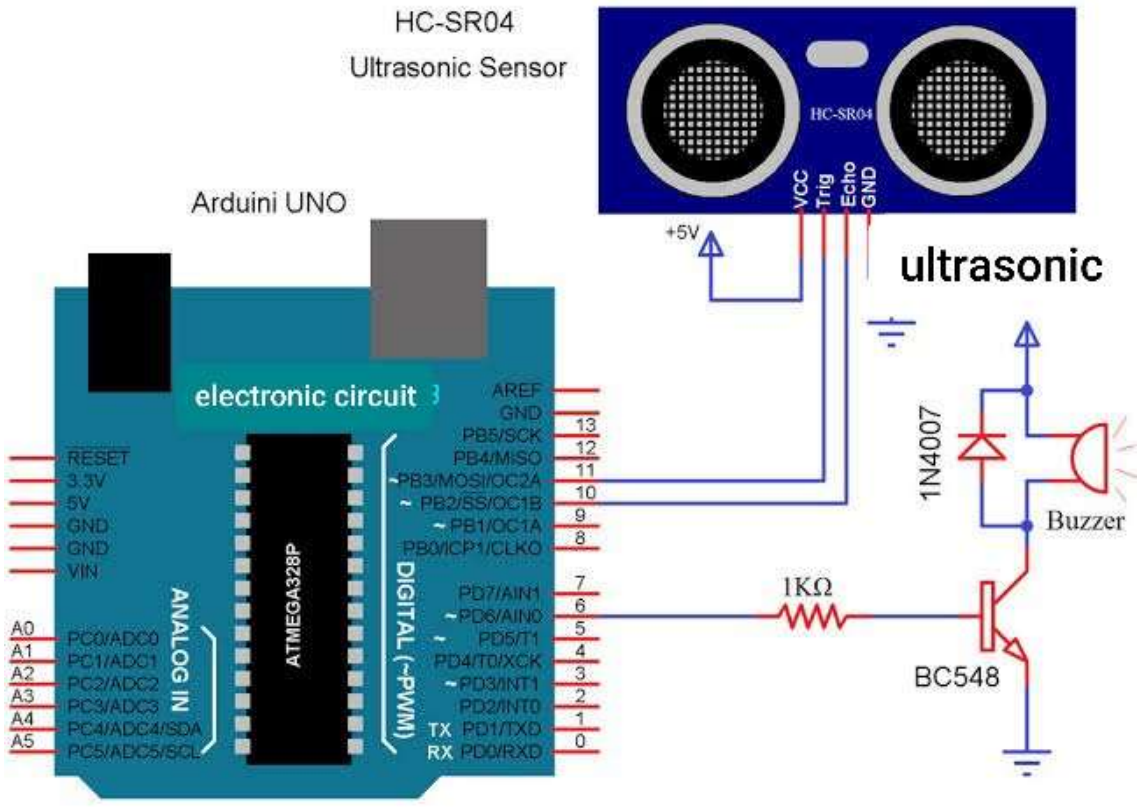



Fig.10 IR Tansmitter and Receiver Circuit

## 3.4 IR Transmitter and Receiver Circuits

Infrared (IR) communication is a very common wireless communication technology. IR communication is an easy to use and inexpensive wireless communication. IR Communication generally comprises of IR Transmitter and Receiver.

The most common use of Infrared (IR) communication is remote controls of different appliances like TV's. The handheld remote control of the TV consists of IR Transmitter and the IR Receiver is placed at the TV.

Some embedded projects also consists of IR Transmitter and Receiver Modules where they can be used as proximity sensors or distance measurement sensors.

In this project, we have demonstrated the functioning of a simple IR Transmitter and Receiver using 555 Timer.

