**How to use Wokwi Arduino Simulator in 2022? What is Wokwi?**

All the exciting features of the Wokwi Arduino Simulator in one page 😀 Sounds cool? #WokwiEmbeddedSystemsSimulator.

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COMPONENTS AND SUPPLIES

Arduino UNO × 1

Arduino Nano R3 × 1

Arduino Mega 2560 × 1

LED (generic) × 1

Real Time Clock (RTC)

× 1

Adafruit NeoPixel Ring: WS2812 5050 RGB LED

× 1

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Wokwi Arduino Simulator

ABOUT THIS PROJECT

Introduction to Wokwi Arduino simulator

Wokwi Arduino simulator supports Arduino UNO, Mega, Nano, and several other boards. It simulated various parts (Wokwi elements) such as LEDs, Shift registers, Buzzer, sensors (ultrasonic, temperature, humidity, etc. ), SSD display, keypads, and much more. You can learn Arduino programming wherever you are. No hardware is necessary. Besides all this, the Arduino simulator is completely free to use!

Wokwi Arduino now supports **ESP32 simulation** on Micropython as well.

This article will briefly learn about the "**How-To**s" for the Wokwi Arduino Simulator. By the end of the article, you will have known a lot of features of the Wokwi Arduino simulator and excellent knowledge about the buttons and options present in the Wokwi Arduino simulator. You will be ready to take on your next Arduino Simulator project confidently. Let us get started!

1 How to add a part to the Wokwi Arduino Simulator?

You have to click on the purple "+" button to add the part. You will find the button at the top of the diagram editor.

How to add a new part in the Wokwi Arduino simulator?

Advanced users can add the element in the diagram.json file.

Ading parts to the Wokwi Arduino simulator - advanced way

Refer to the homepage for additional helpful information.

2 How to move the parts on the Wokwi Arduino simulator?

Click and drag the parts to the desired position to move the parts around. You can click and hold the part, move it to the desired location and release the mouse click.

You cannot move the parts when the simulation is running.

How to move the parts around in the simulator window? - Wokwi Arduino simulator

Advanced users can move the element in the diagram.json file. Sometimes, when building complex projects, this will help a lot.

How to move the parts in teh Wokwi Simulator - advanced way

Refer to the homepage for additional helpful information.

3. How to rotate a part on the Wokwi Arduino simulator?

Click on the part and then press 'R' on your keyboard to rotate the part. You cannot rotate the parts when the simulator is running.

Rotating parts on Wokwi - Select the components and press 'R'

You can also rotate the element in the diagram.json file. This is also helpful when you want to set the angle of rotation to a certain angle other than (0, 90, 180, 270)

**Distance Measurement using Arduino Ultrasonic Sensor: Code & Circuit Diagram**

In this project we have used an Arduino and Ultrasonic Sensor to determine the distance of an obstacle from the sensor. Basic principal of ultrasonic distance measurement is based on ECHO.

Distance Measurement using Arduino & Ultrasonic Sensor

Ultrasonic sensors are great tools to measure distance and detect objects without any actual contact with the physical world. It is used in several applications, like in measuring liquid level, checking proximity and even more popularly in automobiles to assist in self-parking or anti-collision systems. Previously we have also build many Ultrasonic Sensor projects like water level detecting, Ultrasonic Radar etc . This is an efficient way to measure small distances precisely. In this project, we have used the **HC-SR04** **Ultrasonic Sensor with Arduino** to determine the distance of an obstacle from the sensor. The basic principle of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in the environment then waves return back to the origin as ECHO after striking on the obstacle. So we only need to calculate the traveling time of both sounds means outgoing time and returning time to origin after striking on the obstacle. As the speed of the sound is known to us, after some calculation we can calculate the distance. We are going to use this same technique for this **Arduino distance measurement**project, so let's get started.

**Components Used**

Arduino Uno or Pro Mini

Ultrasonic sensor Module

16x2 LCD Scale Bread board 9 volt battery Connecting wires

**Ultrasonic Sensor Module**

There are many types of **Arduino distance sensors**, but in this project we have used the **HC-SR04** to measure distance in range of 2cm-400cm with an accuracy of 3mm. The sensor module consists of an ultrasonic transmitter, receiver and control circuit. The working principle of ultrasonic sensor is as follows:

High level signal is sent for 10us using Trigger.

The module sends eight 40 KHz signals automatically, and then detects whether pulse is received or not.

If the signal is received, then it is through high level. The time of high duration is the time gap between sending and receiving the signal.

**Distance= (Time x Speed of Sound in Air (340 m/s))/2**

**Timing Diagram**

The module works on the natural phenomenon of ECHO of sound. A pulse is sent for about 10us to trigger the module. After which the module automatically sends 8 cycles of 40 KHz ultrasound signal and checks its echo. The signal after striking with an obstacle returns back and is captured by the receiver. Thus the distance of the obstacle from the sensor is simply calculated by the formula given as

Distance= (time x speed)/2.

Here we have divided the product of speed and time by 2 because the time is the total time it took to reach the obstacle and return back. Thus the time to reach obstacle is just half the total time taken.

**Ultrasonic Sensor Arduino Circuit Diagram and Explanation**

The circuit diagram for **arduino and ultrasonic sensor** is shown above to measure the distance. In circuit connections Ultrasonic sensor module’s “trigger” and “echo” pins are directly connected to pin 18(A4) and 19(A5) of arduino. A 16x2 LCD is connected with arduino in 4-bit mode. Control pin RS, RW and En are directly connected to arduino pin 2, GND and 3. And data pin D4-D7 is connected to 4, 5, 6 and 7 of arduino.

First of all we need to trigger the ultrasonic sensor module to transmit signal by using arduino and then wait for receive ECHO. Arduino reads the time between triggering and Received ECHO. We know that speed of sound is around 340m/s. so we can calculate distance by using given formula:

Distance= (travel time/2) \* speed of sound

Where speed of sound around 340m per second.

A 16x2 LCD is used for displaying distance.

Find more about the working of distance measurement project in this tutorial: Distance measurement using ultrasonic sensor and AVR Microcontroller.

**Arduino Ultrasonic Sensor Code for Distance Measurement**

The complete code for this ultrasonic distance measurement project is given at the bottom of this page.  In the code we read time by using pulseIn(pin). And then perform calculations and displayed result on 16x2 LCD by using appropriate functions.

#include

Code

#define trigger 18 #define echo 19

LiquidCrystal lcd(2,3,4,5,6,7);

float time=0,distance=0;

void setup() { lcd.begin(16,2);

pinMode(trigger,OUTPUT);

pinMode(echo,INPUT);

lcd.print(" Ultra sonic");

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