



# University of Dar es Salaam

## Project 3

# **Distance Measurement System**



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## Project Description

- This project aims at designing and implementing the electronic system for measuring distances by using **ultrasonic sensor HC-SR04**.
- Ultrasonic sensor HC-SR04 emits ultrasound at 40kHz which travels through the air and if there is an obstacle on its path it will bounce back to the module.
- Taking the travel time and the speed of sound in air you can calculate the distance.



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## Ultrasonic Sensor HC-SR04 specifications and Configuration

			
<b>0.3 CM</b>	<b>&lt;15'</b>	<b>&lt;2MA</b>	<b>2-450CM</b>
RESOLUTION	ANGLE	CURRENT	DETECTION RANGE

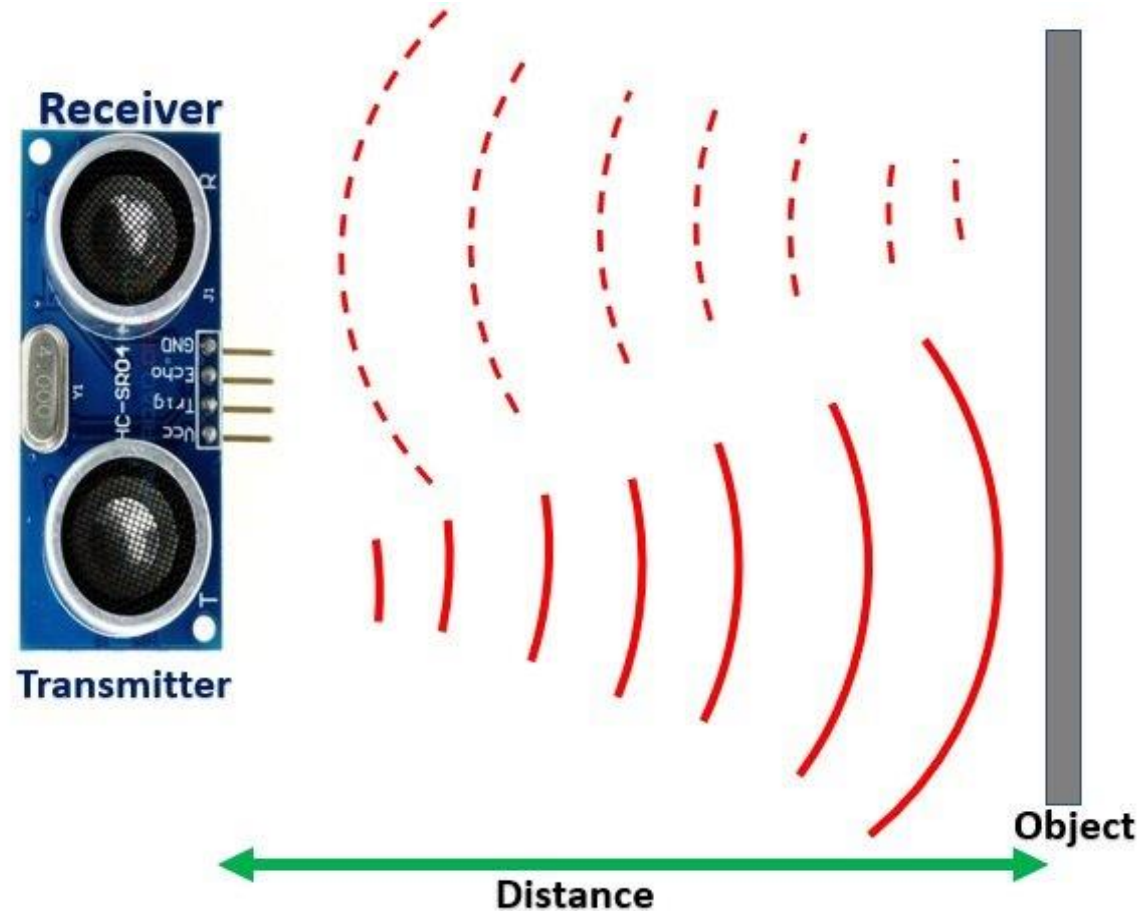


1. VCC
2. TRIG
3. ECHO
4. GND



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## Working Principle of Ultrasonic Sensor.





