Universidad Politécnica de Yucatán

Structured programing

Final Project

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Robotics 2C

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Materials

The following materials were used for the circuit:

- Arduino Uno R3
- LCD 16 x 2
- Ultrasonic sensor hc-sr04
- 220-ohm Resistor
- Slide switch
- Protoboard

Note: All materials and the circuit were simulated in tinkercard software.

Objective

The next project has the finality to put a proof all knowledge and skills obtained during the curse structured programing, where we are going to take it to the practice. For this project I toke the reference from a sensor that measure the amount of liters of water filled until to notify when it is full.

Procedure

For this project I thought in a screen that t shows us the amount of liters at the same time that the container is filling, thus I used a lcm of 16x2 in addition to the ultrasonic sensor.

First, I connected the circuit, the gnd to the negative and vcc to the positive, and inputs and outputs I connected in the next form:

HC-SR04

- Echo(D5)
- Trigger(D6)

Liquid Crystal LCD (D 12, 11, 10, 9, 8, 7)

With that connection I already could begin to write the code, first I called the library of liquid crystal and after I declared my variables and I defined my inputs and outputs. The I continued with the configuration of the sensor and the LCD.

for the last part of the project, I used a little of mathematic can calculate the centimeters by liter that there was in the container. I calculated the volume of the container to convert that in cm by liter. After have the operation I did use a structure of if-else to indicated to the LCD in which part says each phrase and the results.

Results

the result was successful, when I simulated the LCD showed that when the container was filling up, it counted the liters of water and when the water came at the upper it notifies.

Analysis and questions

Which components are digital inputs?

The ultrasonic sensor

Which components are digital outputs?

Liquid crystal LCD

Which components are analog inputs?

None, all are digital inputs

Explain why you connect each component in the ports you use.

First, I did research about its datasheet of each component and since there I visualized if they were a digitals or analogs components and after that I assigned each attach of that way to have a better order

Explain the differences, if any, between the simulation and the real circuit

the first time when I did the simulation of this circuit the software indicates that there were short circuit but if it had happened really, the circuit and the components would damage, another thing that I saw is that to find fails its easier

Code

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(7, 8, 9, 10, 11, 12);
float centimetros;
float tiempo;
float litros;
int trigger =6;
int echo =5;
int high;

void setup(){
Serial.begin(9600);
lcd.begin(16, 2);
 pinMode(trigger, OUTPUT);
 pinMode(echo, INPUT);
}
void loop(){
 digitalWrite(trigger,LOW);
 delayMicroseconds(5);
 digitalWrite(trigger, HIGH);
 delayMicroseconds(10);
 tiempo=pulseIn(echo, HIGH);
 centimetros= int(0.017*tiempo);

 high= 40-centimetros;
 litros= high/1.8;
  if(centimetros>=3 && centimetros<=40){
```

```
Serial.print("liters filled: ");
Serial.print(litros);
Serial.print(" lt");
Serial.println();
lcd.setCursor(0,0);
lcd.print("liters filled");
lcd.setCursor(6,1);
lcd.print(litros);
delay(1000);
lcd.setCursor(0,1);
lcd.print(" ");
 }
 else
   if (centimetros<3){
   Serial.print(" Full tank ");
   Serial.print(litros);
   Serial.print(" lt");
   Serial.println();
   lcd.setCursor(0,0);
   lcd.print("Full tank");
   lcd.setCursor(6,1);
   lcd.print(litros);
   delay(1000);
   lcd.setCursor(0,1);
   lcd.print(" ");


 }
```

}

Circuit