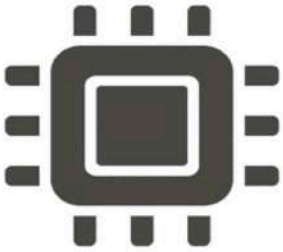

Embedded System

DSE

(Department of Electronics, Keshav Mahavidyalaya)

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College Roll No: 6060

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Submitted to:

Dr Jyoti Anand Ma'am

Practical No. 1

AIM - Program for 16 bit addition.

Code:-

```
LDI R16, $08
LDI R17, $02
LDI R18, $05
LDI R19, $01
LDI R21, $00
ADD R16, R18
BRSH L1
INC R21
L1: ADD R17, R19
    ADD R17, R21
```

Output:-

Watch 2

Name	Value
R16	13
R17	3

R14	0x00
R15	0x00
R16	0x0D
R17	0x03
R18	0x05
R19	0x01
R20	0x00
R21	0x00

Practical No. 2

AIM-Program for 16 bit Subtraction.

Code:-

```
LDI R16,$08
LDI R17,$02
LDI R18,$05
LDI R19,$01
LDI R21,$00
SUB R16,R18
BRSH L1
INC R21
L1: SUB R17,R19
ADD R17,R21
```

Output:-

R14	0x00
R15	0x00
R16	0x03
R17	0x01
R18	0x05
R19	0x01
R20	0x00

Practical No. 3

Aim- Program for Multi Byte Addition.

Code:-

```
 LDI R16,$12
 LDI R17,$04
 LDI R18,$0A
 LDI R19,$08
 LDI R20,$07
 LDI R21,$00
 ADD R16,R17
 BRSH L1
 INC R21
L1: ADD R16,R18
 BRSH L2
 INC R21
L2: ADD R16,R19
 BRSH L3
 INC R21
 L3:ADD R16,R20
 BRSH L4
 INC R21
L4:/// end
```

Output:-

Watch 2

Name	Value
R16	47
R21	0

R15	0x00
R16	0x2F
R17	0x04
R18	0x0A
R19	0x08
R20	0x07
R21	0x00

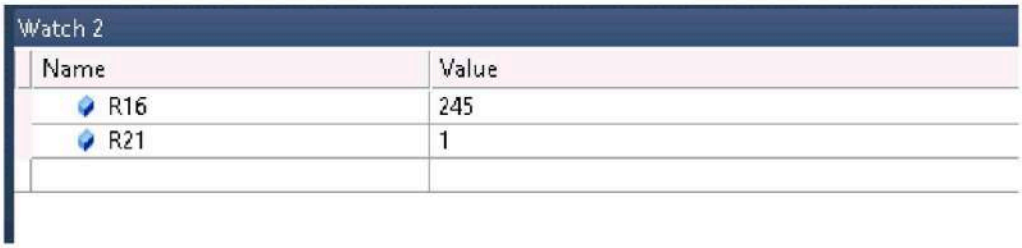
Practical No. 4

AIM- Program for Multi Byte Subtraction.

Code:-

```
 LDI R16,$12
 LDI R17,$04
 LDI R18,$0A
 LDI R19,$08
 LDI R20,$07
 LDI R21,$00
 sub R16,R17
 BRSH L1
 INC R21
L1: sub R16,R18
 BRSH L2
 INC R21
L2: sub R16,R19
 BRSH L3
 INC R21
L3:sub R16,R20
 BRSH L4
 INC R21
L4:/// end
```

Output:-



Name	Value
Program Counter	0x00000000
Stack Pointer	0x00000000
X Register	0x0000
Y Register	0x0000
Z Register	0x0000
Status Register	I T H S V N Z C
Cycle Counter	16384
Frequency	1.000 MHz
Stop Watch	16,384.00 µs
⊞ Registers	

R16	0xF5
R17	0x04
R18	0x0A
R19	0x08
R20	0x07
R21	0x01
R22	0x00

Practical No. 5

Aim- Program for Multiply two 8-bit numbers and store the 16 bit result in memory.

