Project: McDonalds Dive

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Everybody loves eating at McDonalds! Since there is a lockdown in the country due to the corona virus outbreak, none of us can enjoy eating our favourite burgers and French Fries. Keeping this in mind, the McDonalds team of your city is planning to establish a new drive through ordering system. This will ensure minimum contact while eating so that we can follow social distancing even after lockdown ends. Here is what a Drive Through means- You can take your car to the first window where you can place your order. Then you move on to the next window to pay for your meal. The final and third window is where you collect your order. All these windows are situated on the circumference of the restaurant. While following the windows, you encircle the restaurant and after collecting your order, you can continue driving on the road.

PROBLEM STATEMENT:

Simulate a similar drive through which has the following characteristics.

• There is an ultrasonic sensor that senses if there is a vehicle coming. If there is a vehicle detected, it sends signal to a servo motor in order to open a barricade so that the vehicle may pass. After a particular delay, it should close again. (1 ultrasonic sensor, 1 servo motor)

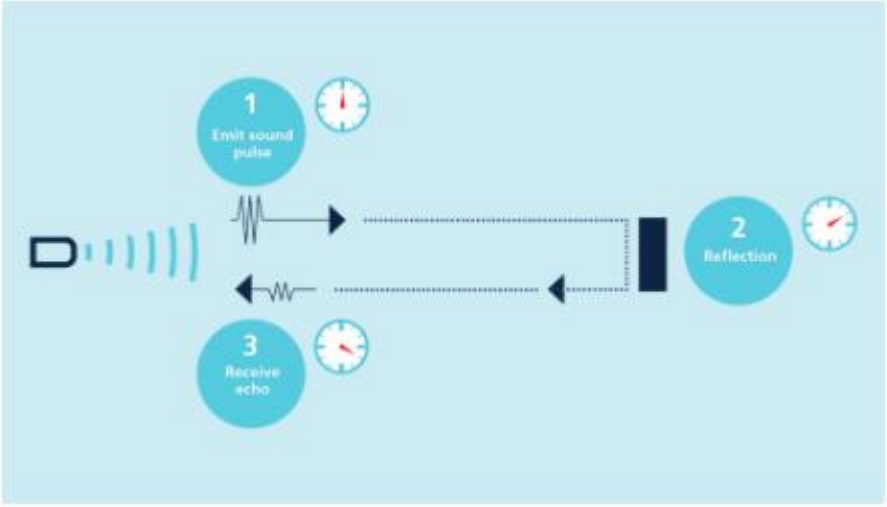
• Then the vehicle goes at window-1 where order can be placed. There are four icons for four menu items and there is an IR sensor placed beneath each icon. The customer waves in front of the sensor respective to the menu item and thus the order for that item is placed. Here wave refers to moving the hand in front of the sensor. (4 IR sensors)

• On the output side, (window-2) we will have four LEDs corresponding to the same menu items. If a particular item is delivered, its LED will glow. (4 LEDs)

• When a vehicle is detected at the final window, another ultrasonic sensor sends signal to another servo to open the barricade so that the vehicle may leave. After a particular delay, it should close again. (1 ultrasonic sensor, 1 servo)

Ultrasonic sensor: Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes

the distance to the target based on the time-span between emitting the signal and



