INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG

Lab Report

Course Code: EEE-2422

Course Title: Electrical Drives Sessional

Submitted To:

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Experiment No: 4

Experiment Name: Familiarization with Arduino and simple LED blinking using Arduino and Proteus Software.

Description:

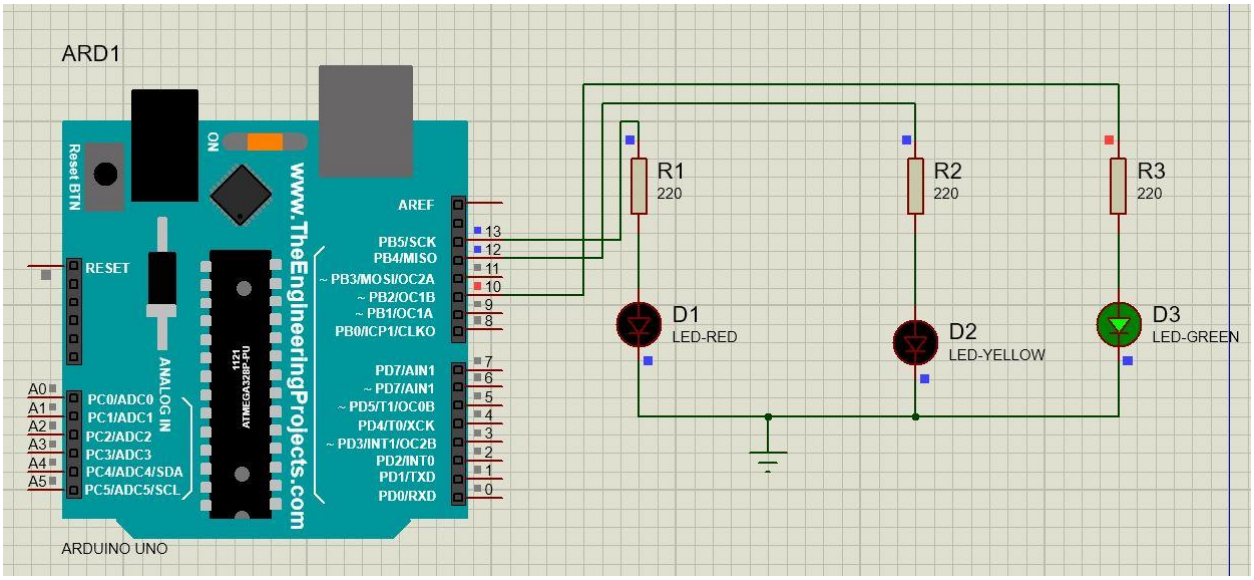
Proteus Software: It is a software which is used to design electronic circuit including PCB layout, simulation and schematic capture modules. Proteus is ahead in simulating the circuits containing the micro controllers where we can simulate the circuit by uploading the hex code to the Microcontroller.

Arduino: Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

LED: LED is the acronym for “Light Emitting Diode”. LEDs are semiconductor devices that produce light. These were initially used as indicator lights but are now used extensively for indoor and outdoor lighting. LED Lighting Supply specializes in commercial and industrial LED Lighting.

Circuit Diagram:



Code:

```
int led1=13;
int led2=12;
int led3=10;
void setup(){
pinMode(led1, OUTPUT);
pinMode(led2, OUTPUT);
pinMode(led3, OUTPUT);
}
void loop(){
digitalWrite(led1,HIGH);
digitalWrite(led2,LOW);
digitalWrite(led3,LOW);
delay(500);
digitalWrite(led1,LOW);
digitalWrite(led2,HIGH);
digitalWrite(led3,LOW);
digitalWrite(led1,LOW);
digitalWrite(led2,LOW);
digitalWrite(led3,HIGH);
delay(500);
}
```

Done compiling.

Discussion:

1) Simulation should remain off while adding or removing component in the circuit.

2) Path of .hex file should be set properly in Arduino board for simulation.

3) Resistor should be used with each LED to overcome overload.

Experiment No: 5

Experiment Name: Simulation of LDR using Arduino and Proteus Software.

