PROJECT ON

BLIND AID

1. JADAV SHIVA RAJU 180850330025
2. JASWANTH KOPPULA 180850330026
3. KAMMARA BHARATH TEJA 180850330028

ABSTRACT

The World Health Organization (WHO) Fact reported that there are 285 million visually-impaired people worldwide.Over the past years, blindness that is caused by diseases has decreased due to the success of public health actions. However, the number of blind people that are over 60 years old is increasing by 2 million per decade.

The need for assistive devices for navigation and orientation has increased.These aides provide the blind with all information and features for safe mobility, which are available to people with sight.

IMPLEMENTATION

This is a basic wearable device which is worn around waist/chest.This device vibrates when there is an obstacle around a blind person.The intensity of the vibrator tells about the proximity of the obstacle.The sensors and actuators we have implemented are:

1.LIDAR(Light detection and ranging sensor) —VL53OX.

2.ultra sonic sensor — HC-SR04.

3.vibration motor.

Development Board: ARDUINO MEGA 2560

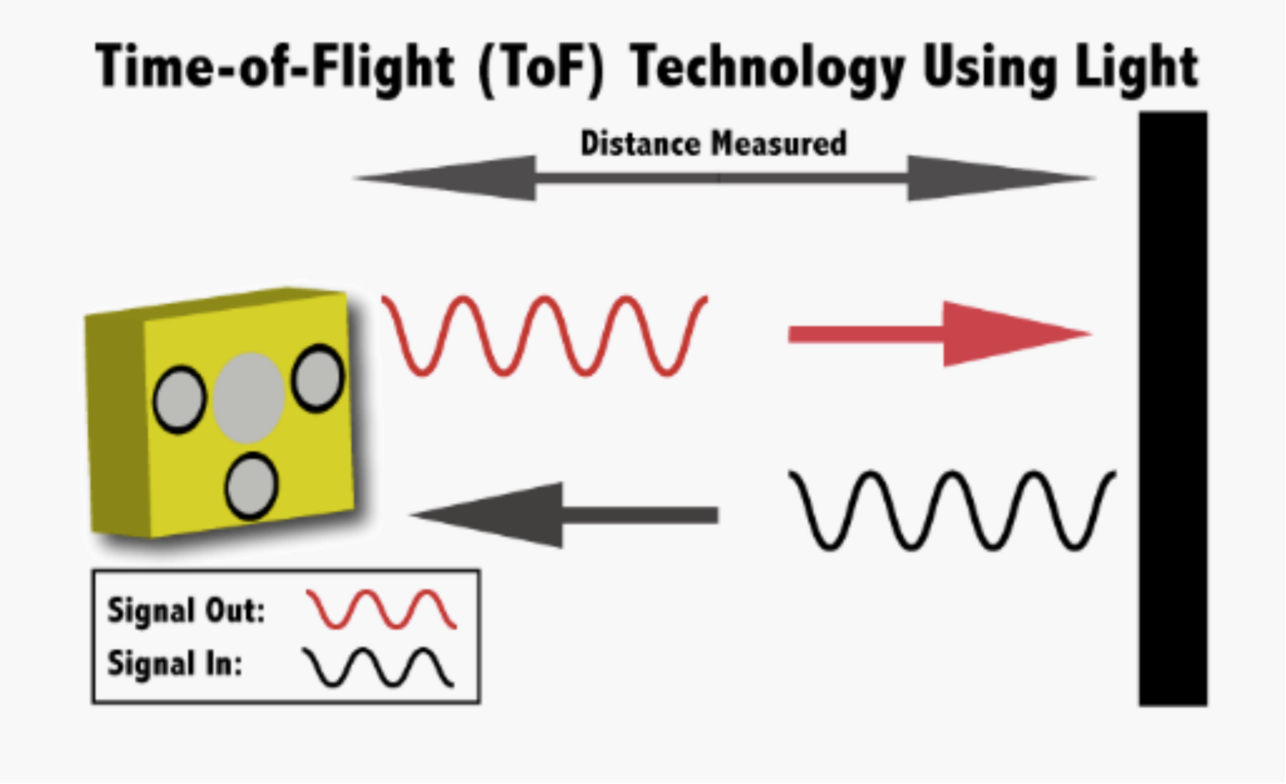
IDE used: Arduino 1.6.12

SENSORS

1.LIDAR(Light detection and ranging sensor) —VL53OX

working principle:Time-of-Flight

The Time-of-Flight principle (ToF) is a method for measuring the distance between a sensor and an object, based on the time difference between the emission of a signal and its return to the sensor, after being reflected by an object. Various types of signals (also called carriers) can be used with the Time-of-Flight principle, the most common being **sound and light**.

