Course no: CSE3104
Department: CSE
Course: Peripherals and Interfacing Laboratory

Project Name: Advanced Traffic Signal and Safe Road Crossing System.

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Objectives:

1. This project aims to ensure safe road for pedestrians.
2. This focuses on the implementation of an advanced dynamic traffic control system to make the movement of vehicles and person as efficient, orderly and safe as possible.
3. The main moto of this project is to reduce no of road accident that occurs during crossing the road in hurry.
4. Also it provides an automated traffic control system so that without a traffic police the whole system can be managed easily.
5. One of the purposes to do this project was to learn how to work with different devices like Arduino UNO, IR sensor, Servo motor, LCD display, LED and so on.

Introduction:

Our project “Advanced Traffic Signal and Safe Road Crossing System” is a system to ensure a safe orderly and efficient traffic system for both vehicles and pedestrians

We make sure that it saves our time also there will be no risk of accident as life and time both are important. We implemented this by changing the time of traffic lights according to the no of people waiting to cross the road and a barrier to stop movement of people or vehicles alternatively as required.

Thus, our project focuses on counting the no of total people. If the no of people is less then simply green light will be lightened and vehicles get the road. But if there is more no of people and some of the people still on the road then the green light will not be lightened. Until all the people crosses the road, there will be red light even though it was green light turn.

Similarly, when there are no people for crossing the road, even though it was red light turn, it will be green very quickly and save the valuable time of other people on vehicles.
Thus, this project helps to save time as well as reduce the risk of accident during road crossing.

Working Principle:

The working principle of the Advanced Traffic Signal and Safe Road Crossing System involves some dynamic logics to control the traffic signal and safe road crossing for the pedestrians.

Here is a step-by-step explanation of the working principle of the Advanced Traffic Signal and Safe Road Crossing System:

- At first, the system will show Green-Light and allow the vehicles to pass the road. Then there will be a barricade in front of the Pedestrians so that they can't pass the road. It will count the number of Pedestrians waiting to cross the road parallelly (Multitasking).

- After a certain cycle (say 2 minutes), the system will check parallelly there if there is any Pedestrians waiting for crossing the road or not.
  If there are no pedestrians waiting, the Green-Light will be shown for the next cycle. Otherwise, it will show Yellow-Light for alerting the drivers that Red-Light will be shown in a few seconds.
  If there are a certain number of pedestrians (say 10 pedestrians), the system will automatically show Yellow-Light for alerting the drivers that Red Light will be shown in a few seconds.

- Then the Red-Light will be shown and there will be a barricade in front of the Vehicles so that no vehicle can pass the road during the Red-Light period.

- Then the barricade in front of the Pedestrians will remove and they will start crossing the road.

- Until passing all the Pedestrians, the Red-Light will be shown and barricade in front of the Vehicles will not remove so that no vehicle can pass the road and can’t do any humper of the Pedestrians.

- After all the Pedestrians crossing the road, the Yellow-Light will be shown for alerting the new incoming Pedestrians that the Green-Light will be shown soon.

- Then the Green-Light Will be shown and the barricade in front of the Vehicles will be removed & the barricade in front of the Pedestrians will be shown.

- (Repeating Processes)