Description:

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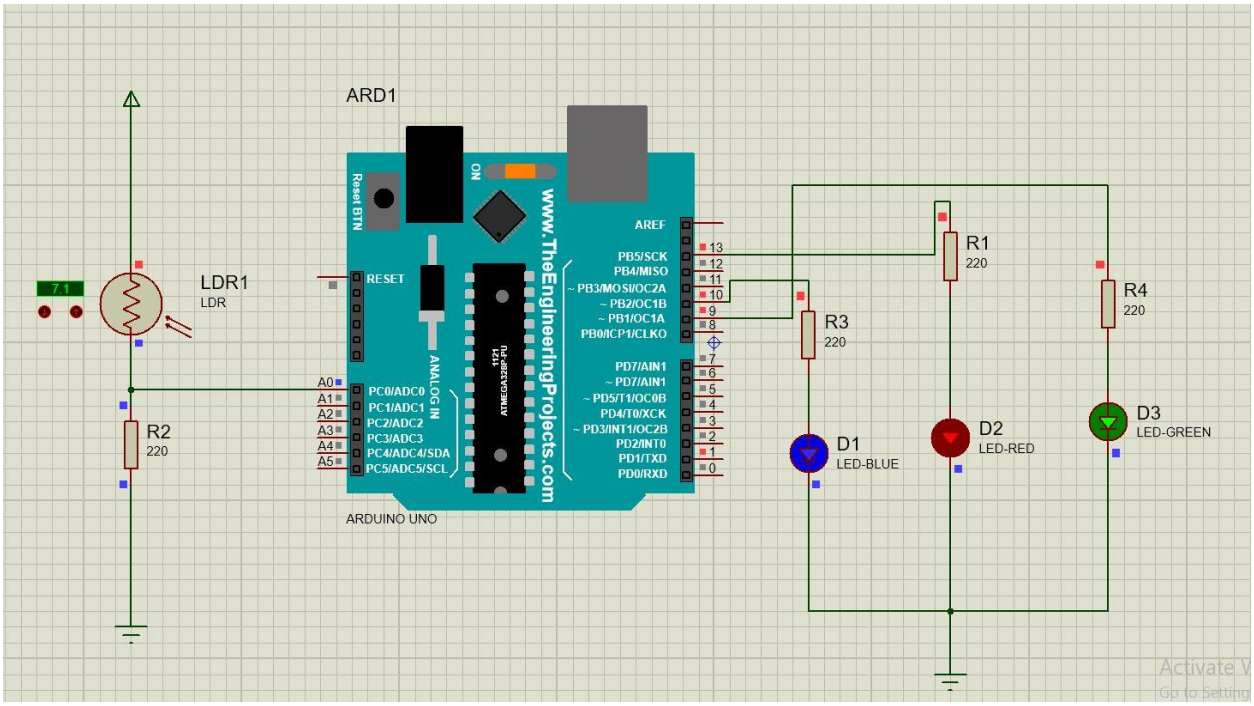
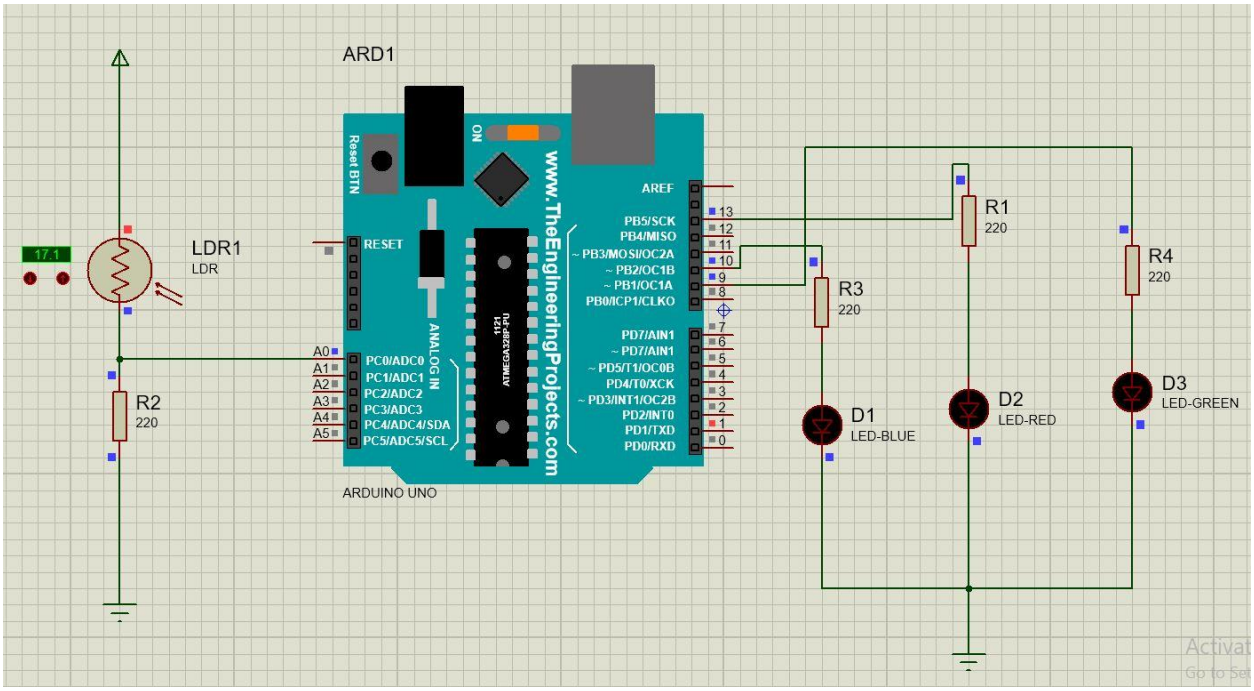
LDR: A Light Dependent Resistor (LDR) is also called a photoresistor or a cadmium sulfide (CdS) cell. It is also called a photoconductor. It is basically a photocell that works on the principle of photoconductivity. The passive component is basically a resistor whose resistance value decreases when the intensity of light decreases. This optoelectronic device is mostly used in light varying sensor circuit, and light and dark activated switching circuits. Some of its applications include camera light meters, street lights, clock radios, light beam alarms, reflective smoke alarms, and outdoor clocks.