Code:-

```
 LDI R16,$04
 LDI R17,$05
 MOV R20,R16
 DEC R17
L1:ADD R16,R20
 DEC R17
 BRNE L1
 STS 0x300,R17
```

Output:-

Practical No. 6

AIM- Program for Divide a 16 bit number by 8 bit number and store the quotient and remainder in two consecutive memory loction.

Code:-

```
LDI R16,0x0a
LDI R17,0x00
LDI R18,0x04
LDI R19,0x00
LDI R20,0x00
L1:ADD R17,R18
 MOV R20,R16
 SUB R20,R17
 BRMI result
 INC R19
 BRNE L1
STS 0x300,R22
BREQ over
RESULT:SUB R17,R18
MOV R21,R17
SUB R16,R21
MOV R20, R16
STS 0x300,R19
STS 0x301,R20
OVER:
```

Name	Value
R13	0x00
R14	0x00
R15	0x00
R16	0x02
R17	0x08
R18	0x04
R19	0x02
R20	0x02
R21	0x08
R22	0x00
R23	0x00
R24	0x00
R25	0x00
R26	0x00

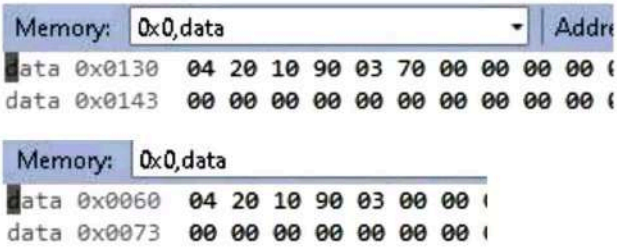
Practical 7

AIM:- Program to transfer a block of data.

Code:-

```
LDI  R16,5   LDI
XL,0X30      LDI
XH,0X01      LDI
YL,0X60      LDI
YH,0X00  L1:  LD
R20,X+        ST
Y+,R20   DEC R16
BRNE L1
```

Output: -



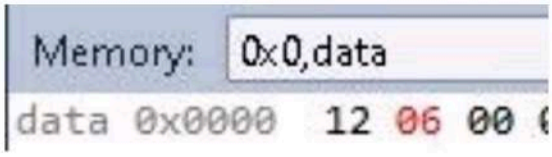
Practical No. 8

AIM:- Program to find the number of zeros in the 8 bit data.

Code:-

```
LDS R17,0X0000
LDI R18,0 LDI
R20,0X08 LDI
R19,8 L1:ROR
R17 BRSH L2
INC R18 L2:DEC
R19 BRNE L1
SUB R20,R18
MOV R18,R20
STS 0X0001,R18
```

Output: -



Practical No. 9

AIM:- Program that finds the position of the first high in an 8-bit data. The data is scanned from D7 to D0.

Code:-

```
CLC
LDI R16, 0
LDI R24,23 LDI
R17, 8  INC R16
LOOP:     ROL
R24
BRCC ENDLOOP
INC R16
ENDLOOP:     DEC
R17
BRNE LOOP
```

Output: -

Name	Value
r24	11
R16	5
R16	5
R20	0
r17	0
r	Unknown identifier

Practical No. 10

AIM:- Program to search a given number in a given list of 10 numbers.

Code:-

```
LDI R17,10
LDI XL,0X30
LDI XH,0X00
LDI R16,3
L1:LD R18,X
CP R18,R16
BREQ L2
  INC XL
DEC R17   BRNE
L1
L2:MOV R20,XL
MOV R21,XH
```

Output: -

Program Counter	0x00000000
Stack Pointer	0x00000000
X Register	0x0035
Y Register	0x0000

R19	0x00
R20	0x35
R21	0x00
R22	0x00

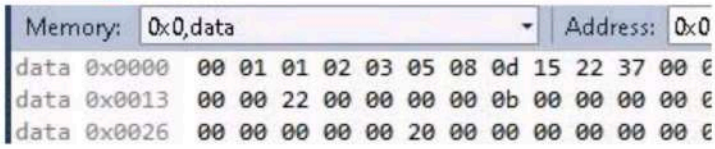
Practical No. 11

Aim Program to generate first ten terms of Fibonacci series.