Pseudo Code:

```
//Define Pin Number
red = 9
yellow = 8
green = 7

//Variable Define
state = 0 // IR sensor entering count
state2 = 0 // IR sensor outgoing count
presentTimeRed = 0, presentTimeGreen = 0, presentTimeYellow = 0
redTmp = 1, greenTmp = 0, yellowTmp = 0
x = 0 //number of pedestrians
temp = 0 //for servo motor rotation

setup() :
  Initialize Display
  Print("Pedestrians Count")
  Print(x)
  Print(" = Waiting")

  //servo motor pin setup
  myservo.attach(5)
  myservo.attach(3)
  set red, green, yellow as OUTPUT

end setup()

loop() :
  pedestriansIn()
  pedestriansOut()

  if x = 10 then : //x = number of pedestrians
        redTmp = 1
        greenTmp = 0
        yellowTmp = 0
  end if

  if redTmp = 1 then:
        if x>0 then :
              pedestriansPassing()
        else:
              presentGreenTime = millis()
              myservo.write(0)
              myservo2.write(90)
              redTmp = 0
```

```
                greenTmp = 1
        end if
  end if
  if temp = 1 then:
        for i = 0 to 90:
        loop:
                digitalWrite(yellow, HIGH)
                myServo2.write(i)
                delay(100)
                digitalWrite(yellow, LOW)
                delay(100)
                i = i + 10
        end loop
        digitalWrite(red, LOW)
        temp = 0
  end if

  if greenTmp = 1 then:
        if millis() – presentGreenTime <= 10000 then:
                digitalWrite(green, HIGH)
        else if millis() – presentGreenTime > 10000 to <15000 then:
                Blink Yellow Light
        else:
                if x>0 then:
                        presentYellowTime = millis()
                        digitalWrite(green, LOW)
                        greenTmp = 0
                        yellowTmp = 1
                else:
                        presentGreenTime = millis()
                        digitalWrite(green, HIGH)
                        greenTmp = 1
                        yellowTmp = 0
                end if
        end if
  end if

  if yelloTmp = 1 then:
        digitalWrite(yellow, HIGH)
  else:
        presentTimeRed = millis()
        redTmp = 1
        yellowTmp = 0
  endif

end loop()
```

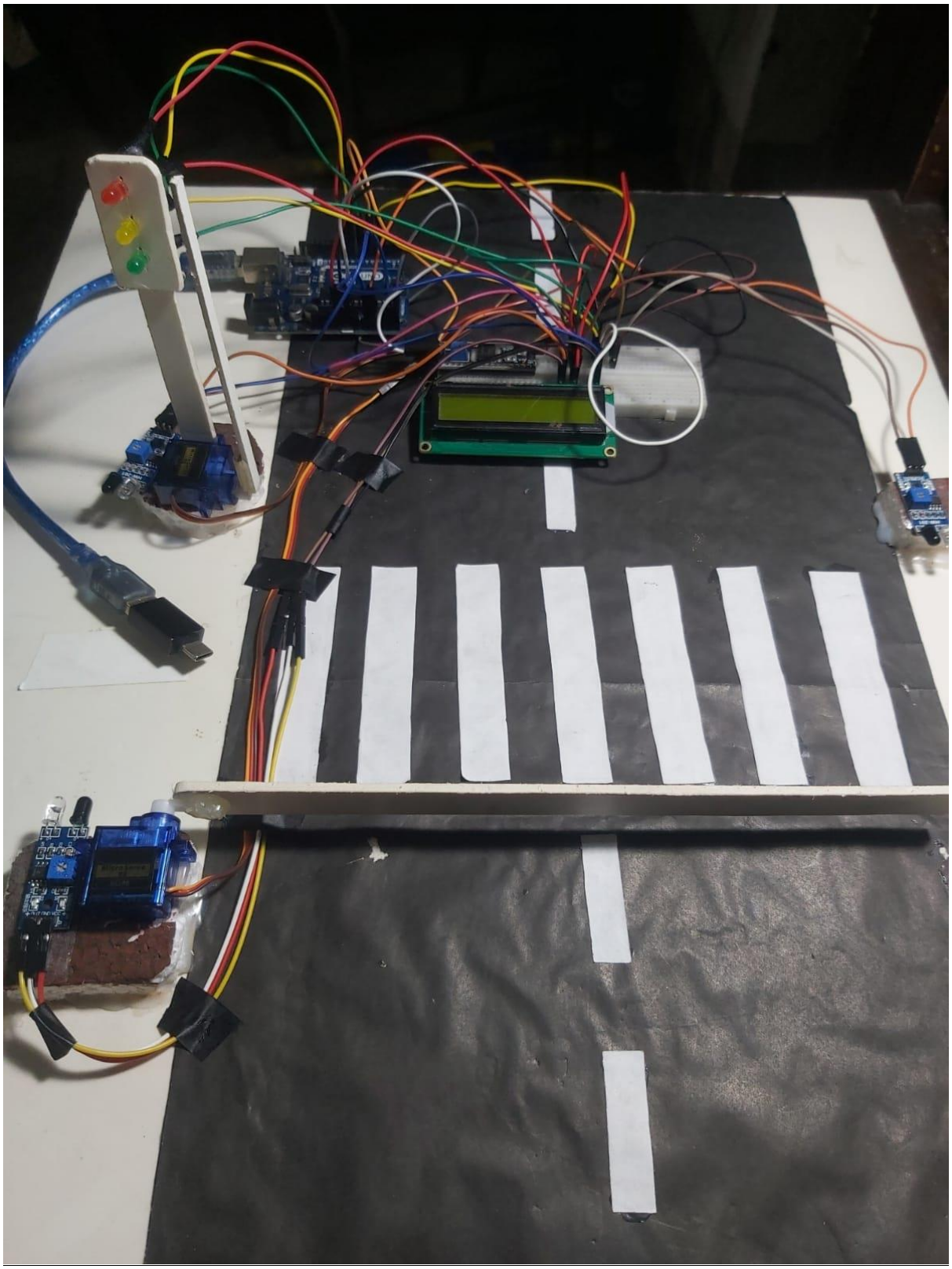
```
pedestriansIn()
  counter = digitalRead(A0) //read from incoming IR sensor
  if state = 0 then:
        switch counter:
              case 1:
                    state = 1
                    x  = x + 1
                    lcd.print(x)
                    break
              case 0:
                    state = 0
                    break
        end switch
  end if
  if counter = LOW then:
        state = 0
  end if
end pedestriansIn()

pesedtriansOut()
  counter = digitalRead(A1) //read from outgoing IR sensor
  if state2 = 0 then:
        switch counter:
              case 1:
                    state2 = 1
                    x  = x - 1
                    lcd.print(x)
                    break
              case 0:
                    state2 = 0
                    break
        end switch
  end if
  if counter = LOW then:
        state2 = 0
  end if
end pesedtriansOut()

pedestriansPassing()
  Initialize Display
  Print("Start Crossing")
  Print(x)
  Print(" = Left")
  Blink Yellow Light for 3 seconds
  digitalWrite(red, HIGH)
```