Circuit Diagram:




ARD1
Reset BTN
ON
RESET
ANALOG IN
www.TheEngineeringProjects.com
AREF
PB5/SCK
PB4/MISO
~ PB3/MOSI/OC2A
~ PB2/OC1B
~ PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~ PD7/AIN1
~ PD5/T1/OC0B
PD4/T0/XCK
~ PD3/INT1/OC2B
PD2/INT0
PD1/TXD
PD0/RXD
A0
A1
A2
A3
A4
A5
PC0/ADC0
PC1/ADC1
PC2/ADC2
PC3/ADC3
PC4/ADC4/SDA
PC5/ADC5/SCL
ARDUINO UNO
17.1
LDR1
LDR
R2
220
R1
220
R3
220
R4
220
D1
LED-BLUE
D2
LED-RED
D3
LED-GREEN

Code:

```
const int ledPin = 10;
const int ledPin2 = 13;
const int ledPin3 = 9;
const int ldrPin = A0;
void setup() {

Serial.begin(9600);

pinMode(ledPin, OUTPUT);
pinMode(ledPin2, OUTPUT);
pinMode(ledPin3, OUTPUT);
pinMode(ldrPin, INPUT);

}

void loop() {

int ldrStatus = analogRead(ldrPin);

if (ldrStatus <= 12) {

digitalWrite(ledPin, HIGH);
digitalWrite(ledPin2, HIGH);
digitalWrite(ledPin3, HIGH);
Serial.print("Its DARK, Turn on the LED : ");

Serial.println(ldrStatus);

}
```

```
else {

digitalWrite(ledPin, LOW);
digitalWrite(ledPin2, LOW);
digitalWrite(ledPin3, LOW);
Serial.print("Its BRIGHT, Turn off the LED : ");

Serial.println(ldrStatus);

}
}
```

Done compiling.

Discussion:

1) Simulation should remain off while adding or removing component in the circuit.

2) Path of .hex file should be set properly in Arduino board for simulation.

3)Compared to Analytical, result is more accurate in general form.

4) Sometimes the LEDs are illuminated before satisfying the conditions of the code.

Experiment No: 6

Experiment Name: Simulation of temperature sensing using LM35 temperature sensor in Proteus Software.

Description:

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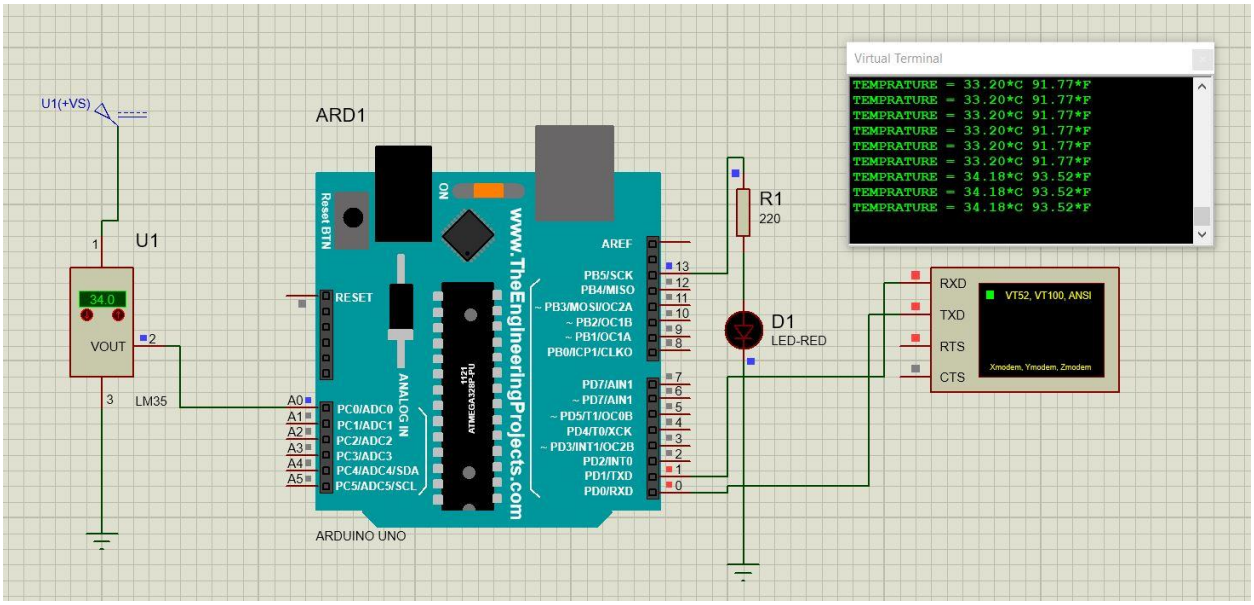
Arduino: Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

