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| **Class** | **SE18xx** | **Group** | **01** | **Contribution** |
| **#** | **Student ID** | **Student Name** | **Task** | **(0-100%)** |
| 1 | SE171325 | Nguyễn Đức Hùng | Tham gia lắp mạch, Phân tích yêu cầu | 100% |
| 2 | SE171259 | Nguyễn Bá Đạt | Thiết kế tinkercad, code | 100% |
| 3 | SE171328 | Nguyễn Phúc Lộc | Tham gia lắp mạch, vẽ flowchart | 100% |
| 4 | SE171330 | Hà Gia Khánh | Tham gia lắp mạch, block diagram | 100% |
| 5 |  |  |  |  |

**IOT 102: PROGRESS TEST 1**

**DO NOT COPY**

**Components**: ultrasonic rangefinder, servo motor, Arduino Uno, LCD, LED (red-green)

**Task**: Design a system to open the barrier when a car approaches.

**Description**:

* Use the ultrasonic rangefinder to estimate the distance *dis* between the car and the barrier.
* 03 pre-defined values: *red\_dis < yellow\_dis < green\_dis*

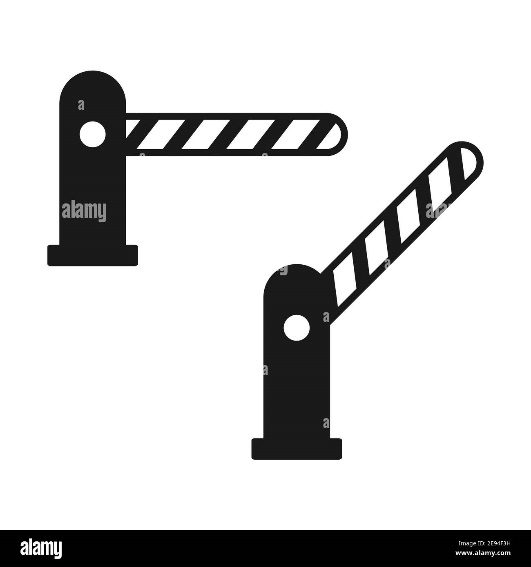
|  |  |  |
| --- | --- | --- |
| *yellow\_dis <= dis < green\_dis* | Only GREEN LED blinks | Blink rate depends on the value of *dis: shorter distance, higher blink rate*  and in the range of [01, 100] Hz |
| *red\_dis <= dis < yellow\_dis* | Only YELLOW LED blinks |
| *dis < red\_dis* | Only RED LED blinks |

* When the distance is less than *red\_dis*, the servo motor controls the barrier **up**, and the LCD displays “**Barrier opened**” and the buzzer is on.
* When the distance is greater than *yellow\_dis*, the servo motor controls the barrier **down** (90 degrees), and the LCD displays “**Barrier closed**”.
* User can change the value of *red\_dis, yellow\_dis* or *green\_dis.*
* *Hint:*