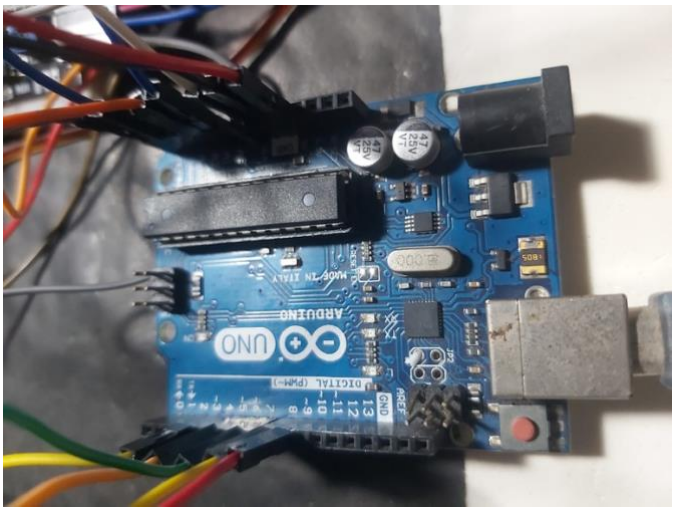
```
  for i = 0 to 90:
  loop:
        digitalWrite(yellow, HIGH)
        myServo.write(i)
        delay(100)
        digitalWrite(yellow, LOW)
        delay(100)
        i = i + 10
  end loop
  myServo2.wirte(0)
  while 1:
  loop:
        pedestriansIn()
        pedestriansOut()
        if x = 0 then:
              digitalWrite(red, LOW)
              Initialize Display
              Print("Pedestrians Count")
              Print(x)
              Print(" = Waiting")
              temp = 1, redTmp = 1, greenTmp = 0, yellowTmp = 0
              break
        end if
  end loop
end pedestriansPassing()
```