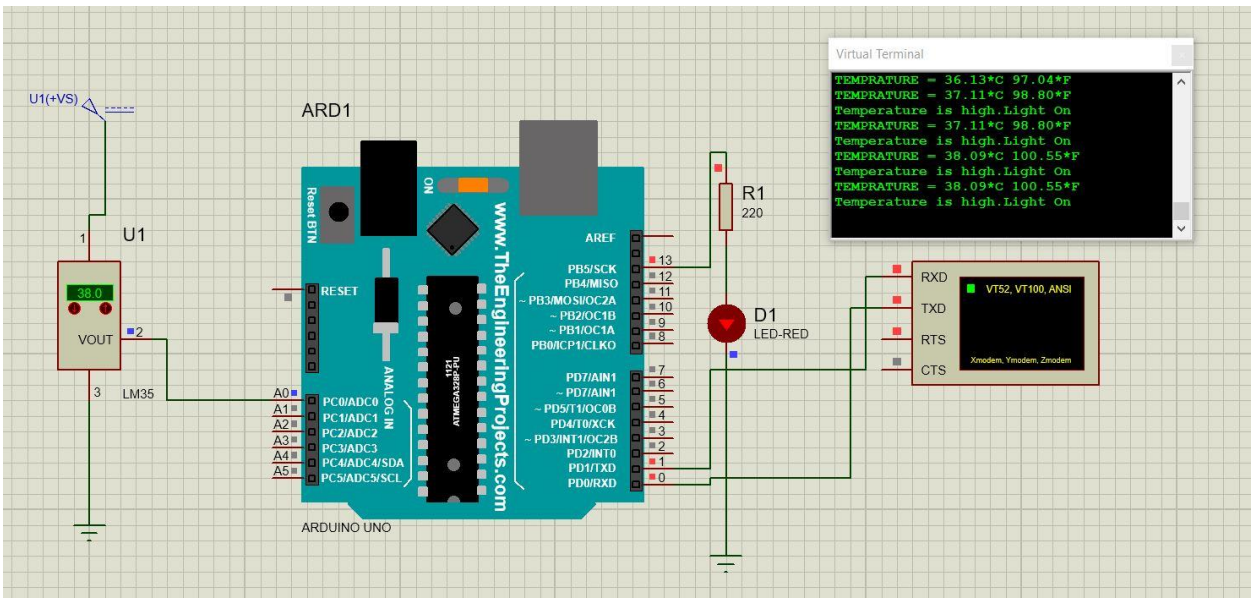
The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

Virtual Terminal: Virtual Terminal is a tool in Proteus, which is used to view data coming from Serial Port (DB9) and also used to send the data to Serial Port.

LM35:LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or any development platform like Arduino.

Circuit Diagram:





Code:

```
int val;
int tempPin = A0;
const int ledPin=13;
void setup()
{
Serial.begin(9600);
pinMode(ledPin, OUTPUT);
}
void loop()
{
val = analogRead(tempPin);
float mv = ( val/1024.0)*5000;
float cel = mv/10;
float farh = (cel*9)/5 + 32;
Serial.print("TEMPRATURE = ");
Serial.print(cel);
```

```
Serial.print("*C ");
Serial.print(farh);
Serial.print("*F ");
Serial.println();
if (farh >98) {
digitalWrite(ledPin, HIGH);
Serial.print("Temperature is high.Light On");
Serial.println();
}
else{
digitalWrite(ledPin, LOW);
}
delay(1000);
}
```

Done compiling.

