Bangabandhu Sheikh Mujibur Rahman Digital University, Bangladesh

Department of ICT

Faculty of Engineering

Program IOT

Course Title: Wireless Communication for IoT Lab

Course Code: IoT 4312

Lab Report-02

Submitted to-

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Name of the Experiment: Interfacing Ultrasonic sensor and LCD display with ESP8266 node MCU.

Introduction:

Ultrasonic Sensor:

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

LCD display:

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels. LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystal in an LCD produces an image using a backlight. As LCDs have replaced older display technologies, LCDs have begun being replaced by new display technologies such as OLEDs.

Node MCU:

The Node MCU (Node Micro Controller Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds. However, as a chip, the ESP8266 is also hard to access and use. You must solder wires, with the appropriate analog voltage, to its pins for the simplest tasks such as powering it on or sending a keystroke to the “computer” on the chip. You also have to program it in low-level machine instructions that can be interpreted by the chip hardware. This level of integration is not a problem using the ESP8266 as an embedded controller chip in mass-produced electronics. It is a huge burden for hobbyists, hackers, or students who want to experiment with it in their own IoT projects.

Equipment:

1) Node MCU.
2) Bread Board.
3) LCD display.
4) Ultra-sonic sensor.
5) Jumping wires.

Sketch:

```
#include <LiquidCrystal_I2C.h>
#include <Wire.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);

#define echoPin 14 // D5
#define trigPin 12 // D6
long duration;
int distance;

void setup() {
  Wire.begin(2, 0);//D3 SCL D4-SDA
  lcd.begin();
  lcd.backlight();

  pinMode(trigPin,OUTPUT);
  pinMode(echoPin,INPUT);
  pinMode(LED_BUILTIN,OUTPUT);
}

void loop() {
  digitalWrite(trigPin,LOW);
```

```
  delayMicroseconds(2);
  digitalWrite(trigPin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin,LOW);

  duration=pulseIn(echoPin,HIGH);
  distance=(duration*0.034/2);

  if(distance < 20){
     digitalWrite(LED_BUILTIN, LOW);
   } else{
      digitalWrite(LED_BUILTIN, HIGH);
   }

  lcd.print("Distance : ");
  lcd.print(distance);
  lcd.print(" cm");
  delay(1000);
  lcd.clear();
}
```

Result:

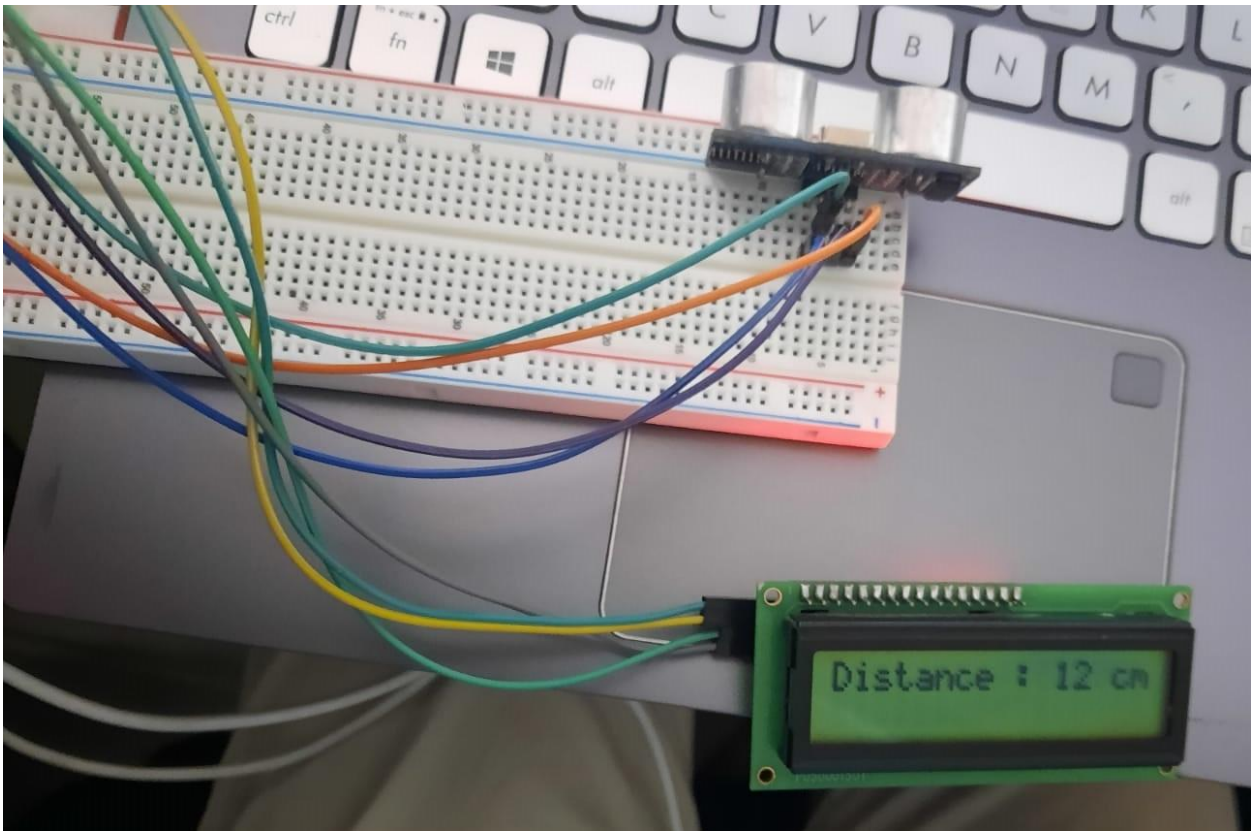

Figure: Experimental Picture

Discussion: We successfully connected HC-06 with the ESP8266 and show the value in LCD Display.