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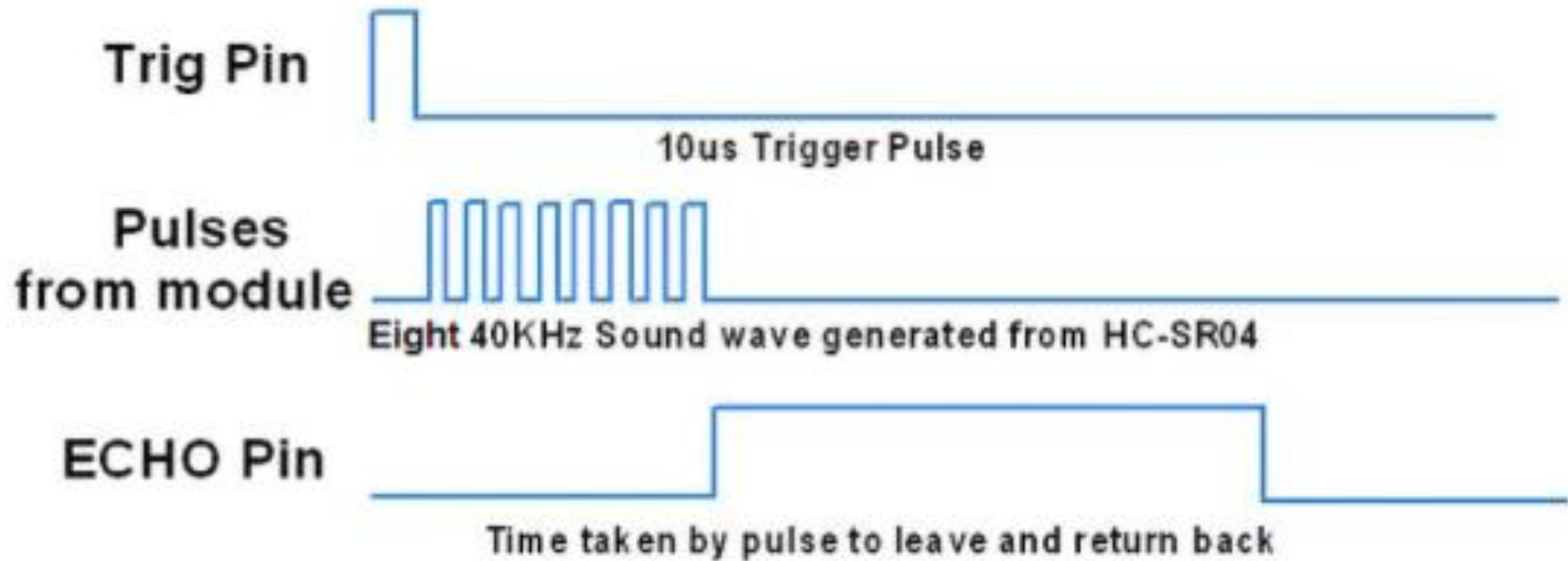
## Working principle cont...

- To generate the ultrasound ,the Trigger Pin is set on a High State for 10  $\mu$ s.
- That will send out an 8 cycle sonic burst which will travel at the speed sound and it will be received in the Echo Pin.
- The Echo Pin will output the time in microseconds the sound wave traveled.



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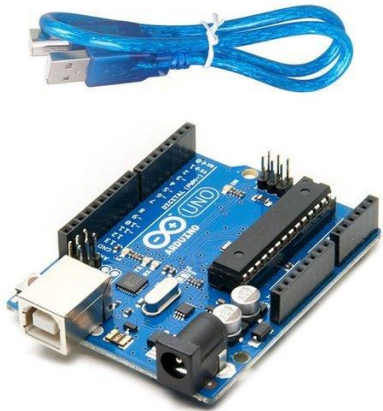
## Ultrasonic module Timing Diagram