Discussion:

1) I find virtual terminal from debug menu when it doesn't pop up automatically.

2) Path of .hex file should be set properly in Arduino board for simulation.

3)Sometimes I forget to stop the simulation while adding or removing component.

4) Sometimes I forget to connect ground with the components.

Experiment No: 7

Experiment Name: Distance measurement simulation in Proteus Software using Ultrasonic Sensor.

Description:

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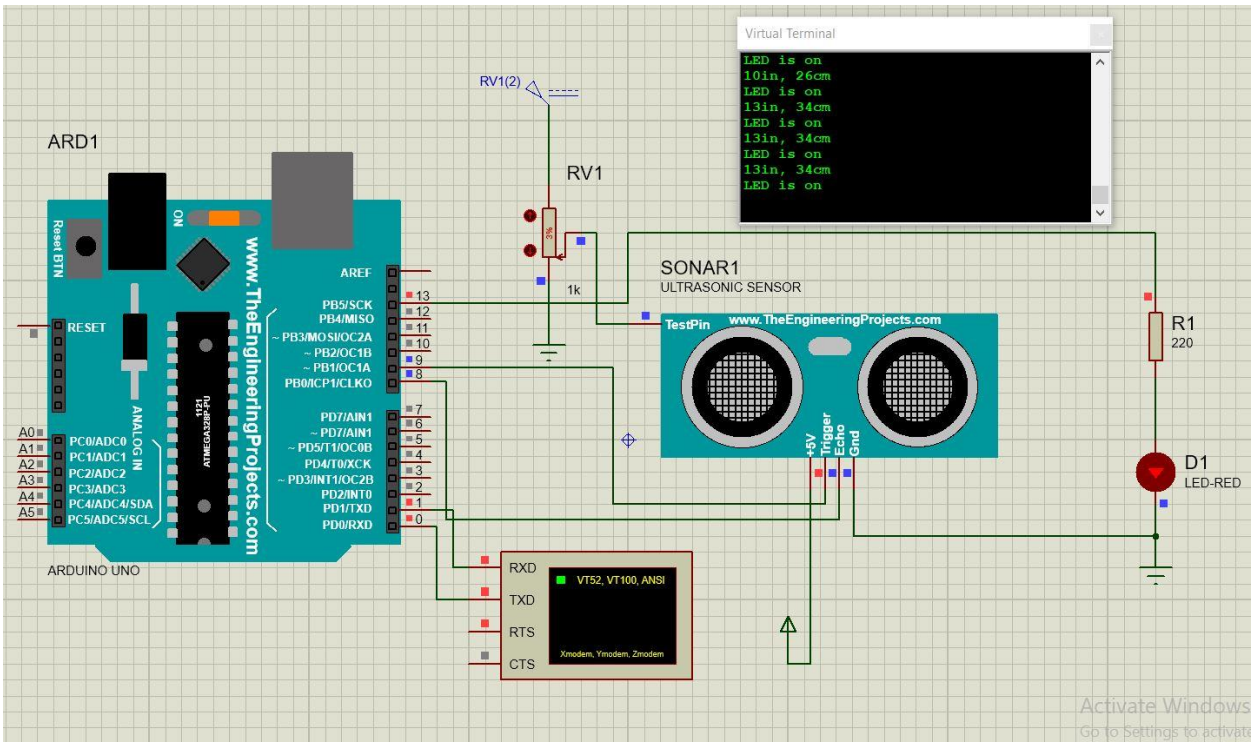
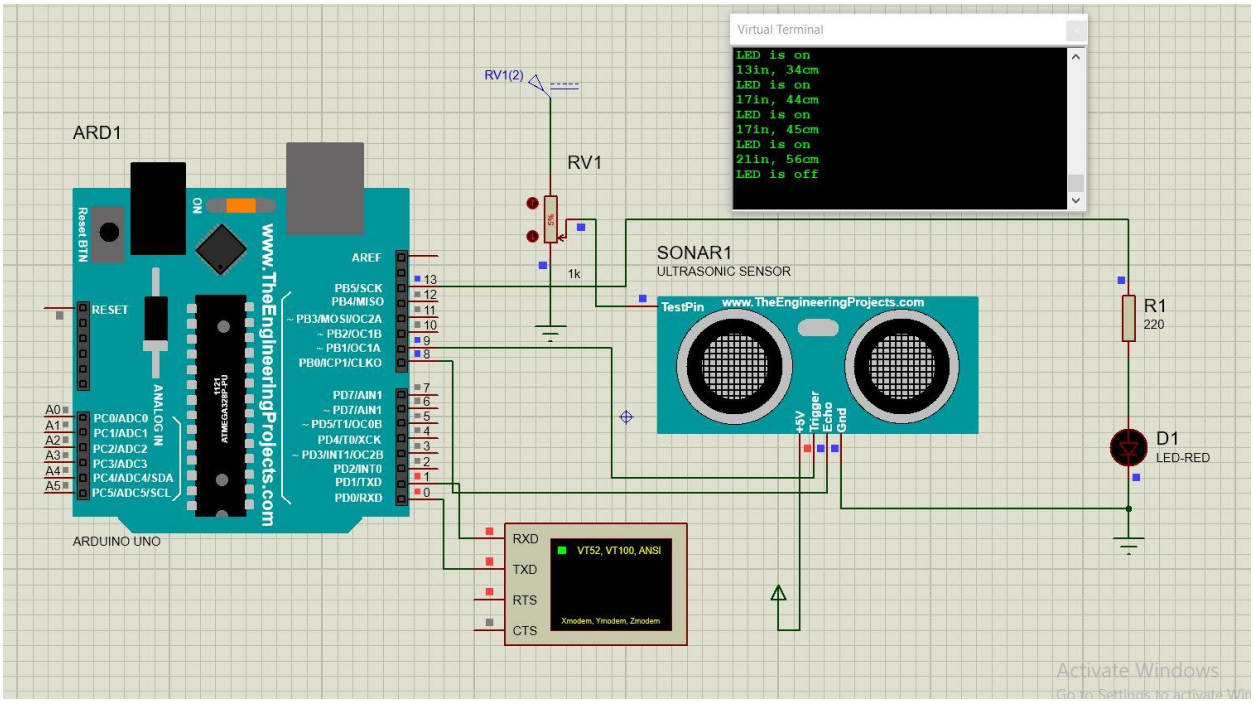
Virtual Terminal: Virtual Terminal is a tool in Proteus, which is used to view data coming from Serial Port (DB9) and also used to send the data to Serial Port.

