

Ultrasonic Distance Measurement Sensor 4M [RKI-1540]



Users Manual

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Features

- Working Voltage : 5V(DC)
- Working Current : 15mA
- Working frequency : 40HZ
- Output: 0-5V (Output high when obstacle detected in range)
- Beam Angle : Max 15 degree
- Distance : 2cm - 400cm
- Accuracy : 0.3cm
- Input trigger signal : 10us impulse TTL
- Echo signal : PWM signal (time required for sound signal to travel twice between source and obstacle)
- Size : 45mm*20mm*15 mm

Introduction:

This sensor is a high performance ultrasonic range finder. It is compact and measures an amazingly wide range from 2cm to 4m. This ranger is a perfect for any robotic application, or any other projects requiring accurate ranging information. This sensor can be connected directly to the digital I/O lines of your microcontroller and distance can be measured in time required for travelling of sound signal using simple formula as below.

$\text{Distance} = (\text{Echo pulse width high time} * \text{Sound Velocity (340M/S)})/2$

or

$\text{Distance in cm} = (\text{Echo pulse width high time (in uS)} * 0.017)$

The module works on 5VDC input and also gives an output signal directly for detection of any obstacle up to 4M.



Working:

Power up the sensor by 5VDC using pins "VCC" and "GND".

First of all a 10us trigger input has to be given to the pin named "Trig" on the sensor. This starts one cycle of range conversion and sends 8 bursts of sound waves from the transmitter.

As soon as the signals are transmitted the "Echo" pin goes to high level and remains in high level until the same sound waves are received by the receiver. If the received sound waves are same as what the same sensor transmitted then the Echo pin goes to low level.

If no object is detected within 5M after 30ms the Echo signal will automatically go to low level.

***Caution: Burst should not be re-transmitted before one cycle of range conversion is over and echo pin has been pulled to low by the sensor.**

Sample Program for ATmega16

Connections:

VCC - +5VDC

Trig - PA.6 on ATmega16

Echo - PA.7 on ATmega16

GND - GND

ATmega16 running at 16Mhz

```
char timer0counter;
```

```
void main()
```

```
{
```

```
    char buffer[10];
```

```
    float range;
```

```
    sei();                //Enable global interrupt
```

```
    sbi(DDRA,6);          //Set pin as output
```

```
    cbi(DDRA,7);          //Set pin as input
```

```
    while(1)
```

```
    {
```

```
        sbi(PORTA,6);      //Send Trigger
```

```
        DELAYUS(10);
```

```
        cbi(PORTA,6);      //Send trigger
```

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```
timer0counter=0;
TCNT0=0;           //Clear timer
while(bit_is_clear(PINA,7)); //Wait for rising edge
sbi(TCCR0,CS02);    //Select prescalar 256
sbi(TIMSK,TOIE0);   //Enable timer0 overflow interrupt
LCD_CLRSCR();
while(bit_is_set(PINA,7) && timer0counter<9) //wait for falling edge of echo
{
    DELAYUS(5);
}
cbi(TCCR0,CS02); //Stop timer
cbi(TIMSK,TOIE0);
if(bit_is_set(PINA,7))
{
    LCD_PRINT("No OBSTACLE");
}
else
{
    range=(256*timer0counter+TCNT0)*16*0.017; //range conversion
    itoa(range,buffer,10);
    LCD_PRINT(buffer);
    UART_PRINT(buffer);
    UART_PRINT("\n\r");
}
DELAYMS(100);
}

}

SIGNAL(SIG_OVERFLOW0)
{
    cbi(TIMSK,TOIE0);
    TCNT0=0;
    timer0counter++;
    UART_PUTCHAR(timer0counter);
    sbi(TIMSK,TOIE0);
    if(timer0counter>8)
    {
        cbi(TCCR0,CS02);
        cbi(TIMSK,TOIE0);
    }
}
```



Service and Support

Service and support for this product are available from Robokits India. The Robokits Web site (<http://www.robokits.co.in>) maintains current contact information for all Robokits products.

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