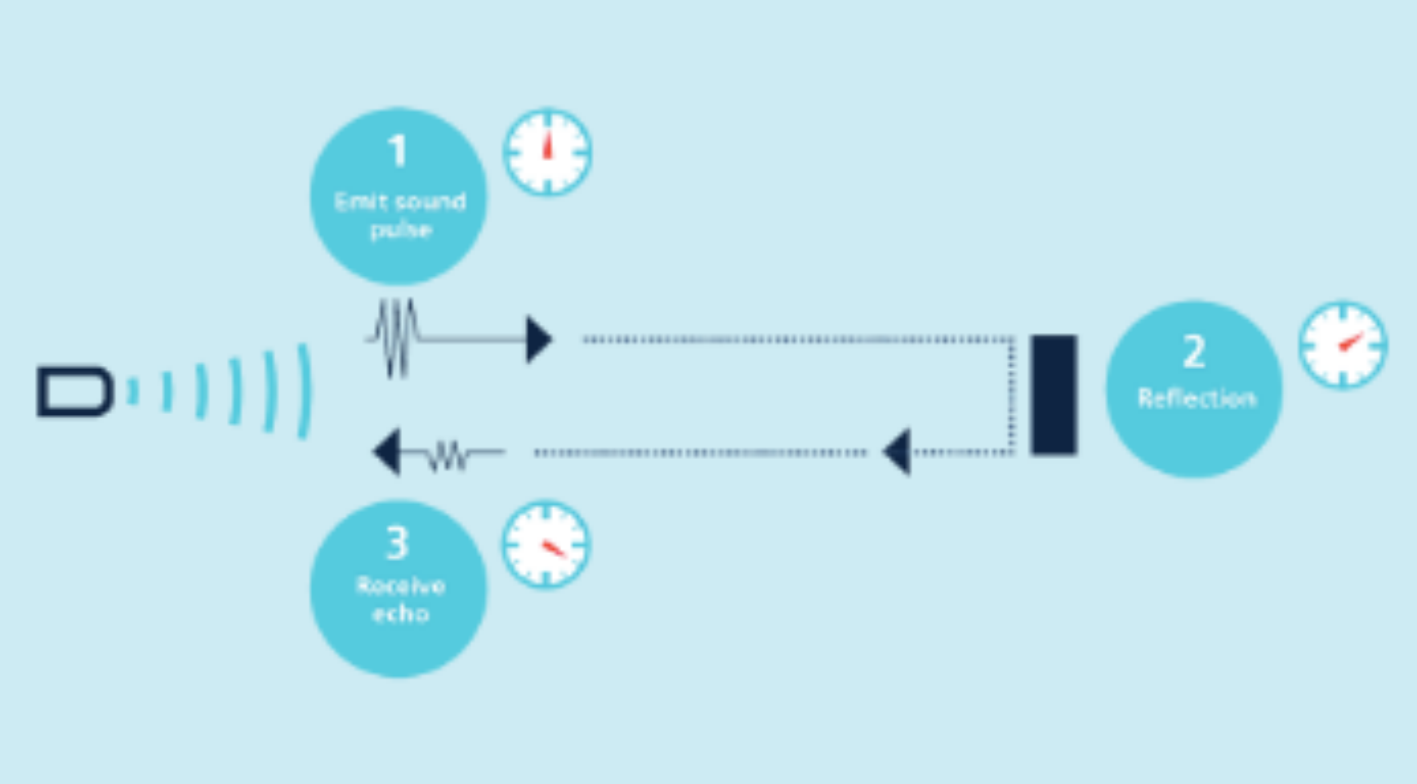


SENSORS

2.ULTRASONIC SENSOR — HC-SR04

working principle: Time-of-Flight

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.



