

Motorola Flash Innovation 2003 Contest
 Project Number: **F2017**

**PROXIMITY SENSOR SYSTEM FOR THE VISUALLY HANDICAPPED
 USING THE MOTOROLA 68HC908QT**

Abstract: A proximity sensor system using ultrasonic technology with the Motorola 68HC908QT as the core processor was developed. The objective of this proximity sensor system is to help the visually handicapped to detect obstacles around them. It is small in size; 9V battery-operated and can detect obstacles more than 2 metres away from the sensor system.

For the purpose of testing the prototype, the Motorola M68DEMOQTY demonstration board was used. Figure 1 shows the block diagram of the implementation.

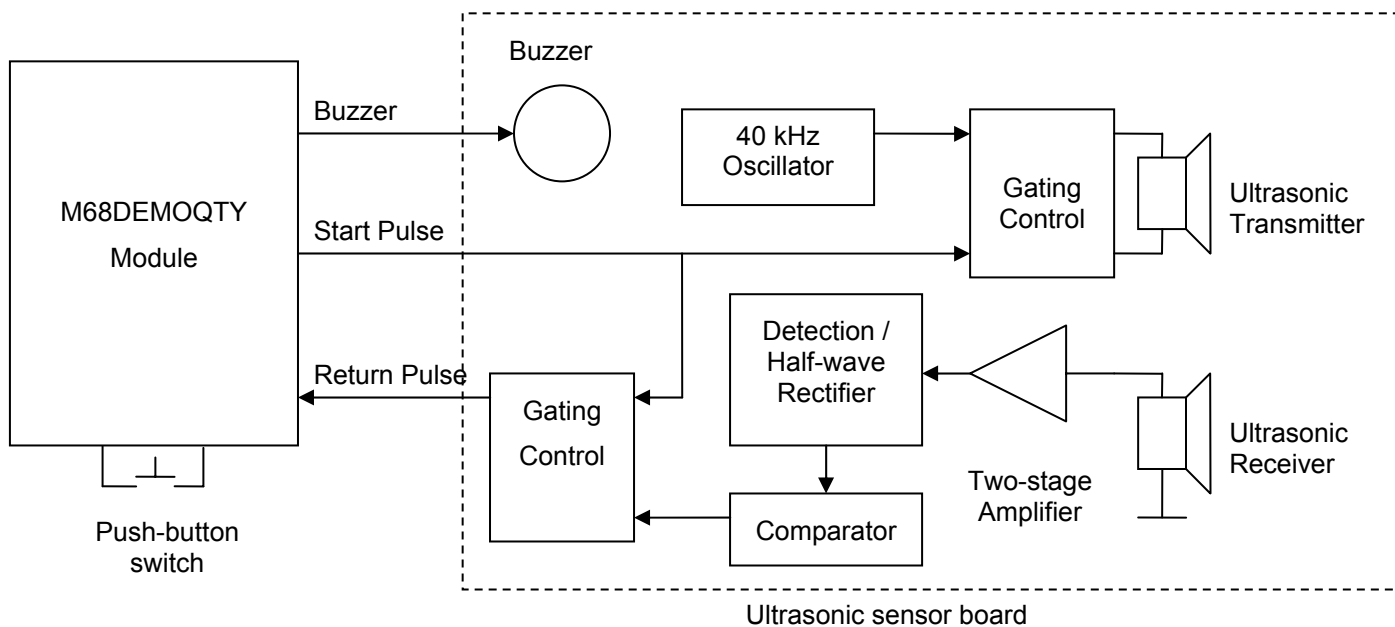


Figure 1: Ultrasonic Proximity Sensor Project using 68HC908QT

Figure 2 shows the implementation of the prototype using a breadboard.

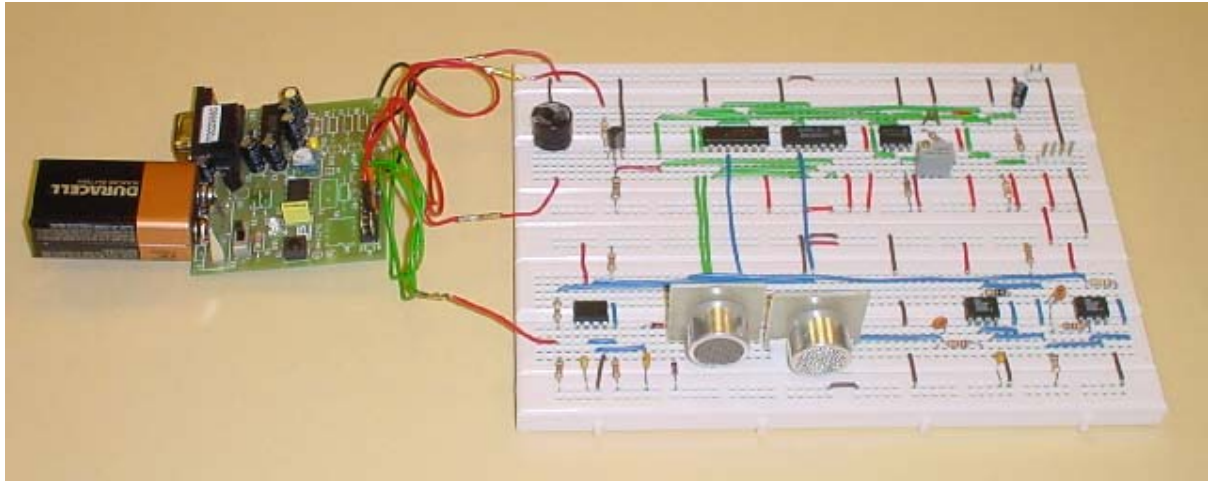


Figure 2: Breadboard Prototype

To detect obstacles, the user presses the push-button switch on the M68DEMOQTY module¹. This causes the 68HC908QT to generate a short positive-going pulse ("Start Pulse") with a pulse width of approximately 1.2 milliseconds. The pulse acts as a gate for the output of the 40 kHz oscillator to drive the ultrasonic transmitter.