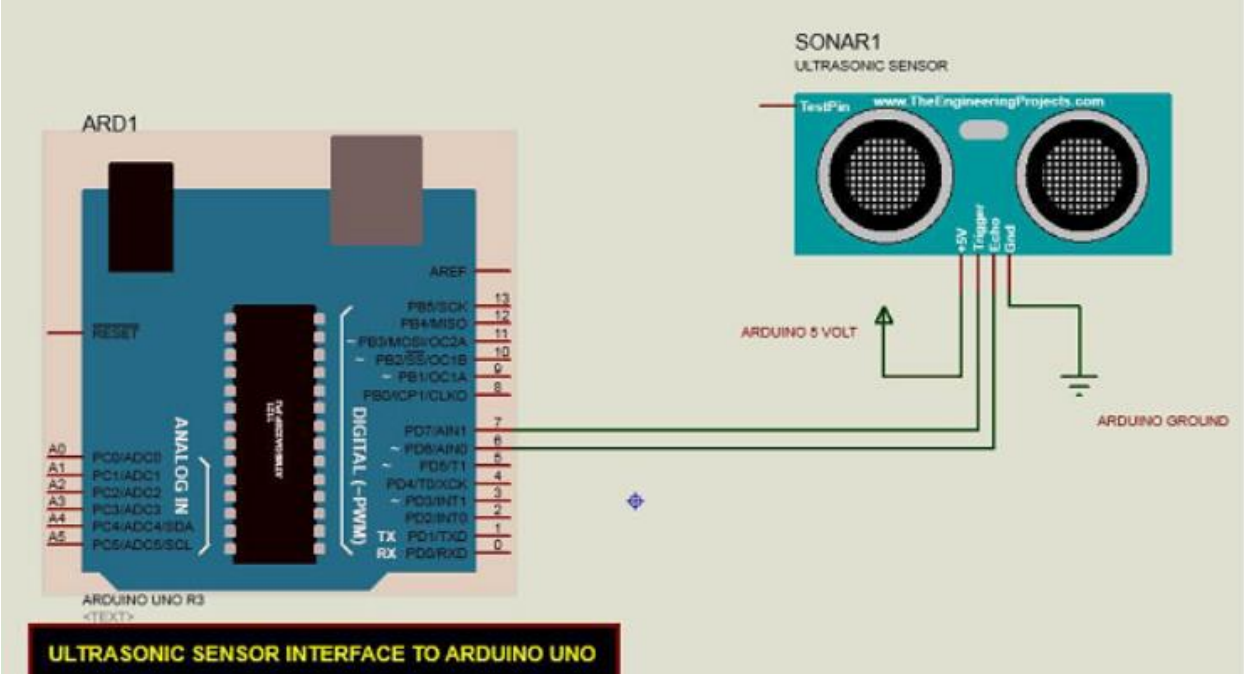
receiving the echo.

if the width of the pulse is measured in microseconds ,then dividing by 58 will give you the distance in cm, or by dividing by 148 will give the distance in inches.

Code for ultrasonic sensor:

```
const int pingPin = 7; // Trigger Pin of Ultrasonic Sensor
const int echoPin = 6; // Echo Pin of Ultrasonic Sensor

void setup() {
  Serial.begin(9600); // Starting Serial Terminal
}

void loop() {
  long duration, inches, cm;
  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(pingPin, LOW);
  pinMode(echoPin, INPUT);
  duration = pulseIn(echoPin, HIGH);
  inches = microsecondsToInches(duration);
  cm = microsecondsToCentimeters(duration);
  Serial.print(inches);
  Serial.print("in, ");
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();
  delay(100);
}
```

```
long microsecondsToInches(long microseconds) {
   return microseconds / 74 / 2;
}

long microsecondsToCentimeters(long microseconds) {
   return microseconds / 29 / 2;
}
```



Applications of ultrasonic sensor:

1) Robotic sensing 2) Liquid level control. 3) Counting people/people detection etc.

Servomotor: it works on servomechanism, here servomechanism refers to : automatic control of any physical quantity is called servo mechanism. Servomotors are used to control the position of the shaft, it contains controller which acts as a error correcting device.

Purpose Of Servomechanism:

1. Accurate control of motion without the need for human attendants (automatic control),

2. Maintenance of accuracy with mechanical load variations, changes in the environment, power supply fluctuations, and aging and deterioration of components (regulation and self- calibration),

3. Control of a high-power load from a low-power command signal (power amplification)
.

4. Control of an output from a remotely located input, without the use of mechanical linkages.

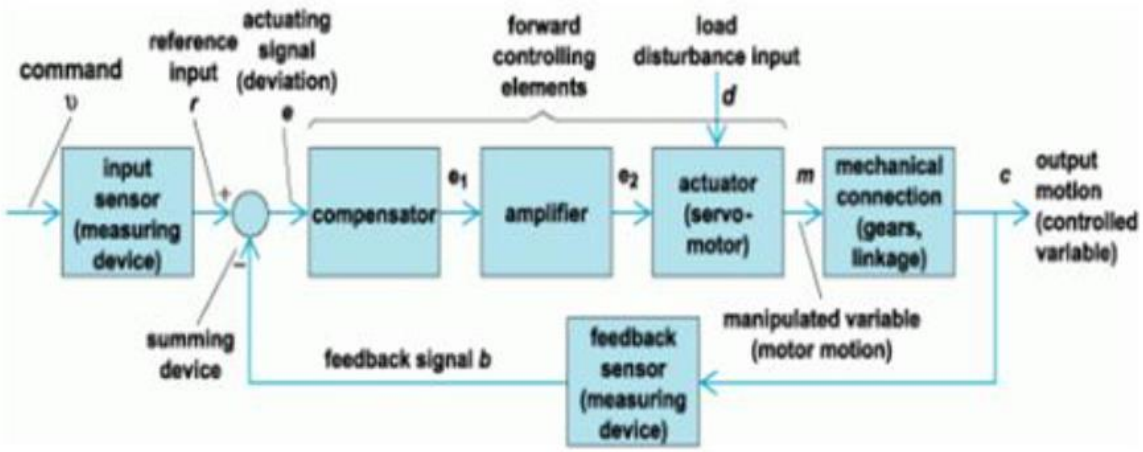


Fig shows Servo loop elements and their interconnections. Cause-and-effect action takes place in the directions of arrows

