

**You**

can you help me use a hc sr04 with a xiao rp2040 using the same tft display to showcase a white bar with the distance

**ChatGPT**

Certainly! To use an HC-SR04 ultrasonic sensor with the Seeed Studio XIAO RP2040 and display the measured distance as a white bar on an ILI9341 TFT display, you'll need to set up the hardware and code accordingly. Here's a step-by-step guide on how to do this:

## 1. Components Needed

- Seeed Studio XIAO RP2040 microcontroller board.
- HC-SR04 Ultrasonic Sensor.
- ILI9341 TFT Display.
- Breadboard and jumper wires.

## 2. Circuit Setup

- HC-SR04 Ultrasonic Sensor:
  - VCC to 5V (Note: HC-SR04 typically operates at 5V; check if your model has a 3.3V variant or use a voltage divider for the Echo pin).
  - GND to ground.
  - TRIG (Trigger pin) to a digital pin on the XIAO RP2040, for example, pin 6.
  - ECHO (Echo pin) to another digital pin on the XIAO RP2040, for example, pin 7. Ensure to use a voltage divider or level shifter here if operating at 5V to bring the voltage down to 3.3V suitable for the XIAO RP2040 input.
- ILI9341 TFT Display:
  - Follow the connection guidelines as described in the previous messages (CS, DC, MOSI, SCLK, and optionally RST to the corresponding pins).

## 3. Arduino Code

Here's a basic sketch to measure distance using the HC-SR04 and display it as a white bar on the TFT display. This example assumes you have the `Adafruit_GFX` and `Adafruit_ILI9341` libraries installed.

```
#include <Adafruit_GFX.h>
#include <Adafruit_ILI9341.h>
```

```

#define TFT_CS 10
#define TFT_RST 9
#define TFT_DC 8

Adafruit_ILI9341 tft = Adafruit_ILI9341(TFT_CS, TFT_DC, TFT_RST);

#define TRIG_PIN 6
#define ECHO_PIN 7

void setup() {
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  tft.begin();
  tft.setRotation(1);
  tft.fillScreen(ILI9341_BLACK);
}

void loop() {
  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);

  unsigned long duration = pulseIn(ECHO_PIN, HIGH);
  float distance = duration * 0.034 / 2;

  // Display logic
  tft.fillScreen(ILI9341_BLACK);
  int barLength = map(distance, 0, 200, 0, tft.height()); // Map the distance to
  bar length
  tft.fillRect(50, tft.height() - barLength, 50, barLength, ILI9341_WHITE);

  delay(100); // Update rate
}

```

## 4. Explanation

- HC-SR04 Operation: The sensor is triggered by a high pulse for 10 microseconds on the TRIG pin. It then sends out an ultrasonic wave. The ECHO pin outputs the time in microseconds that the ultrasonic wave takes to travel to the obstacle and back.

- Distance Calculation: The time returned from the `pulseIn()` function is converted to a distance using the speed of sound (340 m/s, hence 0.034 cm/us), divided by 2 to account for the travel to and from the obstacle.
- Displaying the Distance: The distance is displayed as a vertical bar on the TFT display. The length of the bar is scaled to the height of the display using the `map()` function.

## 5. Safety Note

If you're using 5V for the HC-SR04, make sure to handle the ECHO pin safely with a voltage divider to reduce the voltage to a level that's safe for the XIAO RP2040 (3.3V).

By following these steps, you should be able to use the HC-SR04 with your XIAO RP2040 and ILL9341 display effectively. Adjustments to the code may be necessary based on your specific setup and display dimensions.