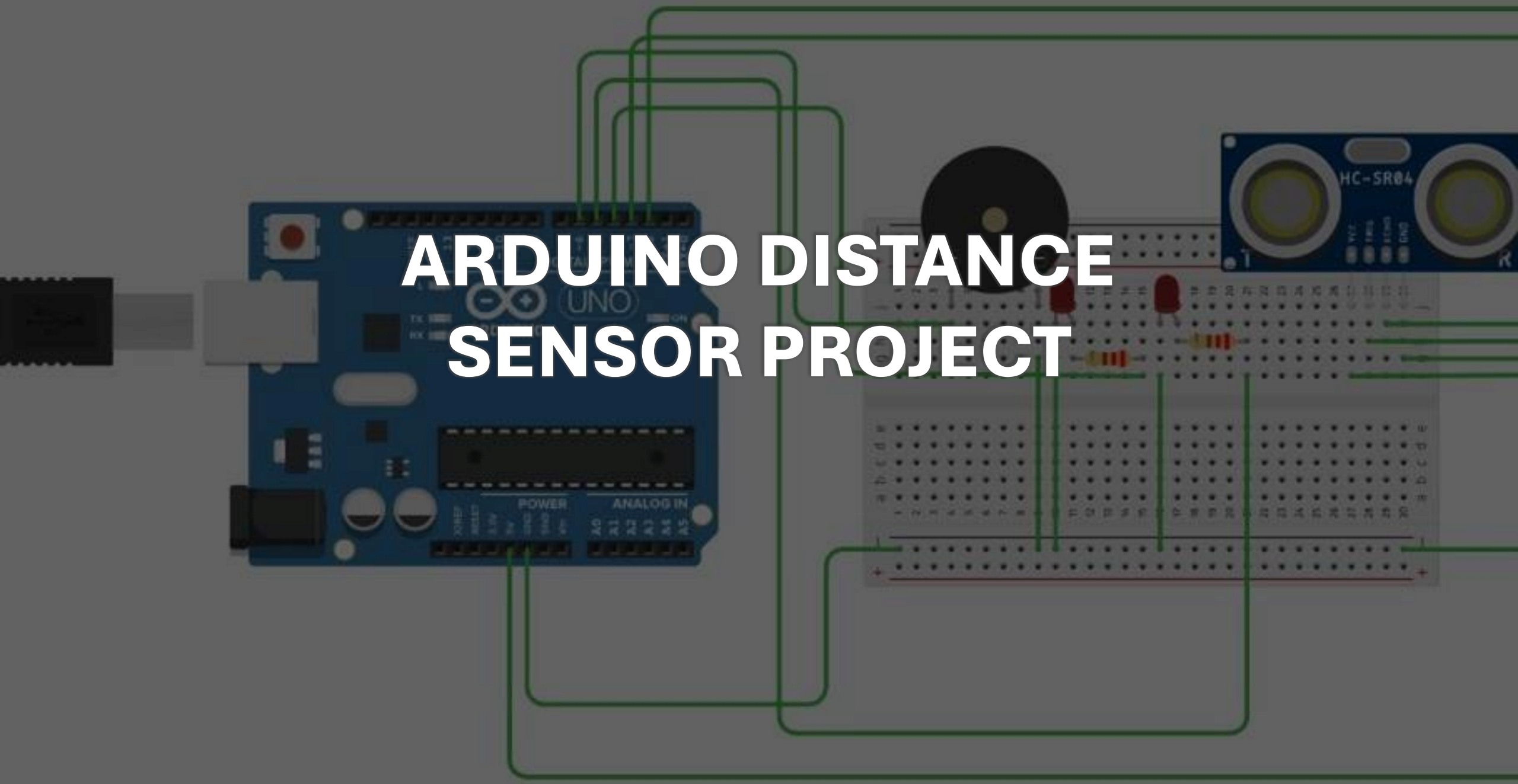
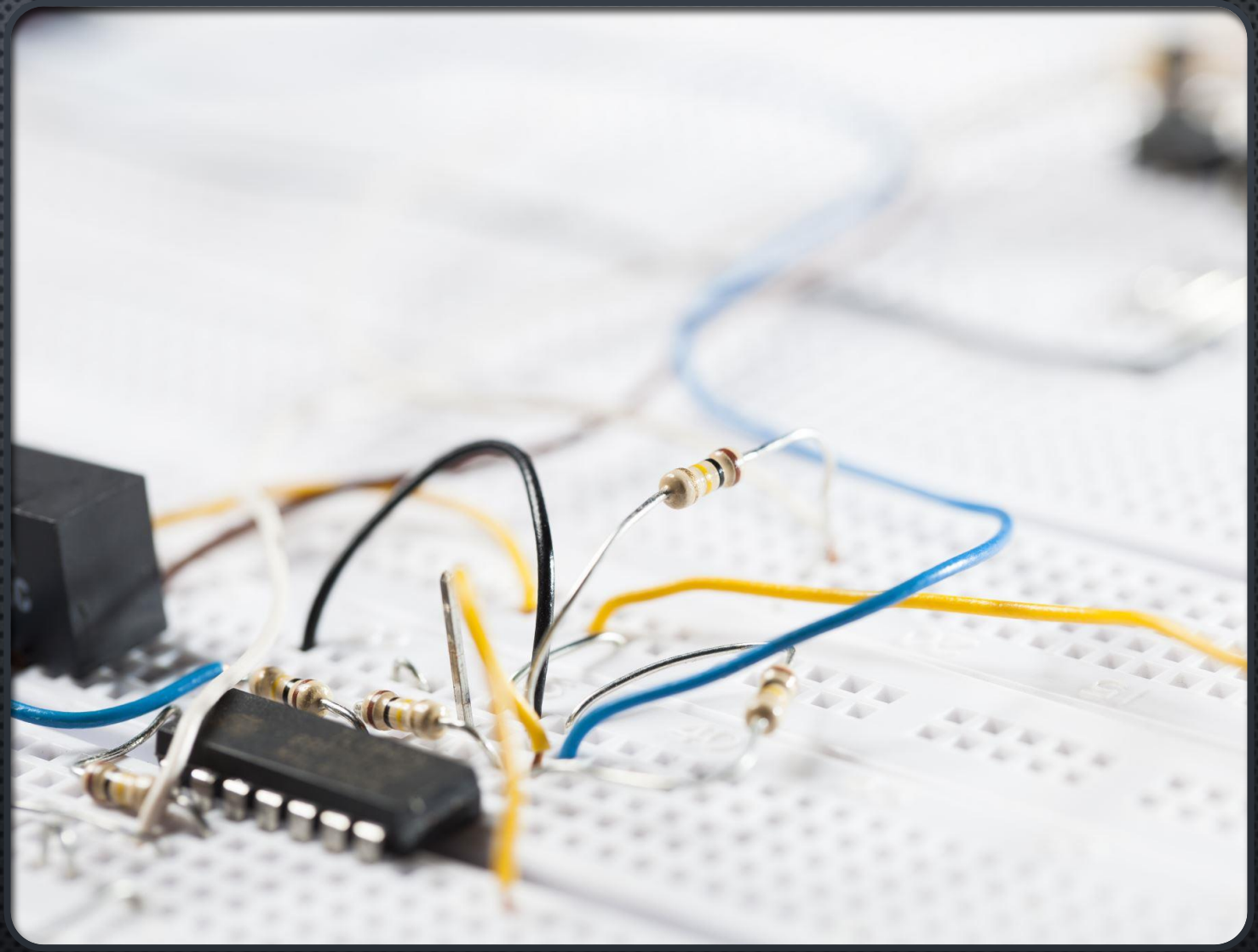
ARDUINO DISTANCE SENSOR PROJECT