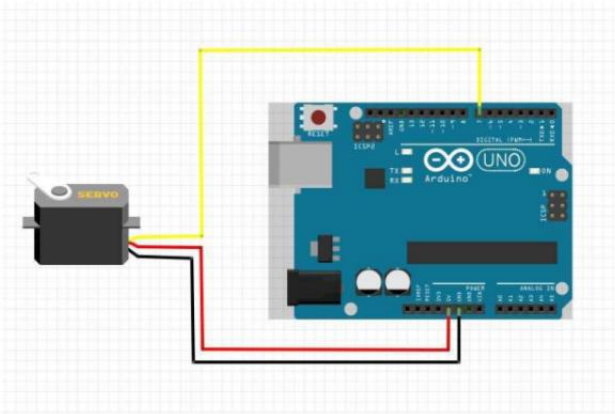
Here it is used to open barricade.

Code for servomotor:

```
#include<Servo.h> //loading the servo library

Servo myservo; //creating object as myservo

int pos=0;

void setup() { // put your setup code here, to run once:

myservo.attach(7); } // attach servo at pin 7

void loop() { // put your main code here, to run repeatedly:

for(pos=0; pos<=180;pos+=1){

myservo.write (pos); //writing the angle of movement in deg

delay (15); //delay of 15 ms

}
```

```
for(pos=180;pos>=0;pos-=1){
myservo.write(pos);
delay(15); } }
```

Connection of servo motor to Arduino




```
// Servo red wire – 5V pin Arduino
//Servo brown wire – Ground pin Arduino
//Servo yellow wire – PWM(9) pin Arduino
```

Connection of servo motor is: servomotor control pin is to any digital pin ,power pin to 5v supply, ground pin to ground pin.

Applications of Servo Motor

1) Humanoid Robot 2) Robotic arm

3) Crane 4) Automatic Gates

IR sensor:

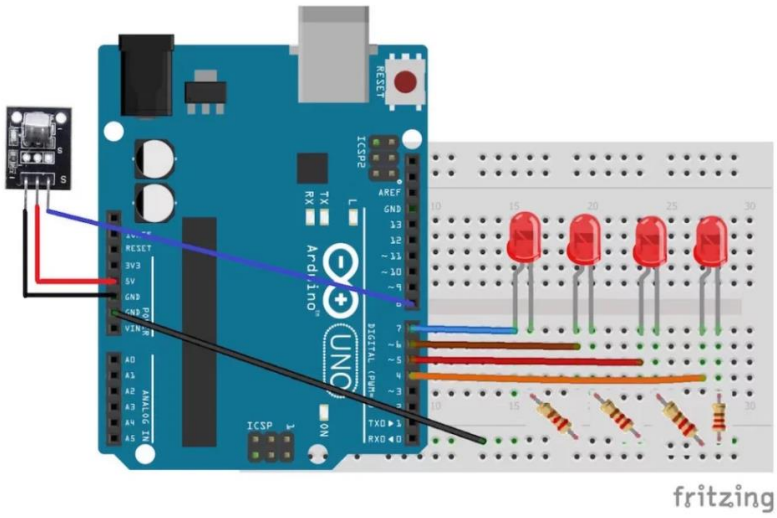
An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects

the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor.

Infrared Radiation Theory

Infrared waves are not visible to the human eye. In the electromagnetic spectrum, infrared radiation can be found between the visible and microwave regions. The infrared waves typically have wavelengths between 0.75 and 1000µm.

The infrared spectrum can be split into near IR, mid IR and far IR. The wavelength region from 0.75 to 3µm is known as the near infrared region. The region between 3 and 6µm is known as the mid-infrared region, and infrared radiation which has a wavelength greater higher than 6µm is known as far infrared.