Code:-

```
LDI R24,8  LDI
R17,1  LDI
XL,0X00  LDI
XH,0X00  LDI
R16,0X00  ST
X+,R16  INC R16
ST X+,R16  ST
X+,R16  L1: MOV
R21,R16  ADD
R16,R17  ST
X+,R16  MOV
R17,R21  DEC R24
BRNE L1
```

Output: -



Practical No. 12

Aim write a program to monitor the PB7 bit. When it is LOW , send $55 and $AA to Port C continuously.

Program

```
cbi  DDRB,7  ldi
R16,0xff     out
DDRC,R16     ldi
R17,$55      ldi
R18,$AA      ldi
R23,0   l1:   in
R20,PINB
    sbrs R20,7
     rjmp l2
dec R23   brne
l1

l2: out PORTC,R17
out PORTC,R18
dec R23   brne l1
```

Output: -

```
lata 0x0022  fe ff 00 00 00
lata 0x0035  55 00 00 3f 00
lata 0x0048  00 00 00 00 00
```

Name- **Vipin Mishra**

Roll no. - **6060**

Sub. - **Embedded system**

Submitted to:

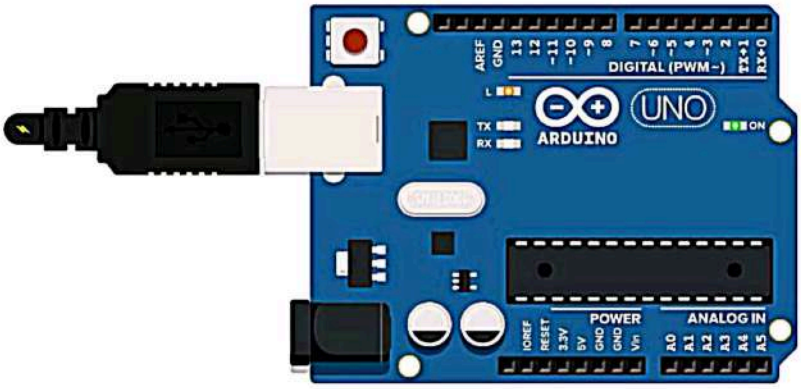
Dr. Jyoti Anand Ma'am

Practical 1

Aim - Flashing on Board LED(Uno) at an observable rate.

Apparatus Required –

Arduino uno.



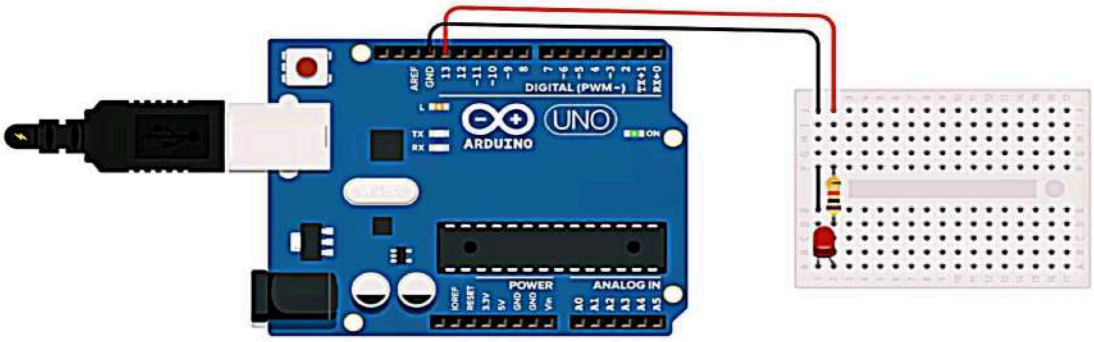
Code -

```
void setup()

{

  pinMode(LED_BUILTIN,
OUTPUT);

}

void loop()

{

  digitalWrite(LED_BUILTIN,HIGH);

  delay(2000);

  digitalWrite(LED_BUILTIN, LOW);

  delay(2000);

}
```

Practical 2

Aim: Hello LED-Flash LED at a rate such that the LED appears always on. Estimate the onset of the rate when the LED appears to stay on.