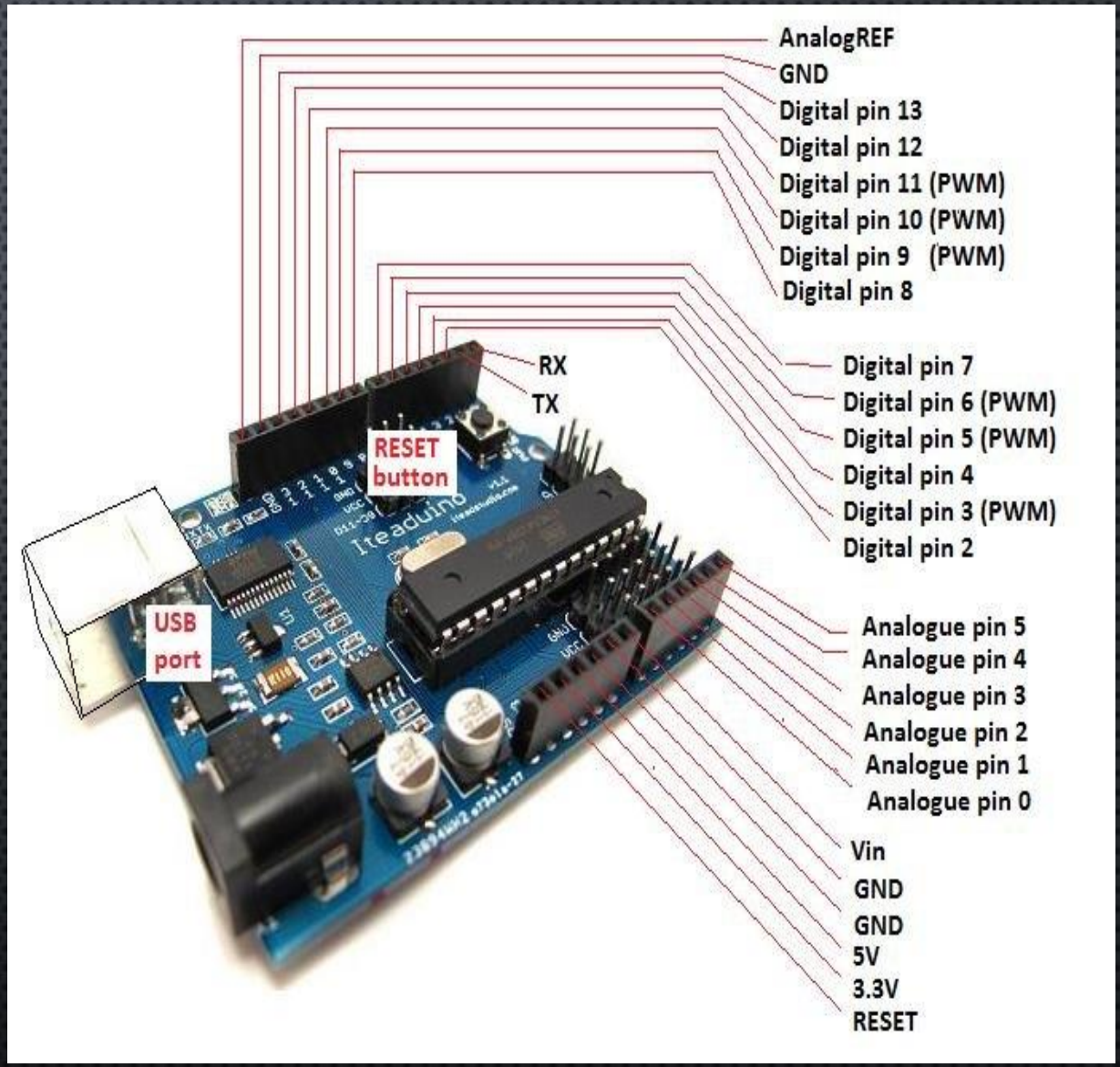
COMPONENTS:

- ❑ ARDUINO UNO
- ❑ BUZZER
- ❑ ULTRASONIC SENSOR
- ❑ BREADBOARD
- ❑ LED
- ❑ RESISTOR
- ❑ JUMPER WIRES
- ❑ BLUETOOTH HC05



ARDUINO UNO:

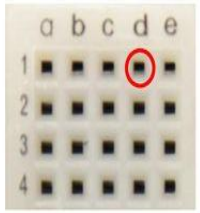
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2010.[2][3] The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various 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.[4] It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It has the same microcontroller as the Arduino Nano board, and the same headers as the Leonardo board.[5][6] 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.



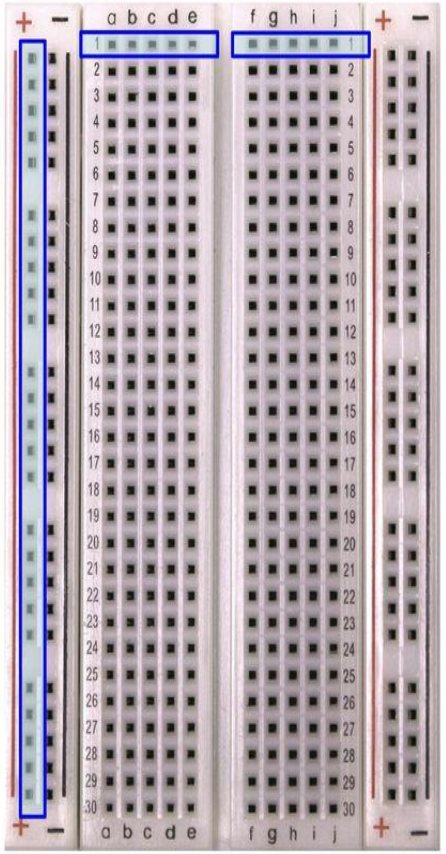
BREADBOARD:

Breadboard Connections

- Columns and rows connected



Holes to insert wires



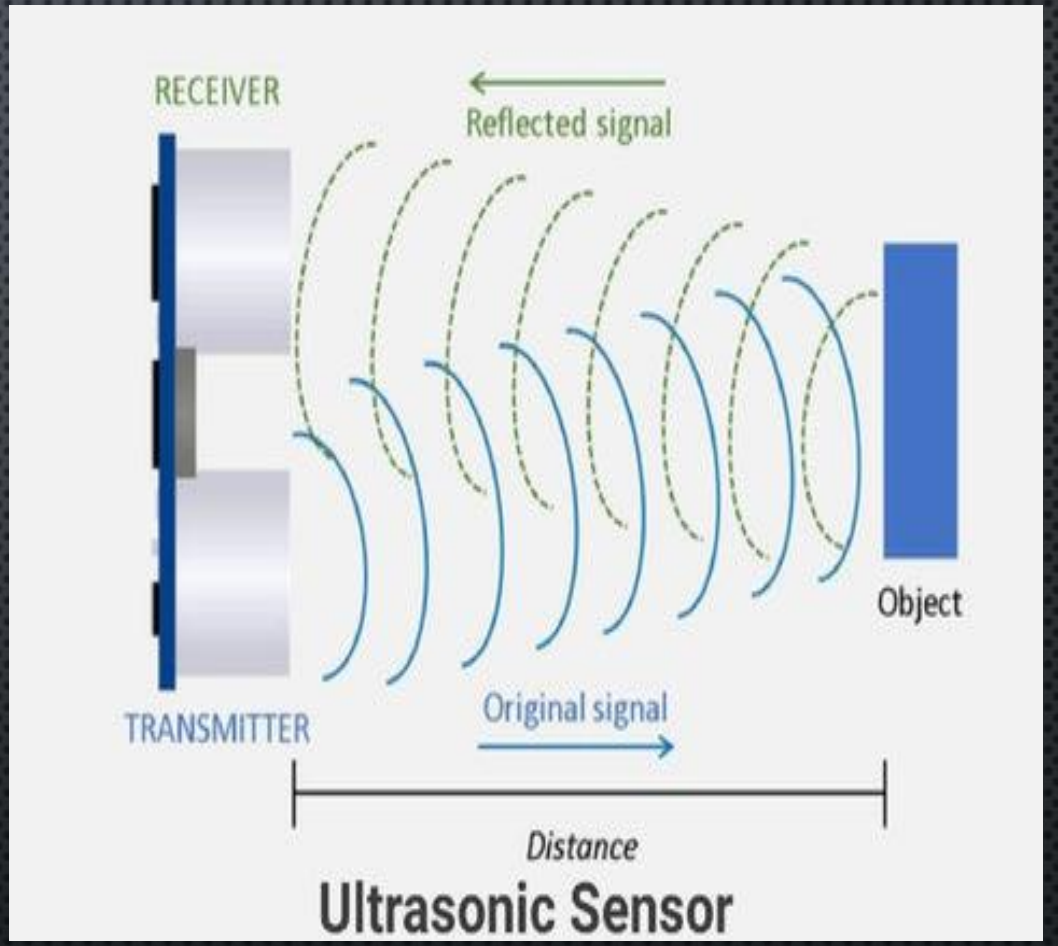
- A BREADBOARD, SOLDERLESS BREADBOARD, OR PROTOBOARD IS A CONSTRUCTION BASE USED TO BUILD SEMI-PERMANENT PROTOTYPES OF ELECTRONIC CIRCUITS. UNLIKE A PERFBOARD OR STRIPBOARD, BREADBOARDS DO NOT REQUIRE SOLDERING OR DESTRUCTION OF TRACKS AND ARE HENCE REUSABLE. FOR THIS REASON, BREADBOARDS ARE ALSO POPULAR WITH STUDENTS AND IN TECHNOLOGICAL EDUCATION
- A VARIETY OF ELECTRONIC SYSTEMS MAY BE PROTOTYPED BY USING BREADBOARDS, FROM SMALL ANALOG AND DIGITAL CIRCUITS TO COMPLETE CENTRAL PROCESSING UNITS (CPUS).

WORKING :-

- ULTRASONIC SENSOR WORKS BY MEASURING THE DISTANCE BETWEEN THE OBJECT AND THE SENSOR THE ULTRASONIC SENSOR PRODUCERS AN ULTRASONIC WAVE BY THE VIBRATION OF PIEZOELECTRIC CRYSTAL IN THE TRANSDUCER CONVERTING THE ELECTRIC PULSE INTO MECHANICAL VIBRATIONS.
- IT HAS TWO COMPONENTS ONE IS TRANSMITTER(T) AND ANOTHER IS RECEIVER(R).
- THE TRANSMITTER TRANSMITS THE ULTRASONIC WAVE AND THEN THIS WAVE HITS THE OBJECT PRESENT INFRONT OF THE SENSOR AND THEN IT BOUNCES BACK FROM THE OBJECT AND RECEIVED AT THE RECEIVER, BY MEASURING THE TIME TAKEN TO TRANSMIT AND RECEIVE THE WAVE WE CAN CALCULATE THE DISTANCE BETWEEN THE SENSOR AND THE OBJECT SO, DISTANCE IS GIVEN BY