Ultrasonic Sensor: An Ultrasonic Sensor is a device which detects the presence of a target object and measure the distance between the sensor and the object by sending a beam of ultrasound from its emmiter and detecting a reflection of the beam from the object with its receiver.The sensor calculates the exact distance between the sensor and object by computing travelling time and speed of the sound.

POT-HG: POT-HG is the only active variable resistor that allows to change the resistance during simulation run-time.

Circuit Diagram:




Virtual Terminal
LED is on
13in, 34cm
LED is on
17in, 44cm
LED is on
17in, 45cm
LED is on
21in, 56cm
LED is off
RV1(2)
RV1
5%
1k
ARD1
Reset BTN
ON
RESET
ANALOG IN
www.TheEngineeringProjects.com
AREF
PB5/SCK
PB4/MISO
~ PB3/MOSI/OC2A
~ PB2/OC1B
~ PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~ PD7/AIN1
~ PD5/T1/OC0B
PD4/T0/XCK
~ PD3/INT1/OC2B
PD2/INT0
PD1/TXD
PD0/RXD
A0 PC0/ADC0
A1 PC1/ADC1
A2 PC2/ADC2
A3 PC3/ADC3
A4 PC4/ADC4/SDA
A5 PC5/ADC5/SCL
ARDUINO UNO
SONAR1
ULTRASONIC SENSOR
TestPin
www.TheEngineeringProjects.com
+5V
Trigger
Echo
Gnd
R1
220
D1
LED-RED
RXD
TXD
RTS
CTS
VT52, VT100, ANSI
Xmodem, Ymodem, Zmodem
Activate Windows

Code:

```
#define trigPin 9
#define echoPin 8
int led=13;
void setup(){
Serial.begin (9600);
pinMode(trigPin,OUTPUT);
pinMode(echoPin,INPUT);
pinMode(led,OUTPUT);
}
void loop()
{
 long duration, distance,inches,cm;
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
```

```
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
inches =duration/ 74 / 2;
cm =duration/ 29 / 2;
Serial.print(inches);
Serial.print("in, ");
Serial.print(cm);
Serial.print("cm");
Serial.println();
if (inches <18)
{
digitalWrite(led,HIGH);
Serial.println("LED is on ");
delay(500);
}
else {

digitalWrite(led,LOW);
Serial.println("LED is off ");
delay(500);
}
}
```

Discussion:

1) I used POT-HG resistor to take different input value during simulation.

2) Path of .hex file should be set properly in Arduino board for simulation.

3) I forgot to specify the location of UltraSonicTEP.HEX file for the ultrasonic sensor.