Connect the negative wire on the IR sensor to GND on the Arduino.
Connect the middle of the IR sensor which is the VCC to 5V on the Arduino.
Connect the signal pin on the IR sensor to pin 8 on the Arduino.

```
#include
#define first_key 48703
#define second_key 58359
#define third_key 539
#define fourth_key 25979
int receiver_pin = 8;

int first_led_pin = 7;
```

```
int second_led_pin = 6;
int third_led_pin = 5;
int fourth_led_pin = 4;
int led[] = {0,0,0,0};
IRrecv receiver(receiver_pin);
decode_results output;

void setup()
{
Serial.begin(9600);
receiver.enableIRIn();
pinMode(first_led_pin, OUTPUT);
pinMode(second_led_pin, OUTPUT);
pinMode(third_led_pin, OUTPUT);
pinMode(fourth_led_pin, OUTPUT);
}

void loop() {
if (receiver.decode(&output)) {
unsigned int value = output.value;
switch(value) {
case first_key:
if(led[1] == 1) {
digitalWrite(first_led_pin, LOW);
led[1] = 0;
} else {
digitalWrite(first_led_pin, HIGH);
led[1] = 1;
}
break;
case second_key:

if(led[2] == 1) {
digitalWrite(second_led_pin, LOW);
led[2] = 0;
} else {
digitalWrite(second_led_pin, HIGH);
led[2] = 1;
}
break;
case third_key:
```

```
if(led[3] == 1) {
digitalWrite(third_led_pin, LOW);
led[3] = 0;
} else {
digitalWrite(third_led_pin, HIGH);
led[3] = 1;
}
break;
case fourth_key:

if(led[4] == 1) {
digitalWrite(fourth_led_pin, LOW);
led[4] = 0;
} else {
digitalWrite(fourth_led_pin, HIGH);
led[4] = 1;
}
break;
}
Serial.println(value);
receiver.resume();
}
}
```

Applications of IR sensors:

1) Gas detectors 2)water analysis 3)Rail safety etc.

IR remote:

An IR remote (also called a transmitter) **uses light to carry signals from the remote to the device it controls**. It emits pulses of invisible infrared light that correspond to

specific binary codes. ... IR remotes use LED lights to transmit their infrared signals. This results in a few limitations of the technology.

Code

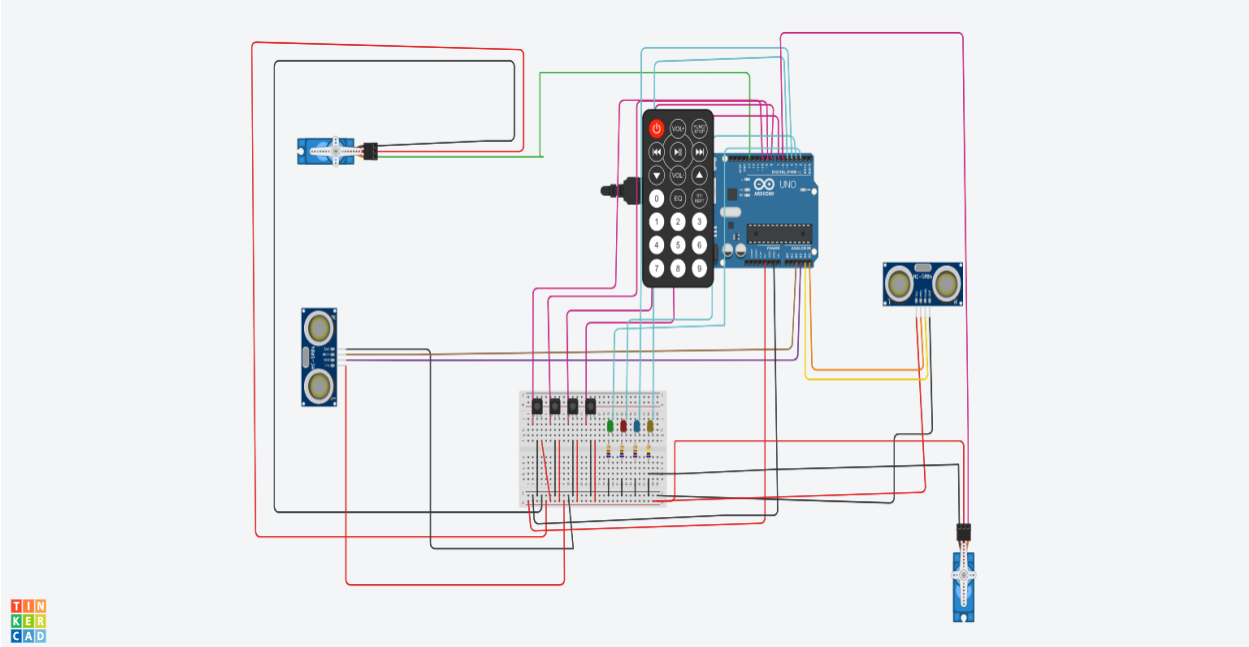
```
#include <IRremote.h>  //including infrared remote header file
int RECV_PIN = 7; // the pin where you connect the output pin of IR sensor
IRrecv irrecv(RECV_PIN);
decode_results results;
void setup()
{
Serial.begin(9600);
irrecv.enableIRIn();
{
void loop()
{
if (irrecv.decode(&results))// Returns 0 if no data ready, 1 if data ready.
{
 int results.value = results;// Results of decoding are stored in result.value
 Serial.println(" ");
 Serial.print("Code: ");
 Serial.println(results.value); //prints the value a a button press
 Serial.println(" ");
 irrecv.resume(); // Restart the ISR state machine and Receive the next value
}
```