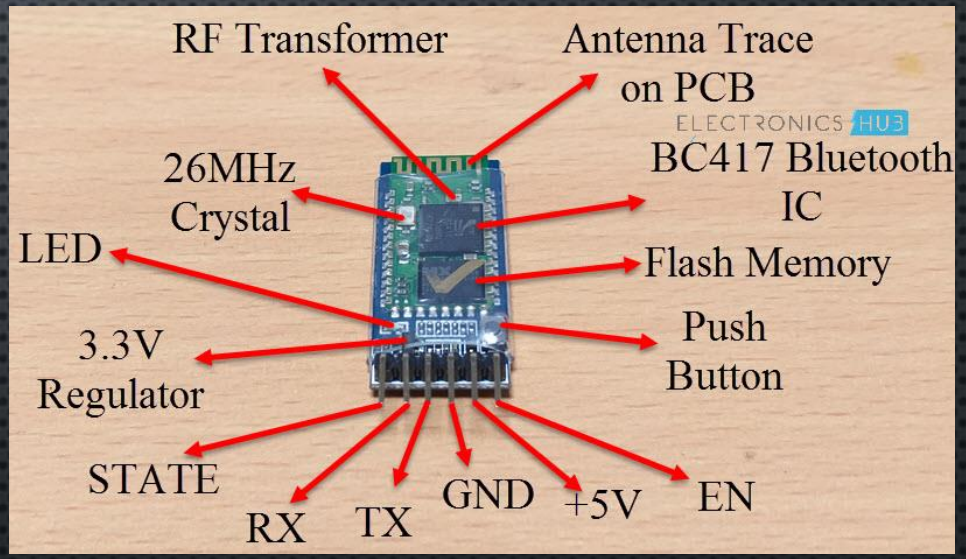
D=(TIME÷2) * SPEED OF SOUND

SPEED OF SOUND = 343M/S



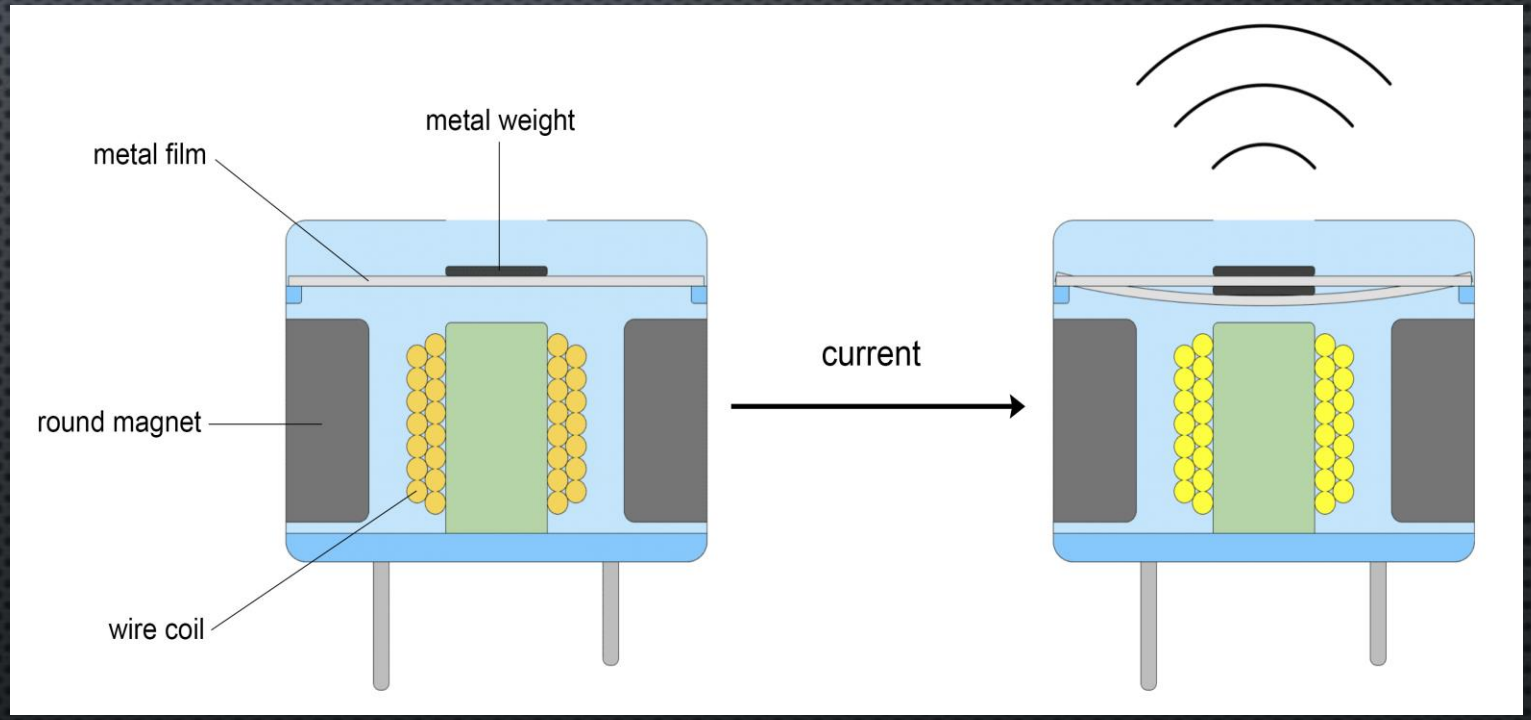
WORKING OF BLUETOOTH MODULE:

- BLUETOOTH MODULE IS DESIGNED TO REPLACE CABLE CONNECTIONS HC-05 USES SERIAL COMMUNICATION TO COMMUNICATE WITH THE ELECTRONICS. USUALLY, IT IS USED TO CONNECT SMALL DEVICES LIKE MOBILE PHONES USING A SHORT-RANGE WIRELESS CONNECTION TO EXCHANGE FILES. IT USES THE 2.45GHZ FREQUENCY BAND. THE TRANSFER RATE OF THE DATA CAN VARY UP TO 1MBPS AND IS IN RANGE OF 10 METERS.
  THE HC-05 MODULE CAN BE OPERATED WITHIN 4-6V OF POWER SUPPLY. IT SUPPORTS BAUD RATE OF 9600, 19200, 38400, 57600, ETC. MOST IMPORTANTLY IT CAN BE OPERATED IN MASTER-SLAVE MODE WHICH MEANS IT WILL NEITHER SEND OR RECEIVE DATA FROM EXTERNAL SOURCES.



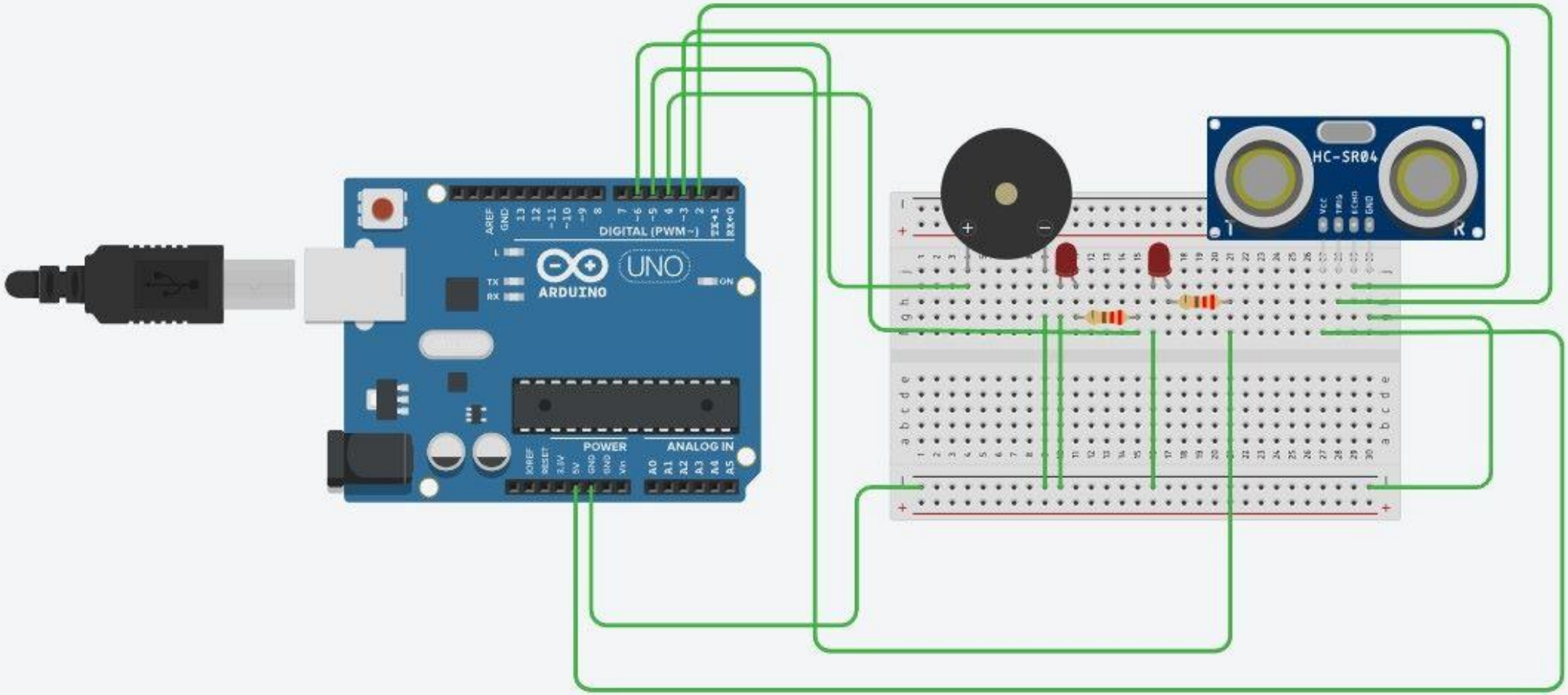
Working of buzzer:

- When a voltage is applied across the two electrodes, the piezoelectric material mechanically deforms due to the applied voltage. This movement of the piezo disk within the buzzer creates sound



CONSTRUCTION

CIRCUIT DIAGRAM



CONSTRUCTION

ULTRASONIC SENSOR:-

- THE ULTRASONIC SENSOR HAS 4 PINS THEY ARE
- VCC, TRIG ,ECHO AND GROUND.
- VCC IS CONNECTED TO THE 5 V SUPPLY.
- TRIG IS CONNECTED TO THE PIN 2 OF THE ARDUINO
- ECHO IS CONNECTED TO THE PIN 3 OF THE ARDUINO
- GROUND IS CONNECTED TO THE GROUND.

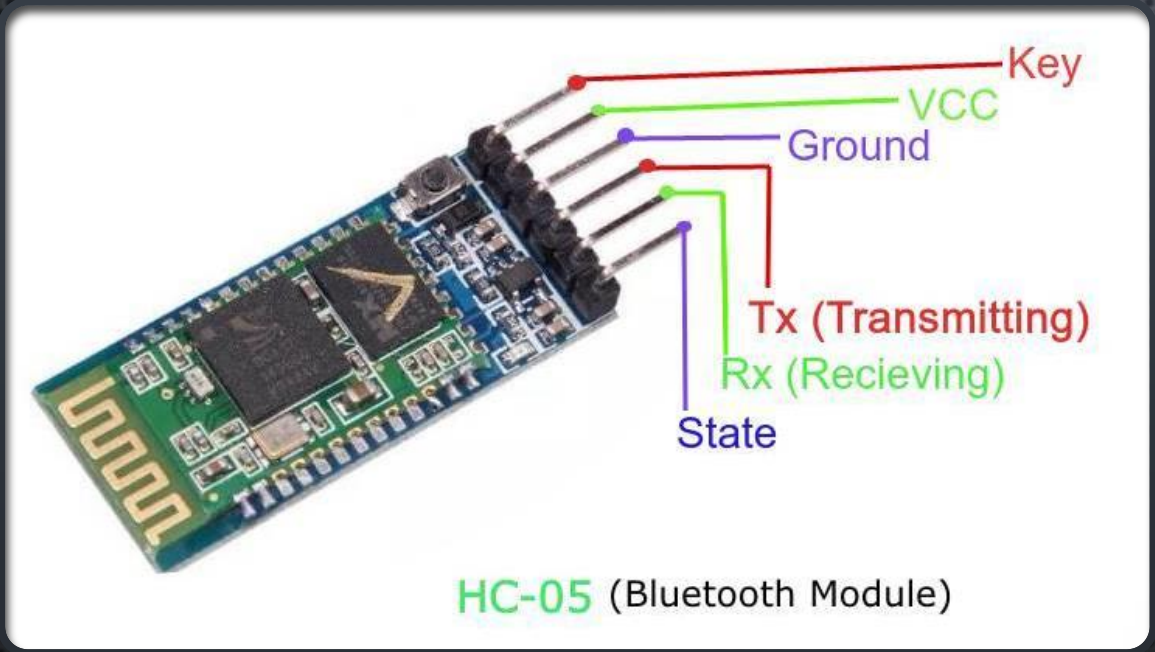
BUZZER:-

- THE POSITIVE TERMINAL OF THE BUZZER IS CONNECTED TO THE PIN 4 OF THE ARDUINO AND THE NEGATIVE TERMINAL IS CONNECTED TO GROUND.

LED'S:-

- THE POSITIVE TERMINAL OF THE LED IS CONNECTED TO THE RESISTOR AND THE RESISTOR IS CONNECTED TO THE PIN 5 OF THE ARDUINO AND THE NEGATIVE TERMINAL OF THE LED IS CONNECTED TO THE GROUND, SIMILARLY ANOTHER LED IS ALSO CONNECTED TO THE PIN 6 OF THE ARDUINO.