Experiment No: 8

Experiment Name: Showing alphabet and decimal number by using 7 segment display in Proteus Software.

Description:

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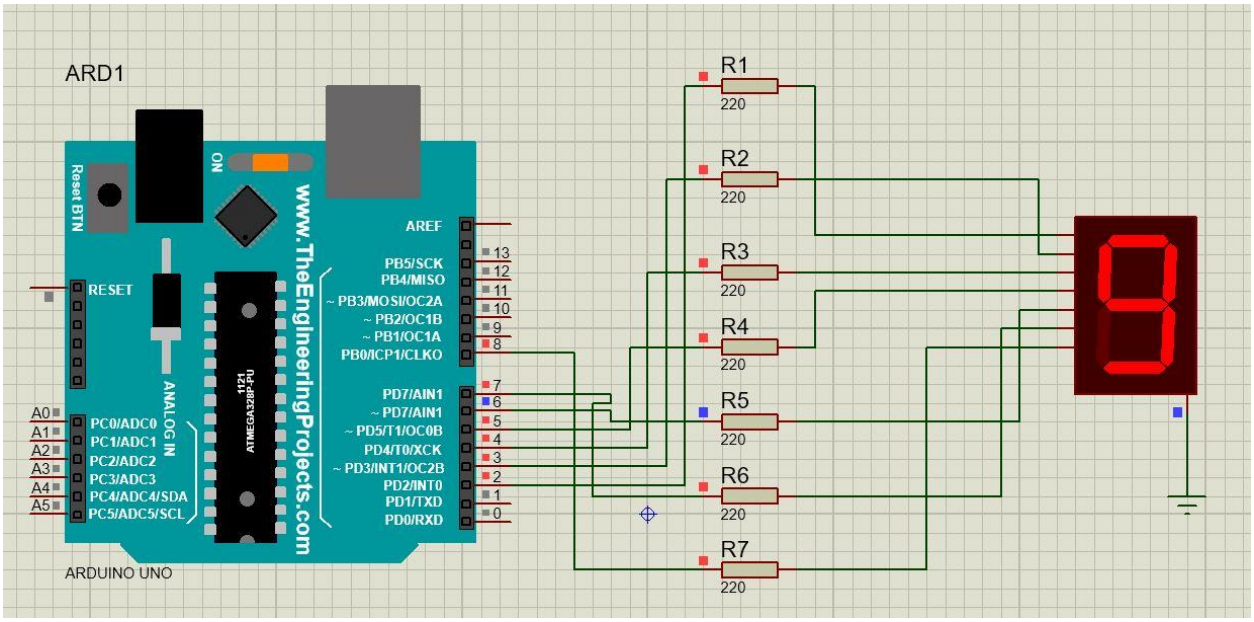
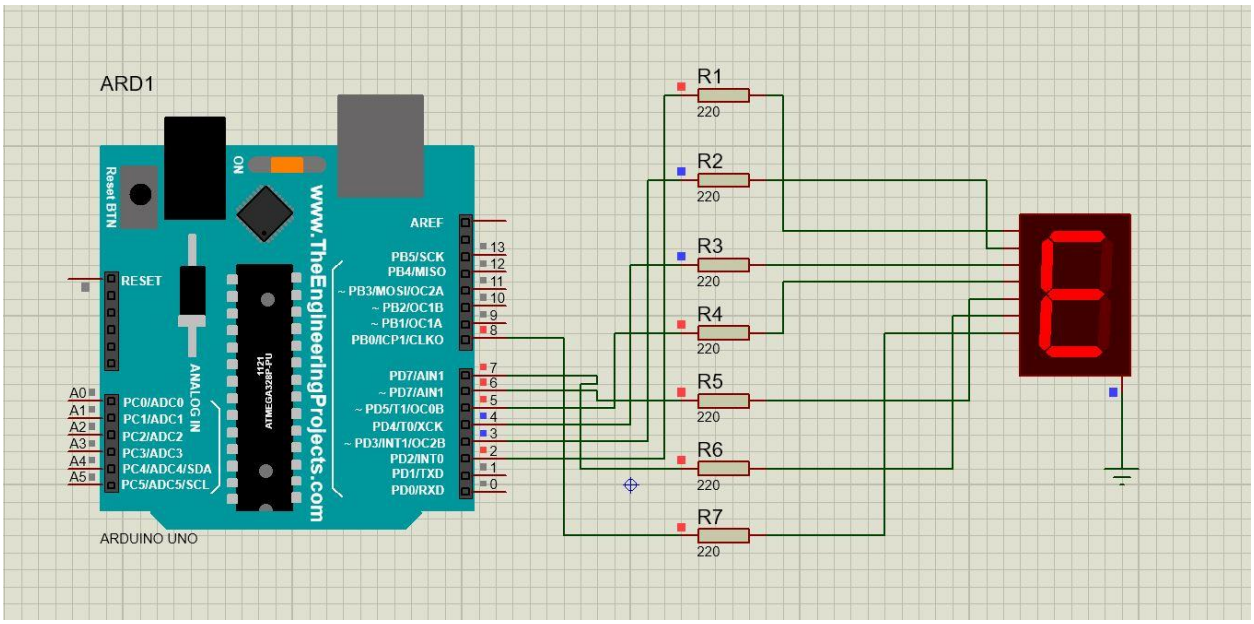
7-Segment Display: A seven-segment display is a set of seven bar-shaped LED (light-emitting diode) or LCD (liquid crystal display) elements, arranged to form a squared-off figure 8. A few seven-segment displays use other illumination devices, such as incandescent or gas-plasma ("neon") lamps. If all elements are activated, the display shows a numeral 8. When some of the elements are activated but not others, any single-digit numeral from 0 to 9, as well as most uppercase and lowercase letters of the English alphabet, can be portrayed. There are therefore two types of LED 7 segment display called Common Anode and Common Cathode.