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## Components



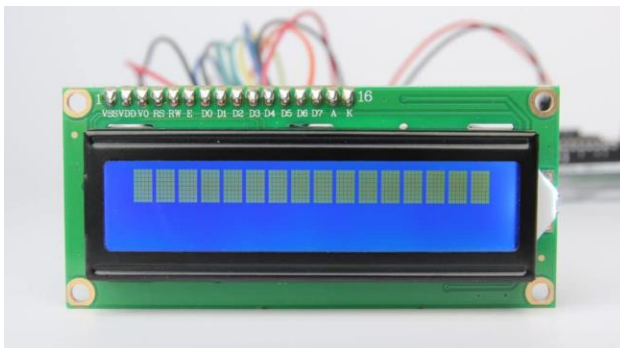
**Arduino UNO**



**Ultrasonic Sensor HC-SR04**



**Breadboard**



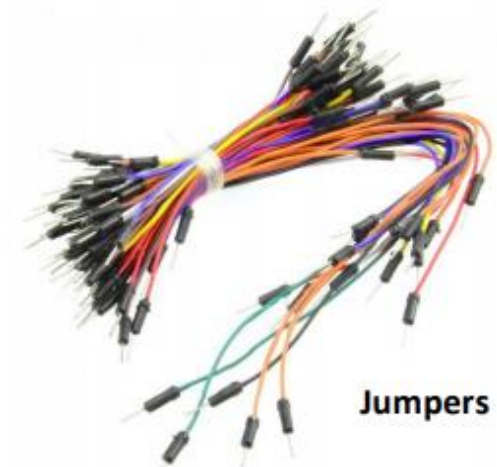
**16x2 LCD**



**Variable resistor(10kΩ)**



**fixed resistor(220Ω)**



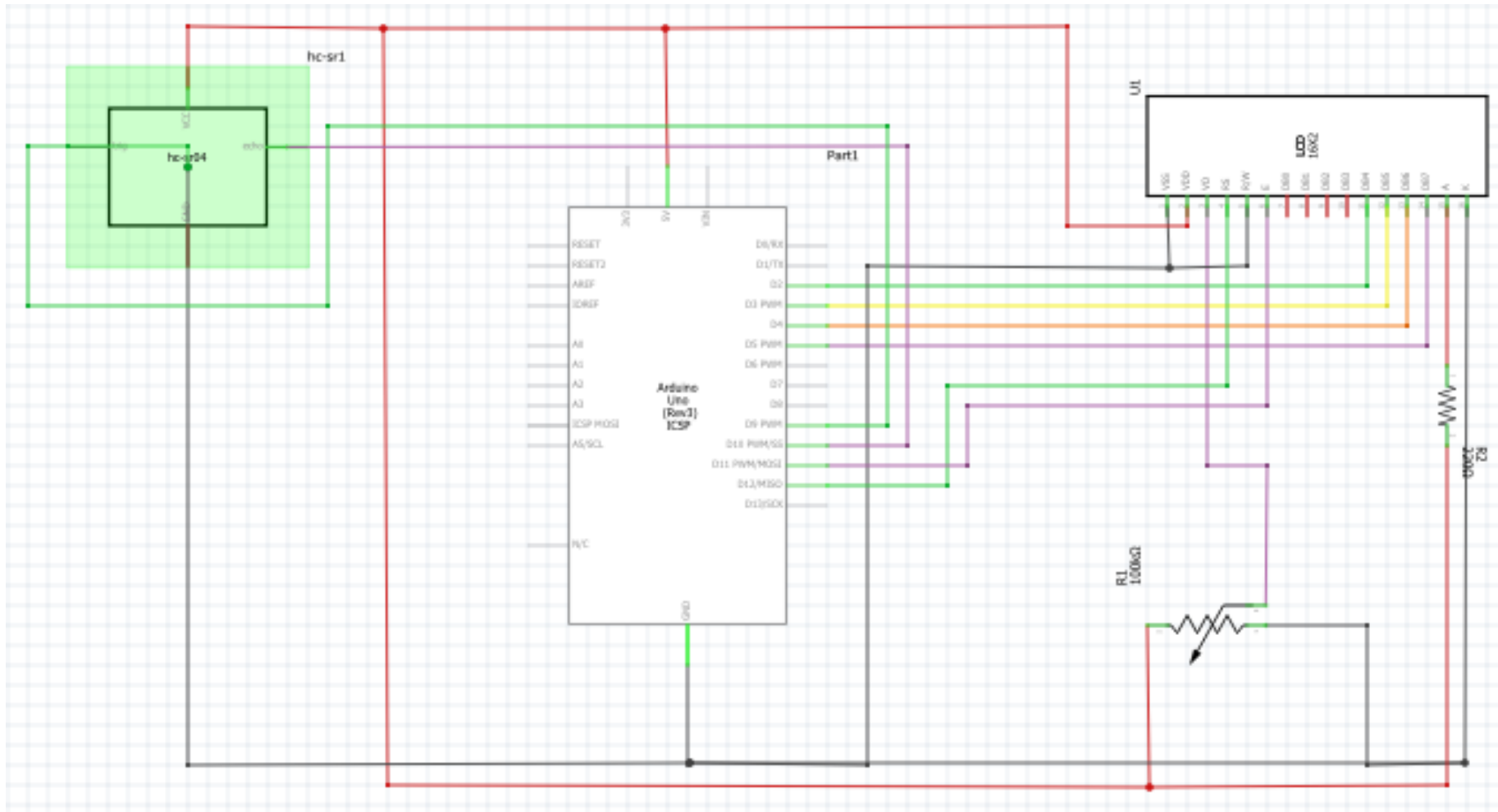
**Jumpers**





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## Schematic Circuit Diagram