DEVELOPMENT BOARD

Development Board: ARDUINO MEGA 2560

Features:

1. High Performance, Low Power Atmel® AVR® 8-Bit Microcontroller.

2. Advanced RISC Architecture
   – 135 Powerful Instructions
   – Most Single Clock Cycle Execution
   – 32 × 8 General Purpose Working Registers
3. High Endurance Non-volatile Memory Segments
   – 64K/128K/256KBytes of In-System Self-Programmable Flash
   – 4Kbytes EEPROM
   – 8Kbytes Internal SRAM
   – Write/Erase Cycles:10,000 Flash/100,000 EEPROM
4. JTAG (IEEE® std. 1149.1 compliant) Interface

DEVELOPMENT BOARD

5.Peripheral Features

— Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
– Four 16-bit Timer/Counter with Separate Prescaler, Compare- and Capture Mode
– Real Time Counter with Separate Oscillator – Four 8-bit PWM Channels
– Six/Twelve PWM Channels with Programmable Resolution from 2 to 16 Bits (ATmega1281/2561, ATmega640/1280/2560)
– Output Compare Modulator – 8/16-channel, 10-bit ADC (ATmega1281/2561, ATmega640/1280/2560)
– Two/Four Programmable Serial USART (ATmega1281/2561, ATmega640/1280/2560)
– Master/Slave SPI Serial Interface
– Byte Oriented 2-wire Serial Interface
– Programmable Watchdog Timer with Separate On-chip Oscillator
– On-chip Analog Comparator
– Interrupt and Wake-up on Pin Change

ULTRASONIC SENSOR-(HC-SR04)

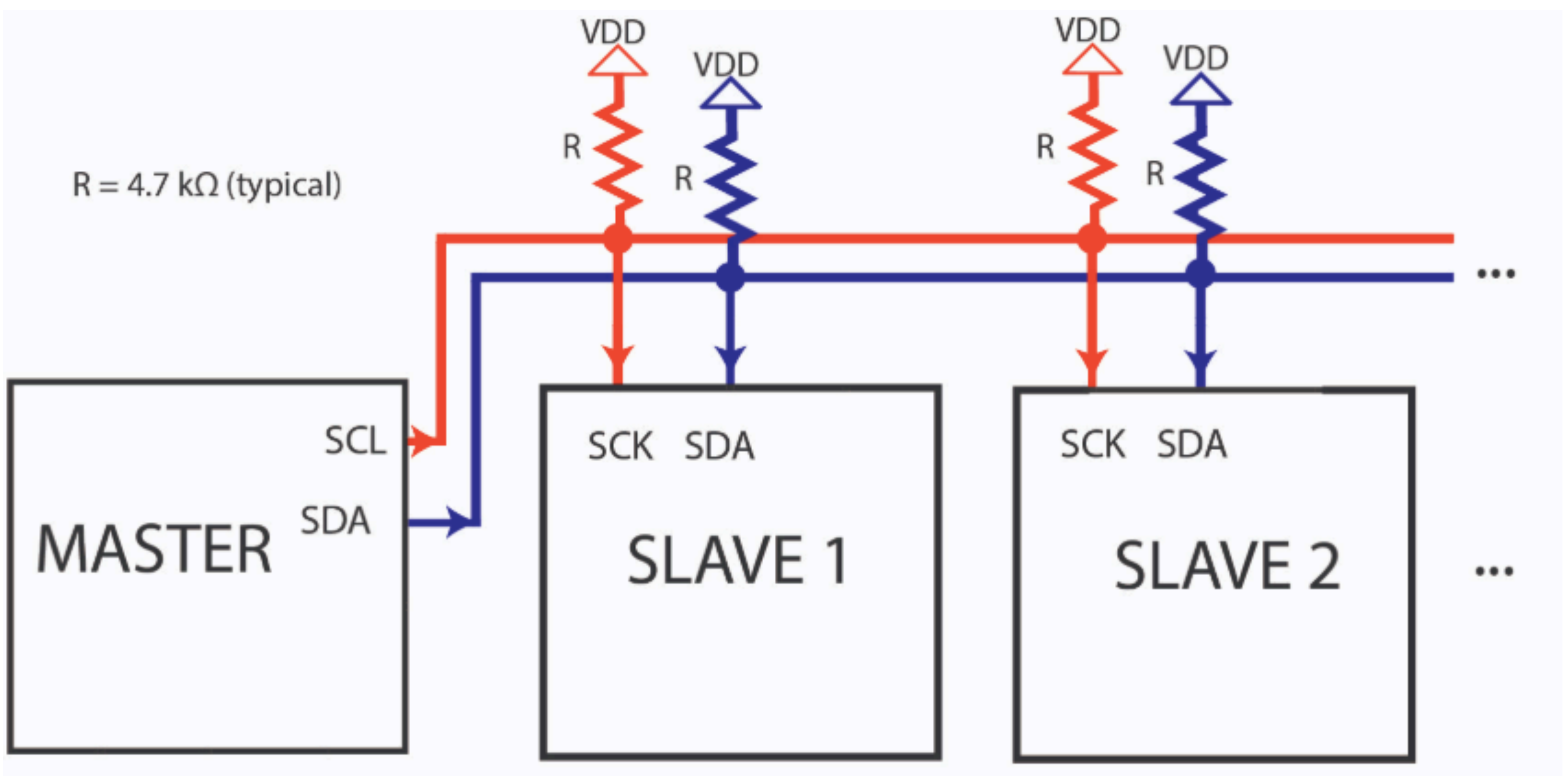
SENSOR SPECIFICATION:

An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. It consists of 4 pins namely (Vcc,Trig,Echo,GND).

Vcc- Connects to 5V of positive voltage for power
Trig- A pulse is sent here for the sensor to go into ranging mode for object detection
Echo- The echo sends a signal back if an object has been detected or not. If a signal is returned, an object has been detected. If not, no object has been detected.
GND- Completes electrical pathway of the power.

I2C PROTOCOL

1.A I2C bus is a bidirectional two-wired serial bus which is used to transport the data between integrated circuits.
2.The I2C stands for “Inter Integrated Circuit”. It was first introduced by the Philips semiconductors in 1982.
3.The I2C bus consists of three data transfer speeds such as standard, fast-mode and high-speed-mode.
4.The I2C bus supports 7-bit and 10-bit address space device and its operation differ with low voltages.



LIDAR SENSOR

LIDAR(Light detection and ranging sensor) —VL53OX

1.The VL53L0X from ST Microelectronics is a time-of-flight ranging system integrated into a compact module.

2.The sensor can report distances of up to 2 m (6.6 ft) with 1 mm resolution, but its effective range and accuracy (noise) depend heavily on ambient conditions and target characteristics like reflectance and size, as well as the sensor configuration.

SPECIFICATIONS:

-Operating voltage: 2.6 V to 5.5 V

-Output format (I2C): 16-bit distance reading (in millimeters)

-Distance measuring range: up to 2 m (6.6 ft); see the graph at the right for typical ranging performance.