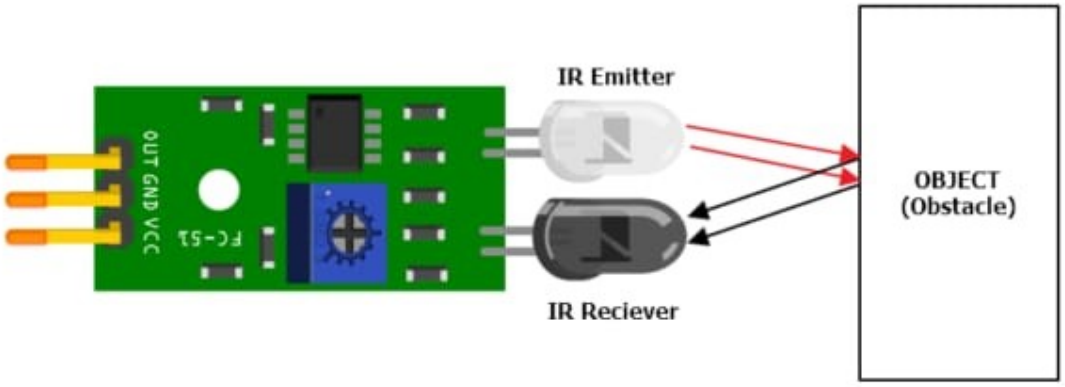



Fig.11 IR Sensor Circuit

## 3.5 What is RF Module?

As the name suggests, RF module operates at Radio Frequency. This frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This type of modulation is an Amplitude Shift Keying (ASK).

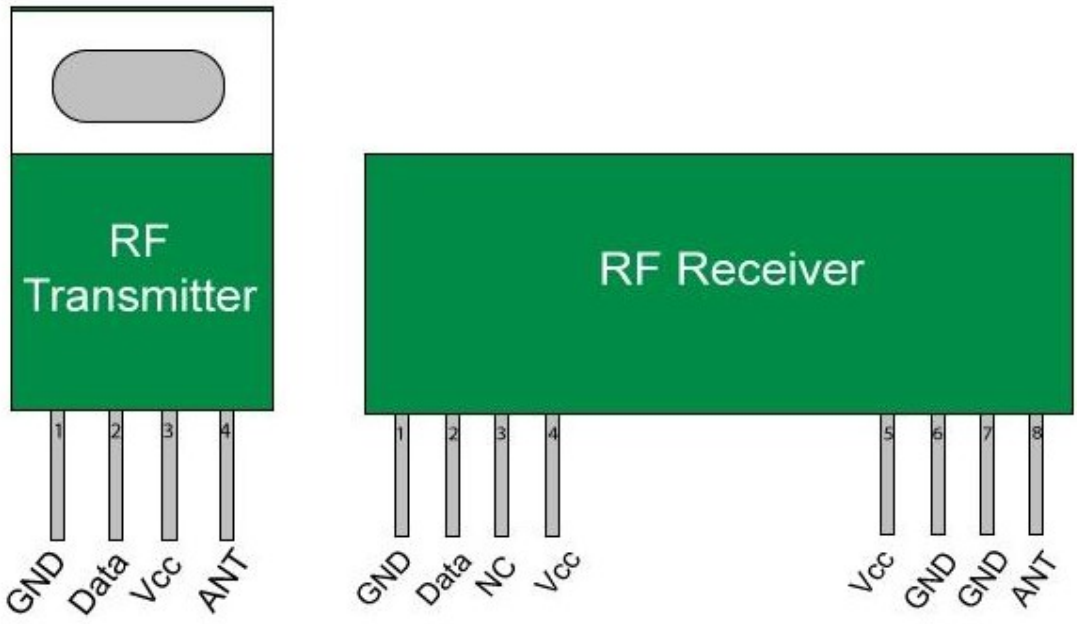



Fig.12 RF Module

This **RF module** is a combination of **RF Transmitter** and **RF Receiver**. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **433 MHz**

The RF transmitter receives serial data and transmits it wirelessly through its RF antenna. The transmission occurs at the rate of 1 Kbps – 10 Kbps. RF receiver receives the transmitted data, and it is operating at the same frequency as that of the transmitter.

## 3.6 Features of RF Module:

- The Receiver frequency 433MHz
- Receiver typical frequency 105 Dbm
- Receivers supply current 3.5 mA
- Low power consumption
- operating voltage of receiver is 5V
- The transmitter frequency range 433.92MHz
- Supply voltage of transmitter is between 3V to 6V
- Output power of transmitter is between 4Dbm to 12Dbm

## 3.7 433 MHz RF Transmitter and Receiver:

In many projects, we use RF modules to transmitting and receiving the data because it has a high volume of applications than IR. RF transceiver module will always work in a pair that is it needs a Transmitter and Receiver to send and receive the data. A transmitter can only send information and a Receiver and can only receive it, so data can send from one end to another and not the other way around.