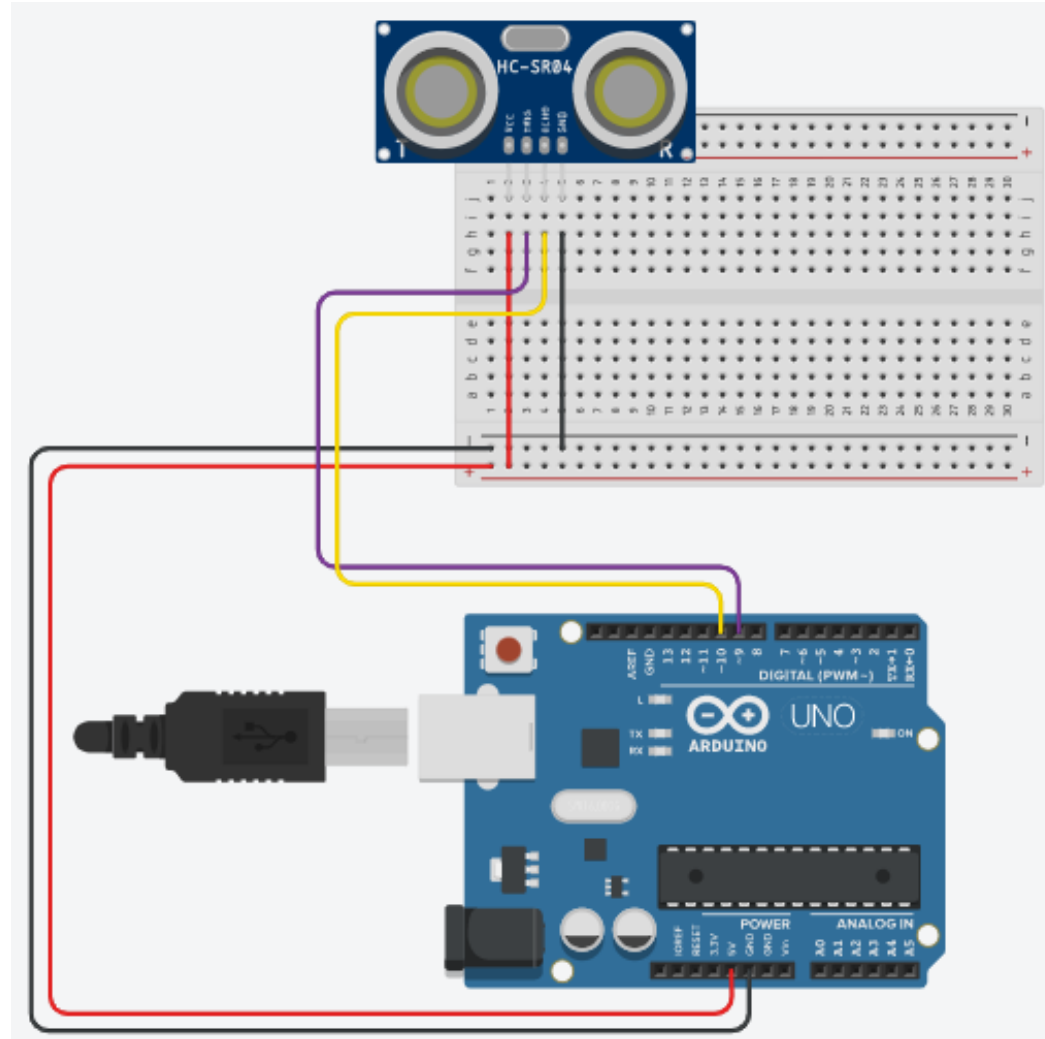






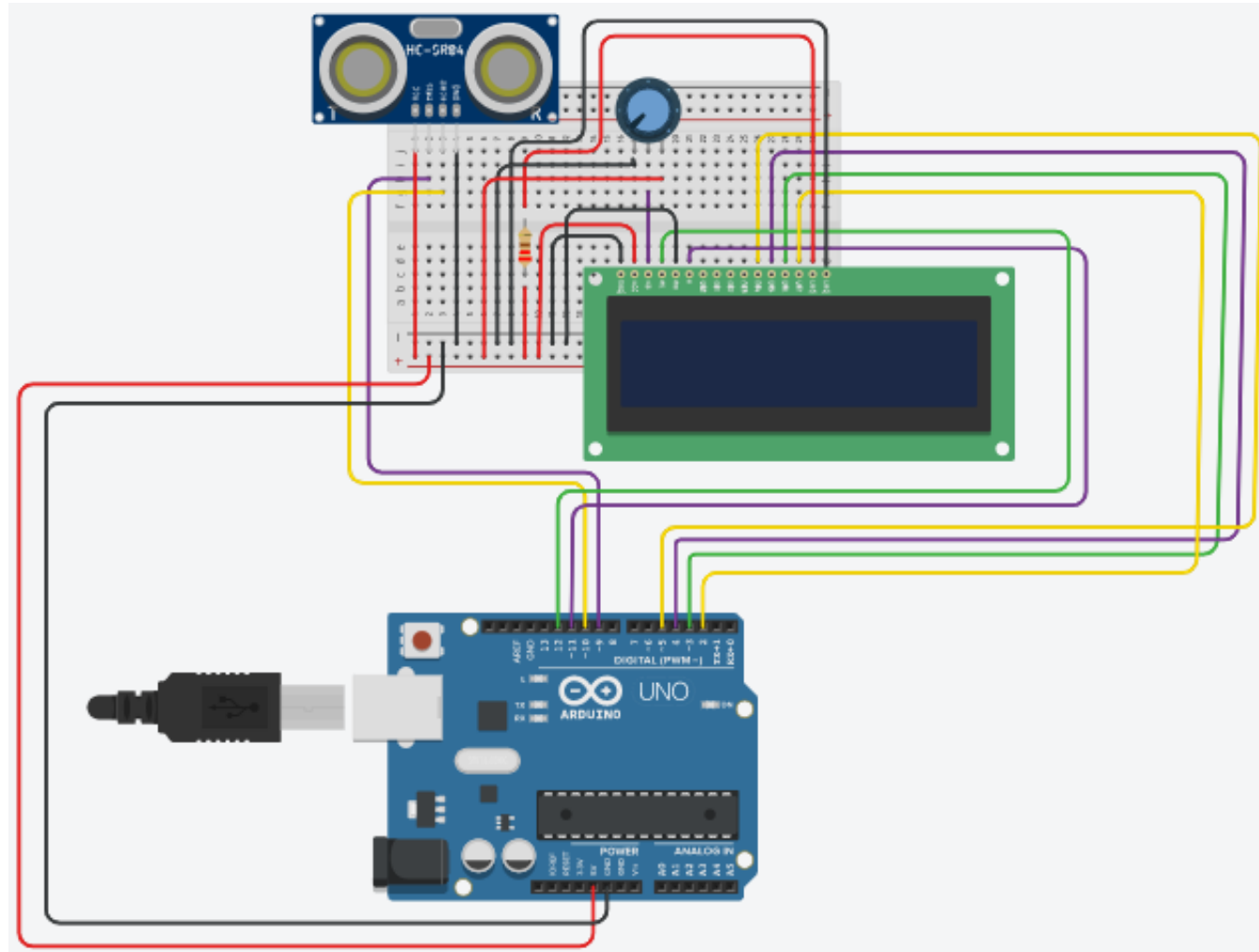
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## Bread board circuit without LCD screen





# Breadboard circuit with LCD screen.





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