Circuit Diagram:




ARD1
Reset BTN
ON
RESET
ANALOG IN
A0
A1
A2
A3
A4
A5
PC0/ADC0
PC1/ADC1
PC2/ADC2
PC3/ADC3
PC4/ADC4/SDA
PC5/ADC5/SCL
www.TheEngineeringProjects.com
ATMEGA328P-PU
AREF
PB5/SCK
PB4/MISO
~ PB3/MOSI/OC2A
~ PB2/OC1B
~ PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~ PD7/AIN1
~ PD5/T1/OC0B
PD4/T0/XCK
~ PD3/INT1/OC2B
PD2/INT0
PD1/TXD
PD0/RXD
ARDUINO UNO
R1
220
R2
220
R3
220
R4
220
R5
220
R6
220
R7
220

Code:

```
void setup() {
// define pin modes
pinMode(2,OUTPUT);
pinMode(3,OUTPUT);
pinMode(4,OUTPUT);
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
pinMode(7,OUTPUT);
pinMode(8,OUTPUT);
}
void loop(){
int i;
int j;
  for( i = 0; i <=9; i++){
        for( j= 2; j <=8; j++)
        {
          if(i==0)
          {
            if(j==8)
            digitalWrite(j,LOW);
            else digitalWrite(j,HIGH);
          }
```

```
  if(i==1)
 {
   if(j==3||j==4)
   digitalWrite(j,HIGH);
   else digitalWrite(j,LOW);
 }
  if(i==2)
 {
   if(j==4||j==7)
   digitalWrite(j,LOW);
   else digitalWrite(j,HIGH);
 }
  if(i==3)
 {
   if(j==6||j==7)
   digitalWrite(j,LOW);
   else digitalWrite(j,HIGH);
 }
 if(i==4)
{
  if(j==2||j==5||j==6)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
 if(i==5)
{
  if(j==3||j==6)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
 if(i==6)
{
  if(j==3)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
```

```
   if(i==7)
  {
    if(j==2||j==3||j==4)
    digitalWrite(j,HIGH);
    else digitalWrite(j,LOW);
  }
   if(i==8)
  {
    digitalWrite(j,HIGH);
  }
   if(i==9)
  {
    if(j==6)
    digitalWrite(j,LOW);
    else digitalWrite(j,HIGH);
  }
  }
  delay(600);
}
```

```
for(j=2;j<=8;j++)
{
  if(j==5)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
for(j=2;j<=8;j++)
{
  if(j==2||j==3)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
 for(j=2;j<=8;j++)
{
  if(j==3||j==4||j==8)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
```

```
 for(j=2;j<=8;j++)
{
  if(j==2||j==7)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
 for(j=2;j<=8;j++)
{
  if(j==3||j==4)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
 for(j=2;j<=8;j++)
{
  if(j==3||j==4||j==5)
  digitalWrite(j,LOW);
  else digitalWrite(j,HIGH);
}
delay(600);
       for(j=2;j<=8;j++)
      {
        if(j==3||j==8)
        digitalWrite(j,LOW);
        else digitalWrite(j,HIGH);
      }
      delay(600);
      }
```

Done compiling.

Discussion:

1) Sometimes I forget to stop the simulation while adding or removing component.

2) Sometimes simulation result cannot be interpreted easily.

3) Path of .hex file should be set properly in Arduino board for simulation.