*int red\_dis = 30;*

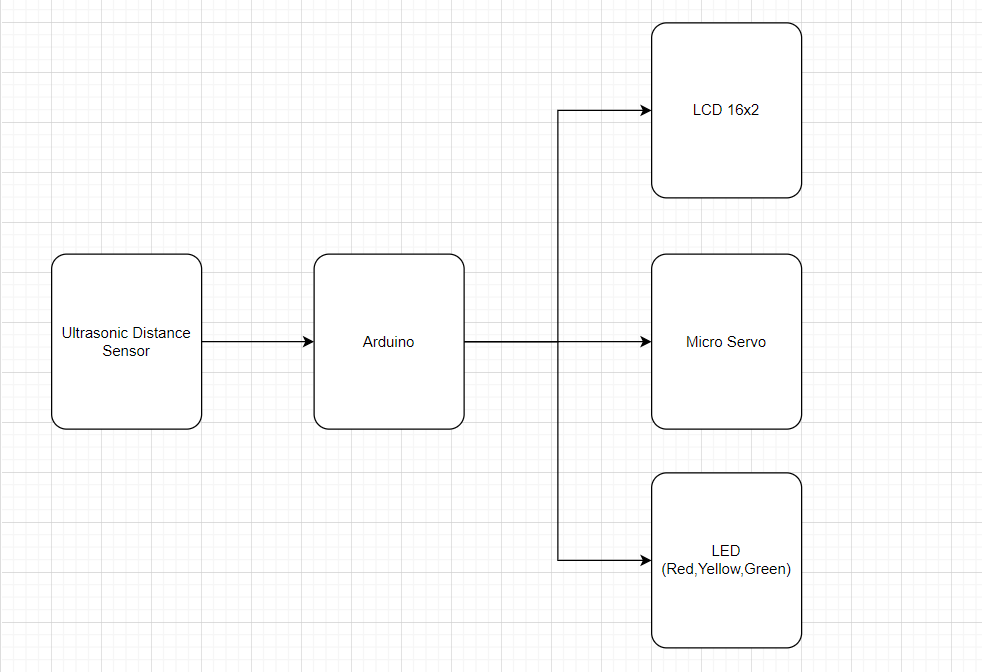
*int yellow\_dis = 50;*

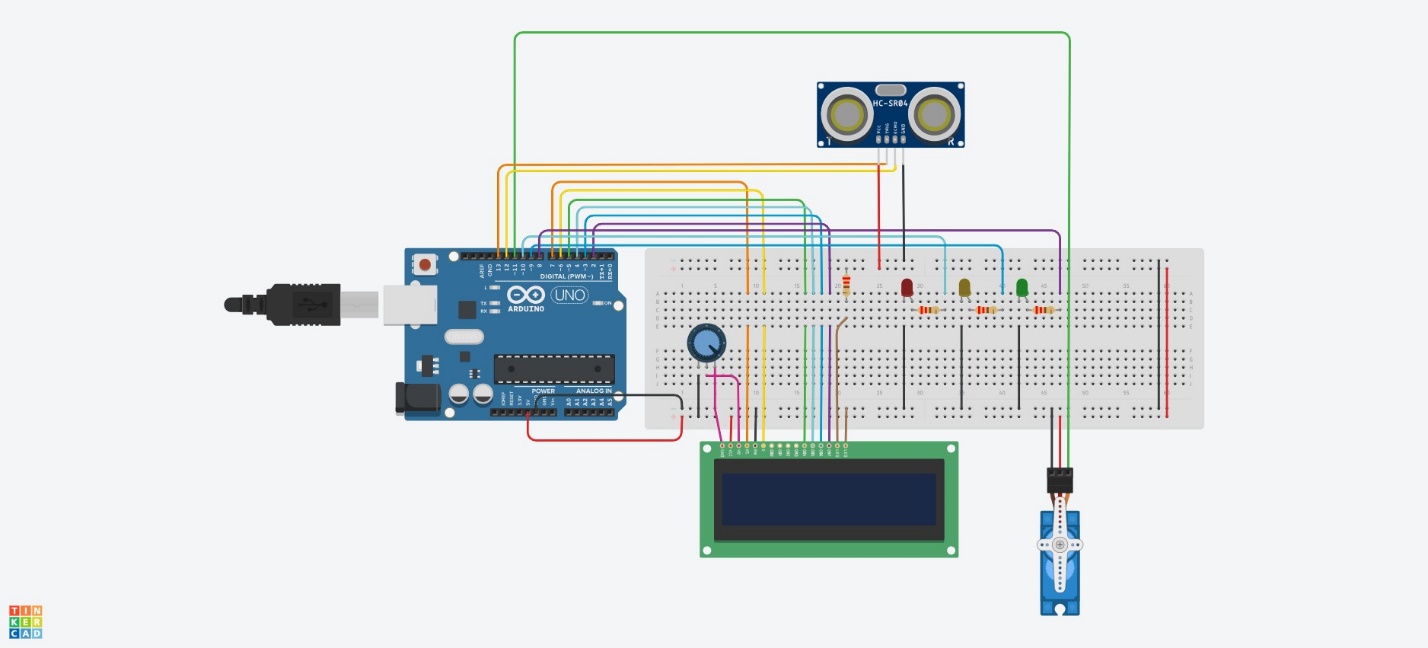
*int green\_dis = 70;*

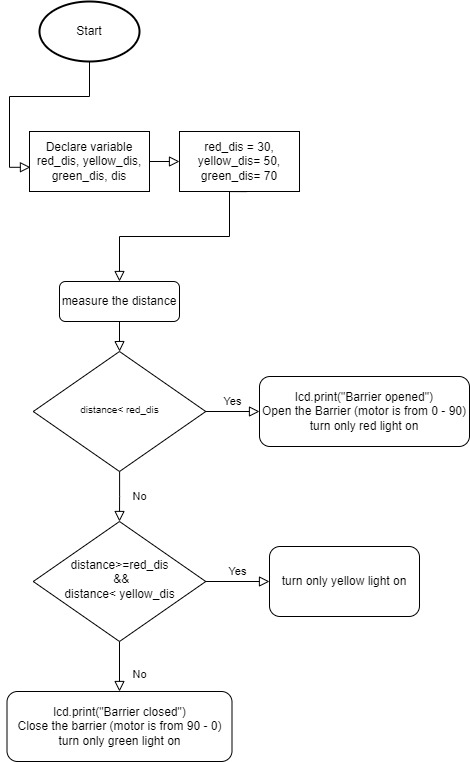


**Answer**

1. **Block diagram:**



1. **Picture of your design:** 
2. **Flowchart (algorithm)**



1. **Code:**

**#include <LiquidCrystal.h>**

**#include <Servo.h>**

**Servo myservo;**

**const unsigned int TRIG\_PIN=13;**

**const unsigned int ECHO\_PIN=12;**

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

**const int red\_led = 10;**

**const int yellow\_led = 9;**

**const int green\_led = 8;**

**const int red\_dis = 30;**

**const int yellow\_dis = 50;**

**const int green\_dis = 70;**

**int pos = 0;**

**void setup()**

**{**

**pinMode(TRIG\_PIN, OUTPUT);**

**pinMode(ECHO\_PIN, INPUT);**

**lcd.begin(16, 2);**

**myservo.attach(11);**

**pinMode(red\_led,OUTPUT);**

**pinMode(yellow\_led,OUTPUT);**

**pinMode(green\_led,OUTPUT);**

**}**

**void loop()**

**{**

**lcd.setCursor(0, 1);**

**digitalWrite(TRIG\_PIN, LOW);**

**delayMicroseconds(2);**

**digitalWrite(TRIG\_PIN, HIGH);**

**delayMicroseconds(10);**

**digitalWrite(TRIG\_PIN, LOW);**

**const unsigned long duration= pulseIn(ECHO\_PIN, HIGH);**

**int distance= duration/29/2;**

**if(distance< red\_dis){**

**short\_distance();**

**if(pos ==90) myservo.write(pos);**