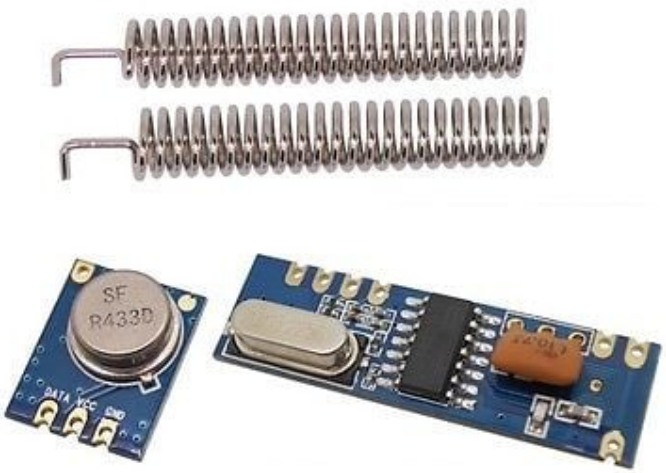
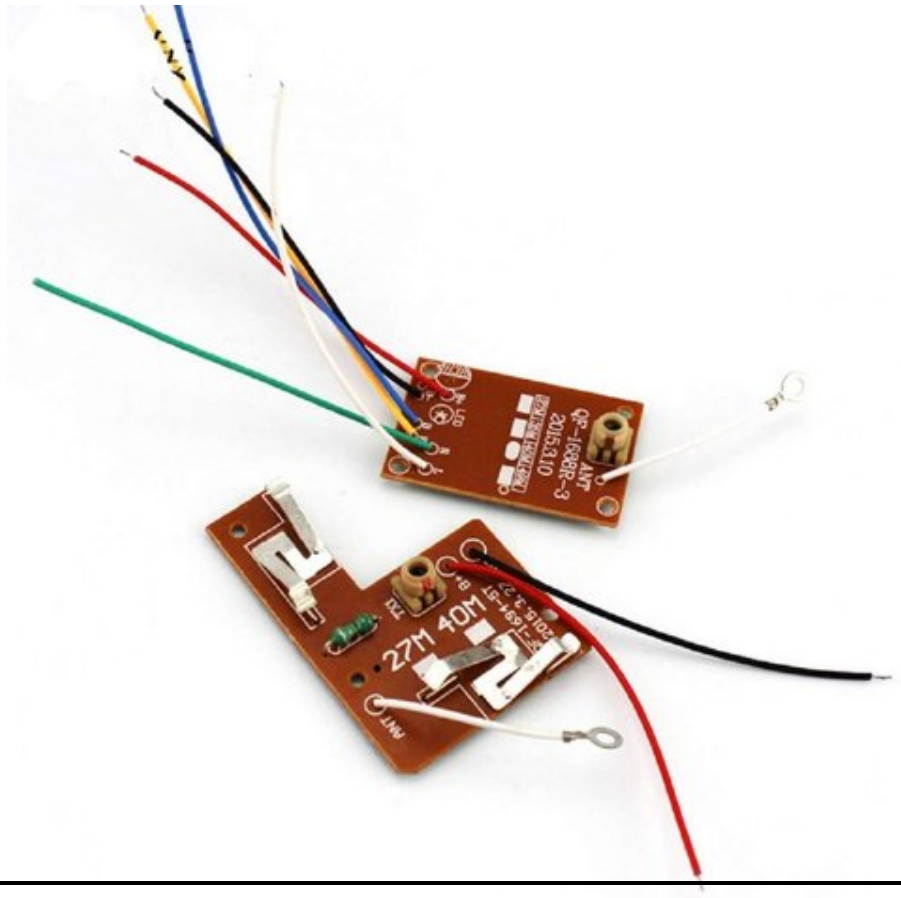



Fig.13 27MHZ 2CH Remote Controller Receiver Board

The RC transmitter and receiver has an electronic frequency: 27 MHz
- The RC transmitter is designed with a Dimensions: pad 3.5
- 7 cm, receiving plate 2.6




- 4.3 cm;
- The remote-control distance of the RC transmitter and receiver, in the case of adequate electricity, without interference, the correct access to the antenna after about 10 m,

Fig.13 Remote Controller Circuit

## 3.8 Ultrasonic sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target). In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is **D = ½ T x C** (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be:

**D = 0.5 x 0.025 x 343**

or about 4.2875 meters.

## 3.9 Alarm indicator

A device that responds to a signal from an alarm sensor. *Note:* Examples of alarm indicators include bells, lamps, horns, gongs, and buzzers.