The reflection of ultrasonic waves from an obstacle is picked up by the ultrasonic receiver and converted into an electrical (reflected) signal. After going through the two-stage amplifier, rectifier and comparator, the reflected signal is detected as a positive-going pulse ("Return Pulse") by the 68HC908QT. The 68HC908QT then estimates the time difference between the "Start Pulse" and "Return Pulse".

To aid the user (who is visually handicapped) to estimate the distance between him and the obstacle, the 68HC908QT generates a series of five beeps using the buzzer. The closer is the distance between the user and obstacle, the shorter is the interval between the beeps.

While the project was originally meant to be a proximity sensor, giving rough estimates of the distance between the user and an obstacle, it can be easily adapted as an ultrasonic range meter, in which case, some form of calibration may have to be done for giving accurate measurements, and also some means to display the measured distance e.g. LEDs or LCD.

¹ In final version of the implementation, a larger switch that is more conveniently placed will be used.

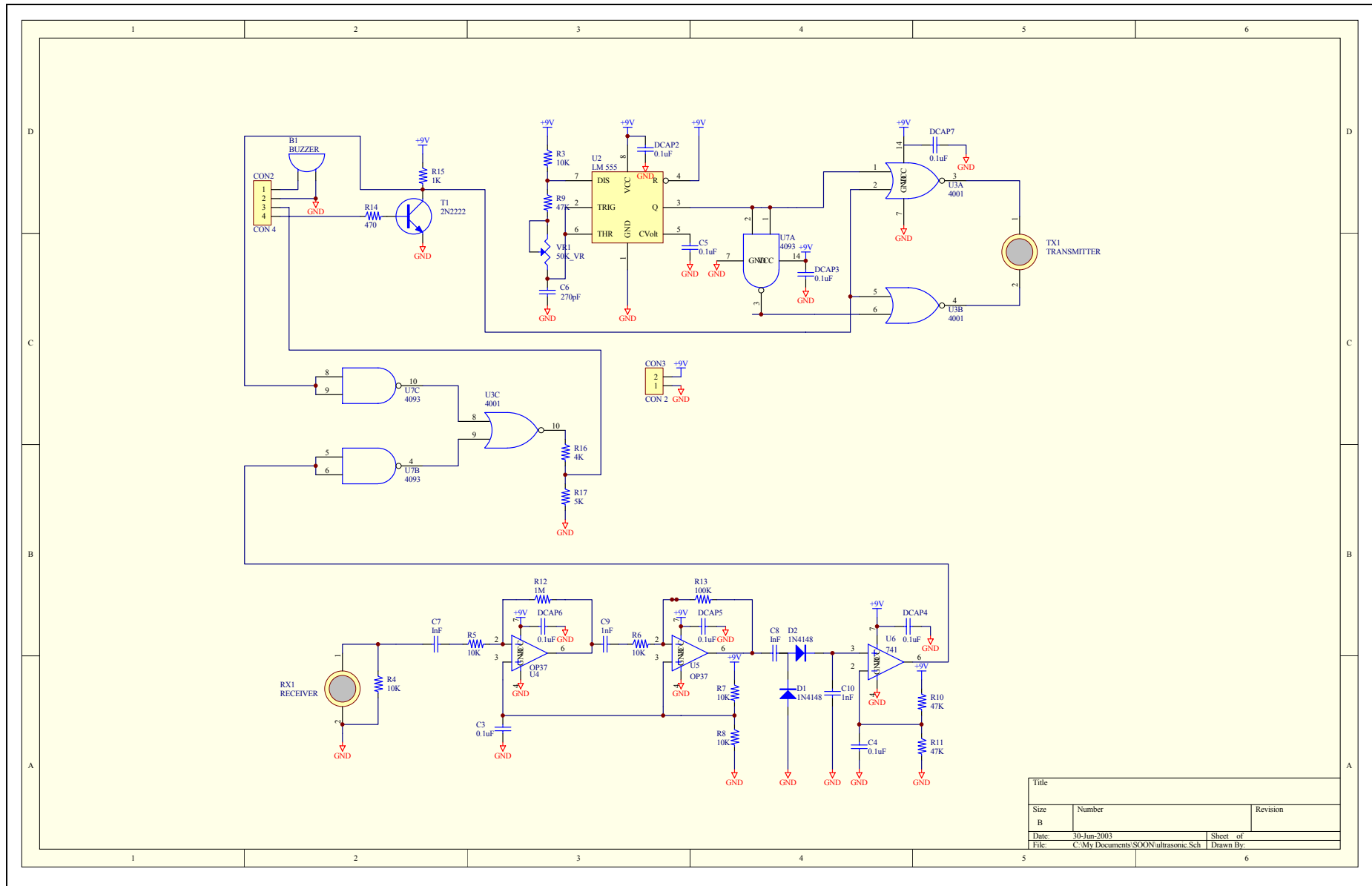


Figure 3: Schematic diagram of sensor module