Connection of arduino and sensors:

1) first I learnt how to design automatic gate system using us sensor and ir sensor.

2) I learnt how to connect ir sensors and led and how it function

3) later I got how to send signal to ir and choose the orders and I connected ,using IR remote as it acts as transmitter and IR sensors acts as receiver by this way this circuit is connected.



Working:

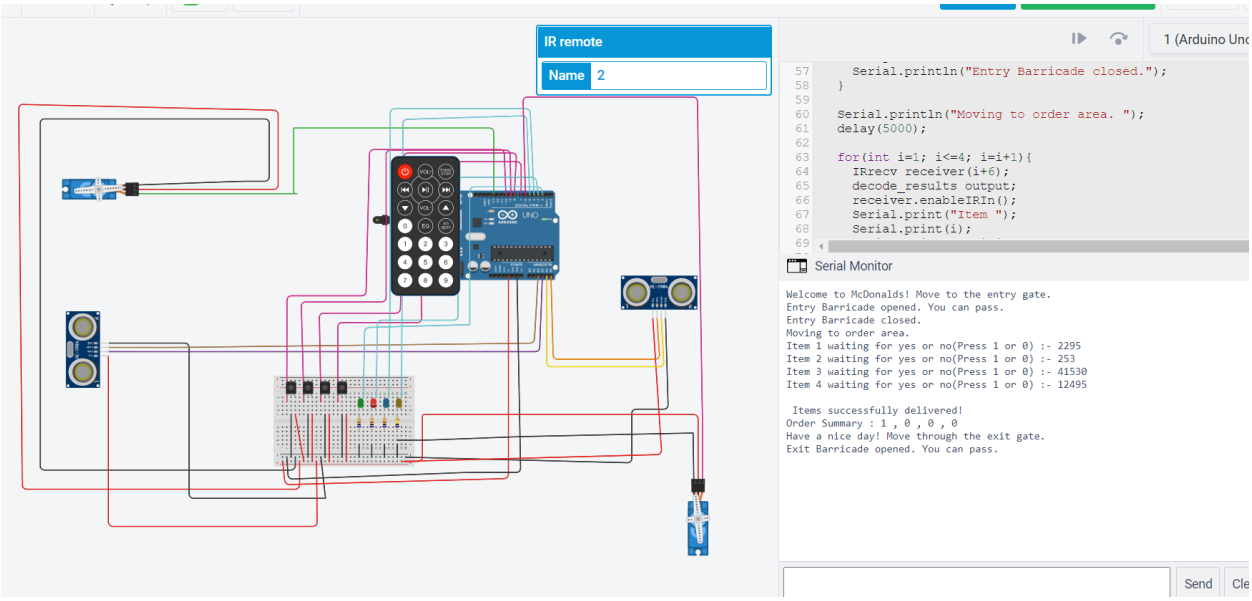
1) When a vehicle is detected by ultrasonic sensor 1(distance<300cm),servo1 rotates to 90 degrees allowing the passage of vehicle and after some delay servo1 rotates to 0 degrees.

2) Then customer orders from 4 menu items by waving hand detected by ir sensor and order is placed.

3) When the particular item is delivered corresponding LED will glow and vehicle leaves through exit gate.

4) ultrasonic sensor 2 detects the vehicle and servo 2 is rotated to 90 degree allowing the passage of vehicle and after some delay servo 2 is rotated to 0 degrees.

Simulation:



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Github link:jyothi-yanapu/arduino-mcdonalds: mcdonald dive through project (github.com)