**else{**

**for(;pos<=90;pos+=1){**

**myservo.write(pos);**

**delay(5);**

**}**

**}**

**lcd.print("Barrier opened");**

**}else if(distance>=red\_dis && distance< yellow\_dis){**

**average\_distance();**

**}else if(distance>=yellow\_dis){**

**long\_distance();**

**if(pos ==0) myservo.write(pos);**

**else{**

**for(;pos>=0;pos-=1){**

**myservo.write(pos);**

**delay(5);**

**}**

**}**

**lcd.print("Barrier closed");**

**}**

**}**

**void long\_distance(){**

**digitalWrite(red\_led, LOW);**

**digitalWrite(yellow\_led, LOW);**

**digitalWrite(green\_led, HIGH);**

**}**

**void average\_distance(){**

**digitalWrite(red\_led, LOW);**

**digitalWrite(yellow\_led, HIGH);**

**digitalWrite(green\_led, LOW);**

**}**

**void short\_distance(){**

**digitalWrite(red\_led, HIGH);**

**digitalWrite(yellow\_led, LOW);**

**digitalWrite(green\_led, LOW);**

**}**

1. **Tinkercad link:**

[**https://www.tinkercad.com/things/5prUb35CCLS-project-iot-pt1-/editel?sharecode=PE18sr1P5a5JZhXCF2VUnhSfLOC0rpn\_XkaAbp3w2uE**](https://www.tinkercad.com/things/5prUb35CCLS-project-iot-pt1-/editel?sharecode=PE18sr1P5a5JZhXCF2VUnhSfLOC0rpn_XkaAbp3w2uE)

1. **Video clip (Google Drive):**

[**https://drive.google.com/file/d/1mDZcUC\_pyUc\_FTj0WGPrpk2cj7ScJQWL/view?usp=sharing**](https://drive.google.com/file/d/1mDZcUC_pyUc_FTj0WGPrpk2cj7ScJQWL/view?usp=sharing)