Full System:

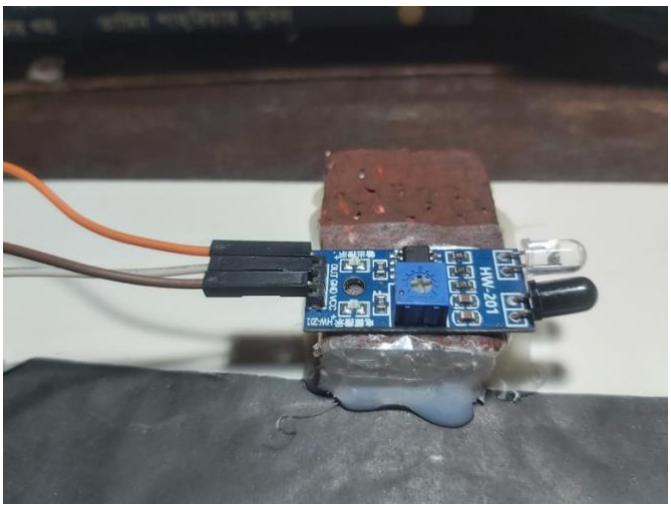


Components:

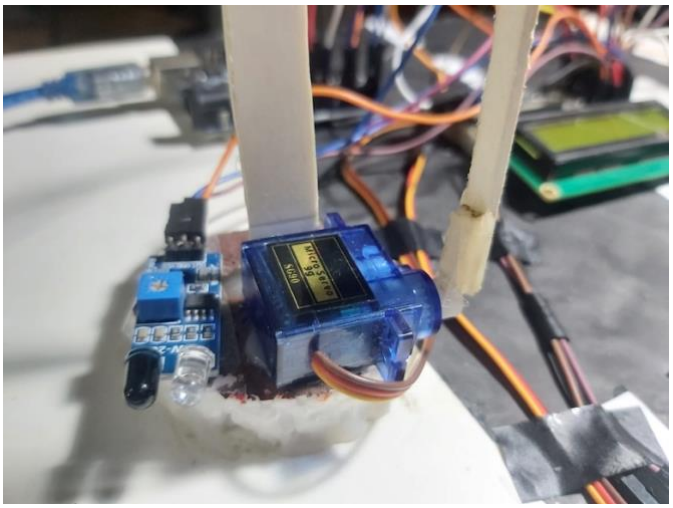
Arduino UNO:



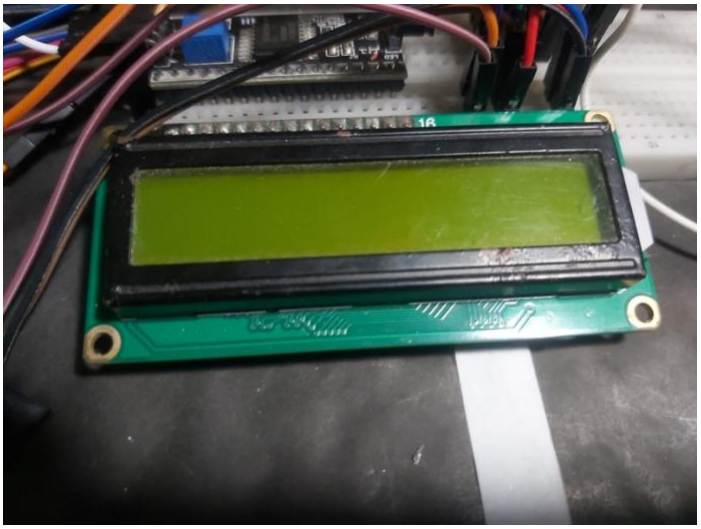
IR Sensor:



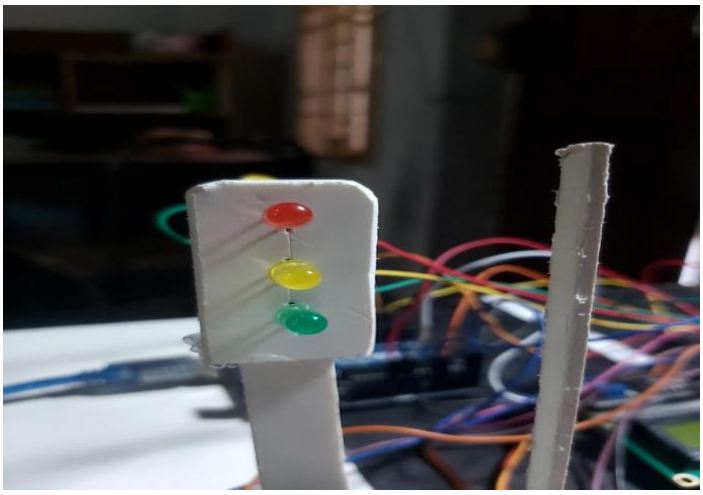
Servo Motor:



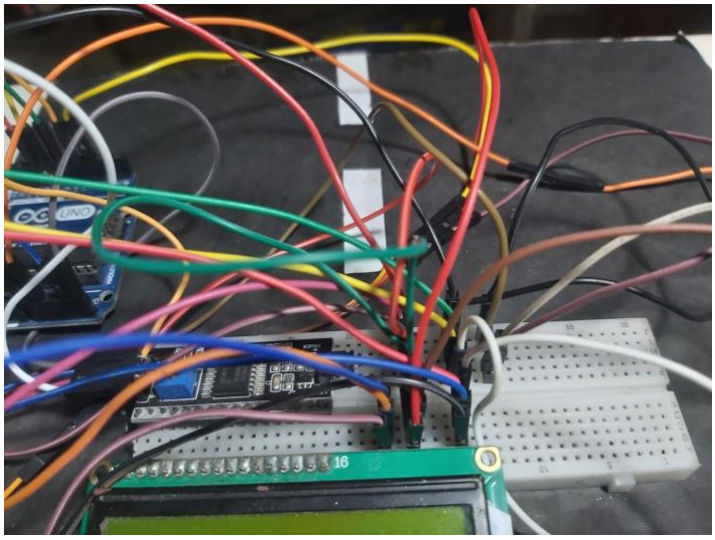
LCD Display:



LED:



Breadboard & Connecting Wires:



Discussion:

In this project, we successfully implemented an advanced and dynamic Traffic Signal control system where the time of duration of the three signals (red, green, yellow) was programmed in a way that both pedestrians and drivers will be benefited, time will be saved and risk of accident during road crossing will be reduced in a significant manner. We ensured this by implementing simple techniques like barrier and counter.

Using two servo motor 2 barriers (one for pedestrians and other for vehicles) are being controlled. They are being functioned in reverse way. When one is at 0o other is at 90o so when pedestrians cross the road cars or other vehicle must be stopped.

If any pedestrian is at the middle of the road and time of green signal arrives there could be an accident. To prevent this, we used a (IR sensor) as counter on the opposite side of the road. There will be green signal on board only when then LCD will display there is 0 pedestrian left. Which means all start crossing has crossed the road has reached out the opposite side of the road.

One another case was highly considered. When there is no pedestrian to cross the road, but red signal stops the cars and other vehicles, it will be a loss of time. To prevent this, we put a condition that when LCD displays 0 pedestrian from the beginning the green light will be lightened immediately after the red light. Duration is very small.

Final case, if two pedestrians cross at the same time IR sensor will count them as one which could be a problem. But to prevent this we used 2 IR sensor.

Thus, we implemented our project which could be helpful for a traffic system.

Conclusion:

Finally, we can say that, we were able to complete our project “Advanced Traffic Signal and Safe Road Crossing System” using Arduino Uno, IR sensor, LCD display, servo motor, different connecting wires and other components successfully.

While doing this project, we learnt how to work with all of these components, faced thousands of problems which is an important part of learning. We researched whenever we faced a problem. After all this, our project come to an end.

This project can be a great solution for traffic management problems. It ensures a safe, orderly and efficient traffic system both for pedestrians and vehicles.