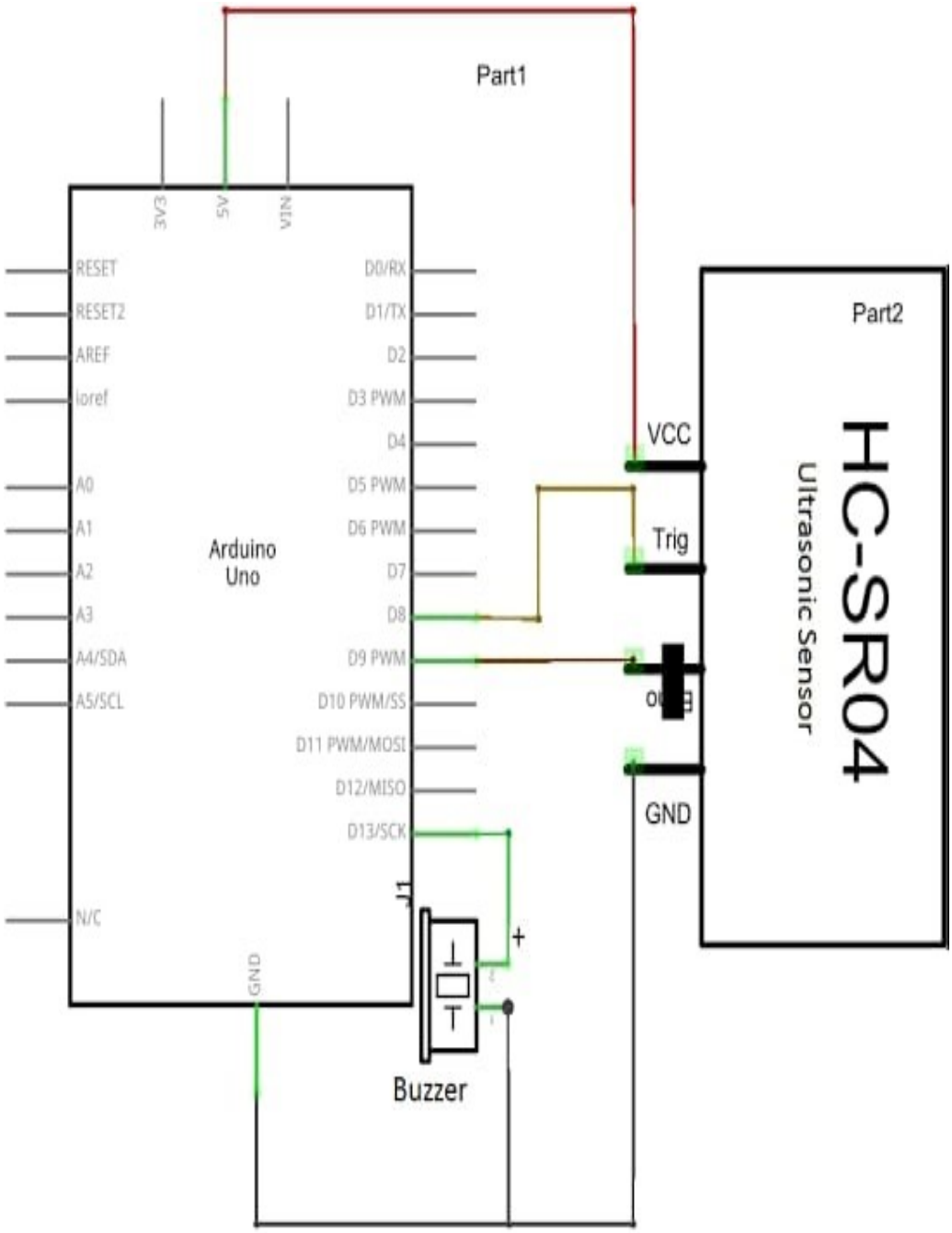



Fig.14 Alarm Indicator Circuit.

# CONCLUSION

The Product developed is definitely a very important product in robotics and floor cleaning area. The robots developed uses 2 vacuum pump which ultimately provides lots of vibration and power loss in the system. Also, the algorithm implemented is not very effective. So, there is definitely current scope for improvement and optimization till the most effective product is being
developed. After optimizing the algorithm and taking it to the heuristic-based search like beeal gorithm it will be a great product and can revolutionize this industry. Definitely it has very huge potential. Also, we can use 1 vacuum pump instead two so that it will be cost effective and very energy saving product with less vibration and much control over the robot. The robot having 33*30*8 cm in dimension is very compact in nature and can go beneath any furniture and bed. This is also very handy in portability. The scrubber of the robot now consists of small plastic fibers .But it can be further improved so that the surface area of the scrubber will come90% in contact with the floor.

## Further Resources

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