Circuit:



Code:

```
void setup()
{
 pinMode(13,OUTPUT);
}
void loop()
{
 digitalWrite(13,HIGH);
 delay(10);
 digitalWrite(13,LOW);
 delay(10);
}
```

```
}

void loop()
{
      int soundsens=analogRead(soundpin);
      if (soundsens>=threshold)
      {
                digitalWrite(ledpin,HIGH); //turns led on
                Serial.println(soundsens);
                delay(100);
          }
      else
      {
                digitalWrite(ledpin,LOW);
          }
}
```

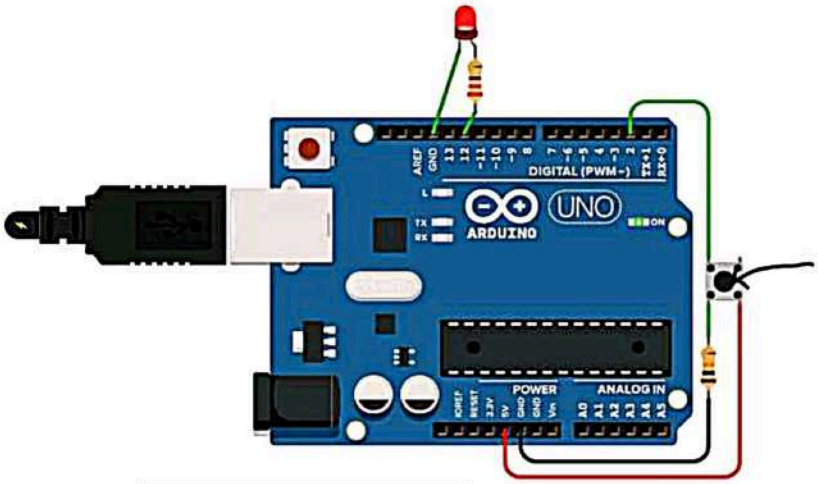
Practical 3

Aim - ON/OFF external LED with push button switch.

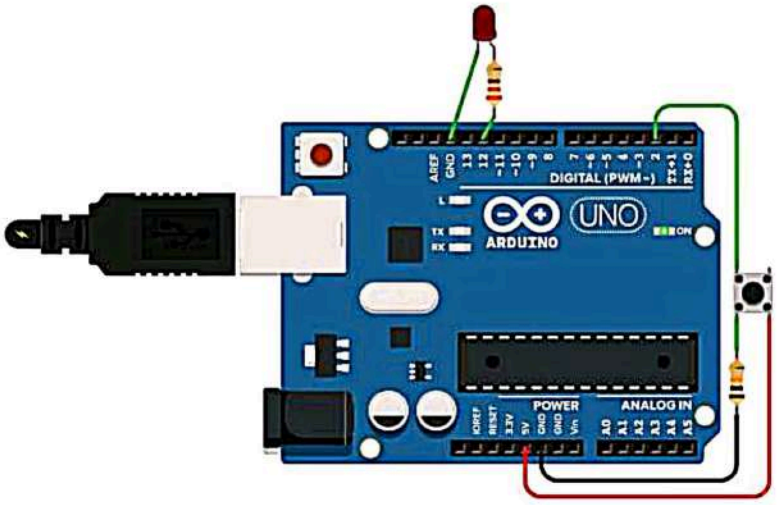
Apparatus Required – Arduino uno, LED, 220 ohm and 10k ohm resistor, push button, wires.