BLUETOOTH MODULE :-



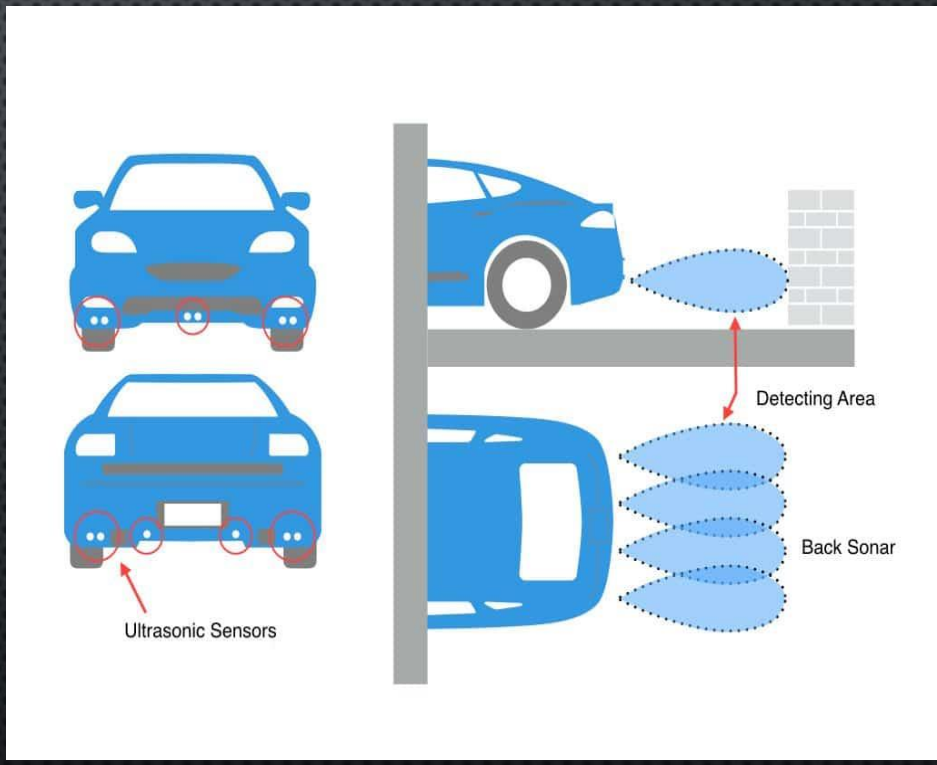
- BLUETOOTH MODULE HAS FOUR PINS THEY ARE VCC, GROUND, TDS AND RDX
- VCC IS CONNECTED TO THE 5 VOLT SUPPLY.
- GROUND IS CONNECTED TO GROUND.
- RDX PIN OF THE BLUETOOTH MODULE IS CONNECT TO THE TX PIN THAT IS THE PIN 1 OF THE ARDUINO.
- TDX PIN OF THE BLUETOOTH MODULE IS CONNECT TO THE RX PIN THAT IS THE PIN 0 OF THE ARDUINO.

SOME APPLICATIONS:-

- Water level controller.
- People detection.
- Anti-collision detection.
- Robotics.
- Distance measuring devices.
- Parking assist system.
- anti theft home security system.

PARKING ASSIST SYSTEM:

- IN THIS SYSTEM THE ULTRASONIC SENSOR IS DEPLOYED AT THE BACK OF THE CAR(OR EVEN AT THE FRONT) AND THE BUZZER IS DEPLOYED NEAR THE DRIVER.
- WHEN EVER THE DRIVER IS PARKING THE CAR THE ULTRASONIC SENSOR WHICH IS PRESENT AT THE BACK OF THE CAR DETECTS THE DISTANCES BETWEEN THE CAR AND OBJECT.
- WHEN THE DISTANCE BETWEEN THE ULTRASONIC SENSOR AND THE OBJECT IS LESS THAN 40CM THEN THE BUZZER STARTS BUZZING AND RED LED'S STARTS BLINKING, AS THE DISTANCE BETWEEN THE SENSOR AND THE OBJECT DECREASES THEN THE BUZZER STARTS BUZZING MUCH FASTER AND LED'S STARTS BLINKING MUCH FASTER, INDICATING THAT THE OBJECT IS COMING NEARER TO THE SENSOR.



WORKING OF ANTI THEFT HOME SECURITY SYSTEM WITH MESSAGING AND CALLING FEATURE:

- WHEN THE OBJECT COMES NEAR TO THE SENSOR THAT IS LESS THAN 40CM THEN THE BUZZER AND THE 2 LEDS LIGHTS GET ACTIVATED AND AT THE SAME TIME AN "ALERT " COMMAND IS SENT TO THE MOBILE WITH THE HELP OF BLUETOOTH MODULE.
- AND WHEN THE OBJECT COMES MUCH NEARER THAT IS LESS THEN 20CM THEN THE ARDUINO WILL SEND A COMMAND CALLED "CALL" TO THE MOBILE WITH THE HELP OF BLUETOOTH MODULE.
- AN APP IS DESIGNED IN SUCH A WAY THAT WHEN EVER IT RECEIVES A COMMAND IT DOES ITS FOLLOWING WORK. WHEN IT RECEIVES A COMMAND CALLED "ALERT" FROM THE ARDUINO, IT WILL SEND THE MESSAGE "SECURITY ALERT....!!!! SOME ENTERED THE HOUSE" AND WHEN THE APP RECEIVES A CAMMAND CALLED "CALL" THE APP AUTOMATICALLY CALLS THE RESPECTIVE PERSON.


THANK
YOU