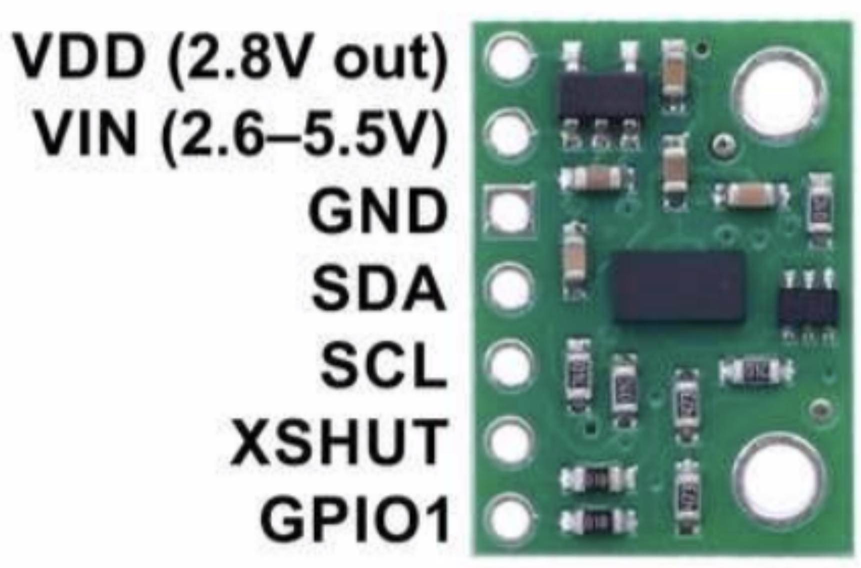
-Effective range depends on configuration, target, and environment.

LIDAR SENSOR

LIDAR(Light detection and ranging sensor) —VL53OX

CONNECTIONS:

1. At least four connections are necessary to use the VL53L0X board: VIN, GND, SCL, and SDA. The VIN pin should be connected to a 2.6 V to 5.5 V source, and GND should be connected to 0 volts. An on-board linear voltage regulator converts VIN to a 2.8 V supply for the VL53L0X IC.
2. The I2C pins, SCL and SDA, are connected to built-in level-shifters that make them safe to use at voltages over 2.8 V; they should be connected to an I2C bus operating at the same logic level as VIN.



SCHEMATIC DIAGRAM OF CONNECTIONS ON LIDAR SENSOR

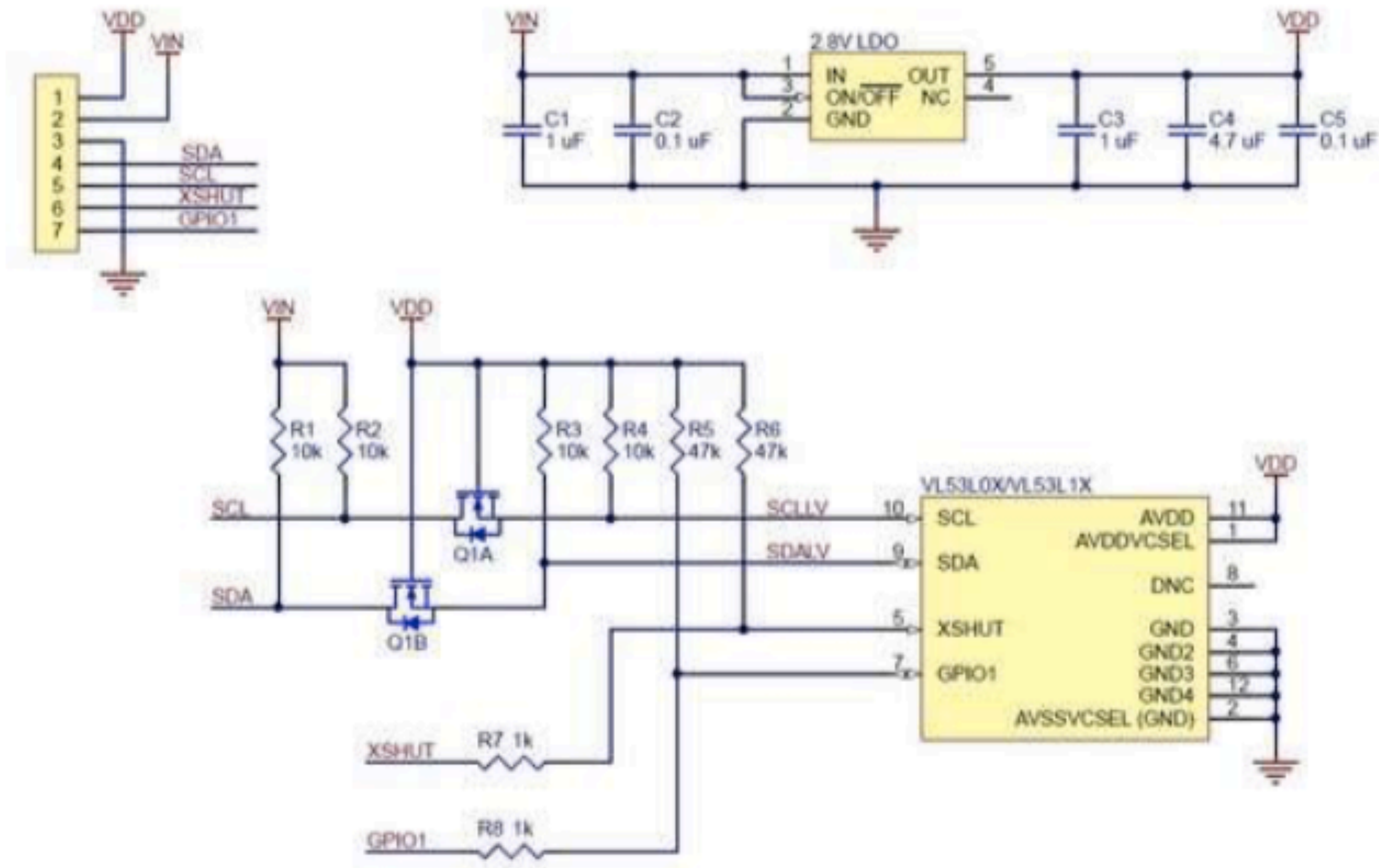


Fig 3.9 Schematic diagram of VL53L0X

VIBRATING MOTORS

There are two basic types of vibration motor.

1.An eccentric rotating mass vibration motor (ERM) uses a small unbalanced mass on a DC motor when it rotates it creates a force that translates to vibrations.

2. A linear resonant actuator (LRA) contains a small internal mass attached to a spring, which creates a force when driven.

WORKING OF PROJECT

WORKING:

1. VL53L0x sensor sends a light wave and waits for the reflected wave. So if it finds any reflected wave then by using time of flight technique it calculates the time taken by the wave to reflect back to the sensor.

2. By noting down the time taken for the reflected wave it calculates the distance between the object and the person.

3. And then sends to the microcontroller using inter integrated communication (I2C) protocol.

4. We have pin called XSHUT which acts as a reset pin.

5. So if we are using I2C communication so we should provide variable address to communicate with variable devices.

WORKING:

6. Address of each devices can be varied using the API's given by the manufacturer.

7. And the XSHUT pin must be made high whenever we want to turn that device off so that the communication can be done with other device connected to that particular SDA and SCL line.

8. After the distance is observed then if the distance is less than 2m then the vibrating motor starts vibrating.

9. As we could not vary the vibrations through the motor so we will turn on the motor and give varying delay and turn off.

10. The amount of delay depends upon the distance between the object and the person using it.

WORKING OF ULTRASONIC SENSOR

WORKING:

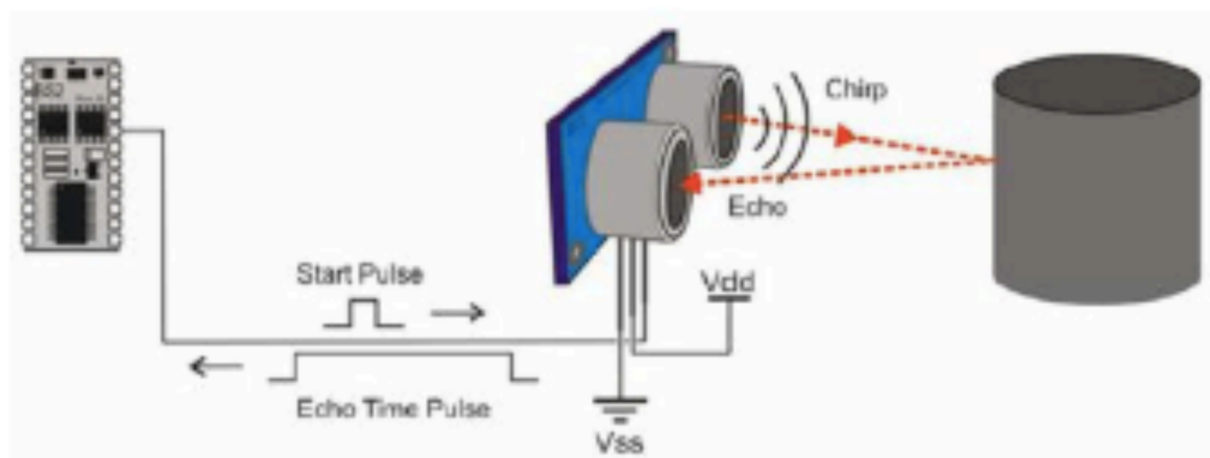
1. connect TRIG pin to pin 13 of arduino and ECHO pin to pin 12 of arduino.
2. By noting down the time taken for the reflected wave it calculates the distance between the object and the person.
3. To start a measurement, the **Trig (Trigger)** pin must receive a pulse of **HIGH** (5V) for at least 10us (10 microsecond).
4. when the sensor detected and ultrasonic wave, it will set the **Echo** pin to **HIGH** (5V) and delay for a period (width) which proportion to distance.
5. To obtain the distance, we need to measure the **width of the Echo** pulse.

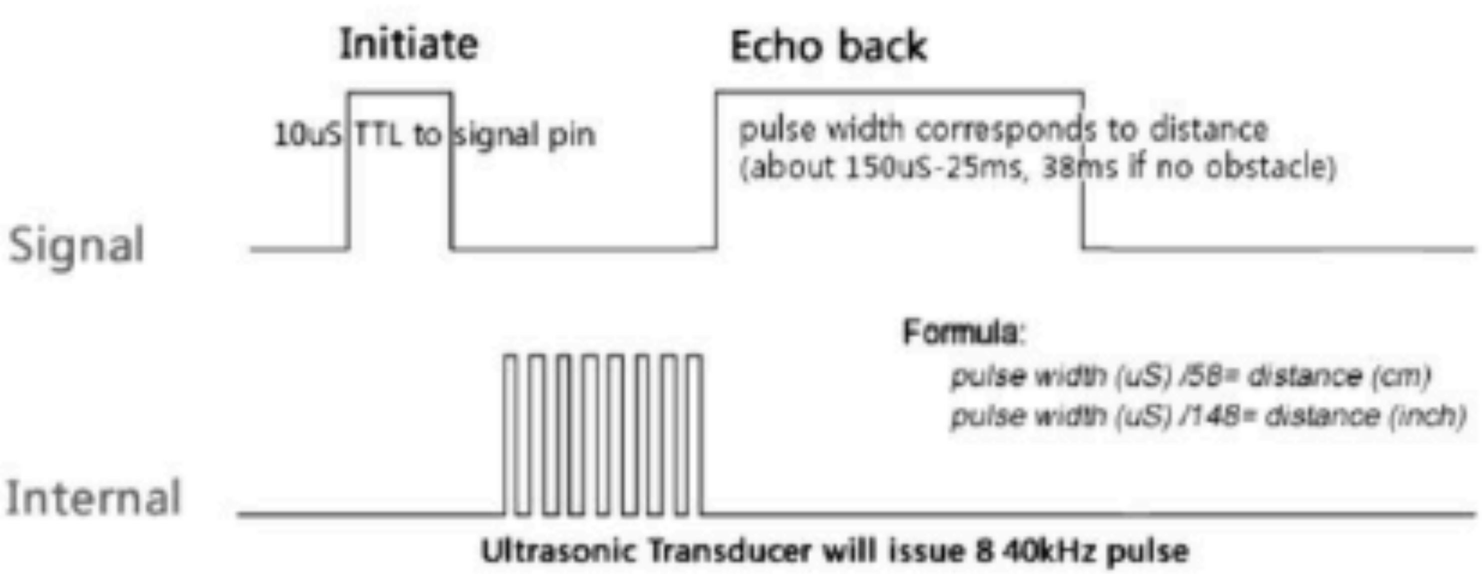
distance(cm)=Pulse width(us)/58

WORKING SCHEMATIC

HC-SR04

- Control





THANK YOU