Code -

```
int buttonState = 0;
void setup()
{
  pinMode(2, INPUT);
  pinMode(12, OUTPUT);
}
void loop()
{
  buttonState = digitalRead(2);
  if (buttonState == HIGH) {
    digitalWrite(12, HIGH);
  } else {
    digitalWrite(12, LOW);
  }
  delay(10);
}
```



When button is pushed



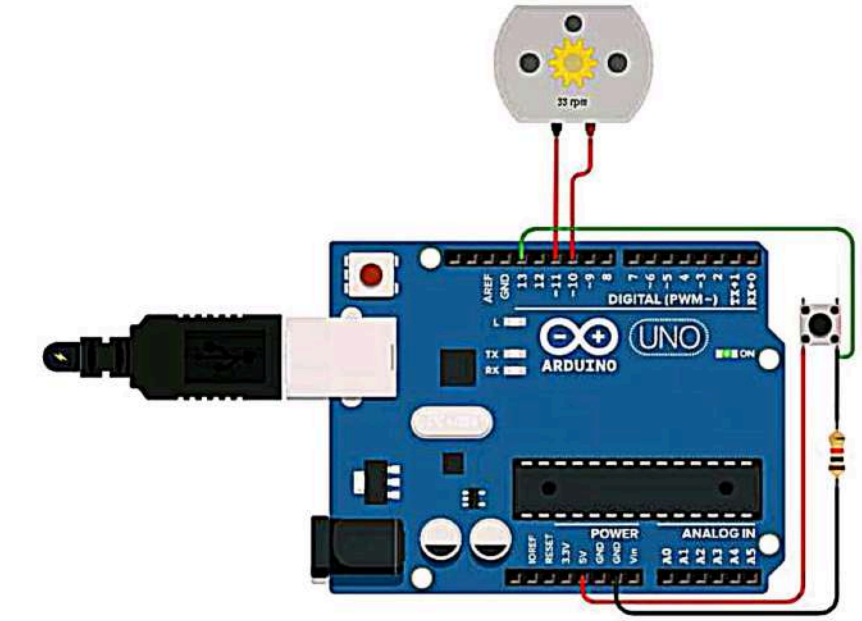
Practical 4

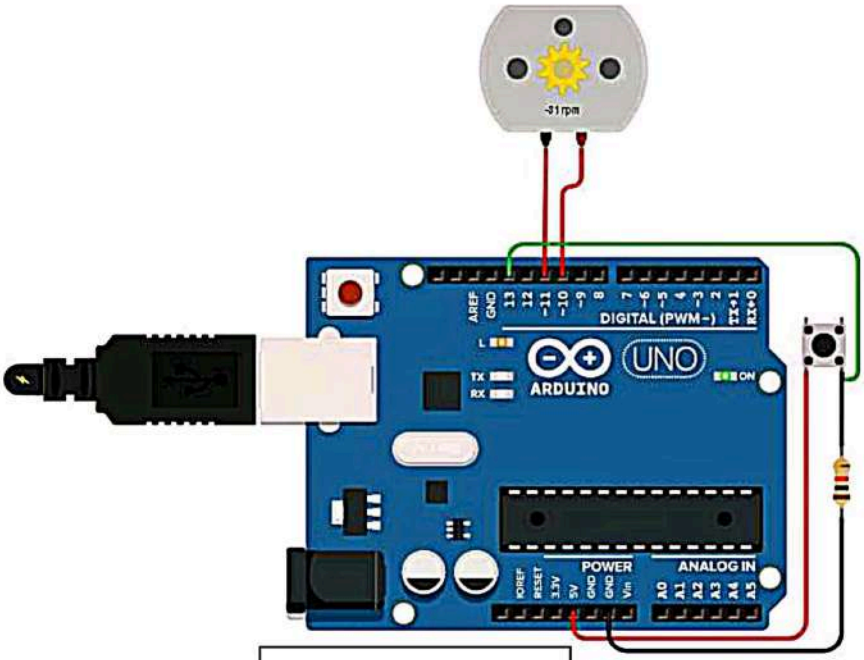
Aim - Interfacing of DC Geared Motor.

Apparatus Required – Arduino uno, DC motor, push button, resistor, wires.

Code -

```
int button = 0;
void setup()
{
  pinMode(13, INPUT);
  pinMode(10, OUTPUT);
  pinMode(11, OUTPUT);
}
void loop()
{
  button = digitalRead(13);
  if(button == HIGH)
  {
    analogWrite(11,2);
    analogWrite(10,0);
  }
  else
  {
   analogWrite(11,0);
   analogWrite(10,2);
  }
  delay(20);
}
```





When button is pushed

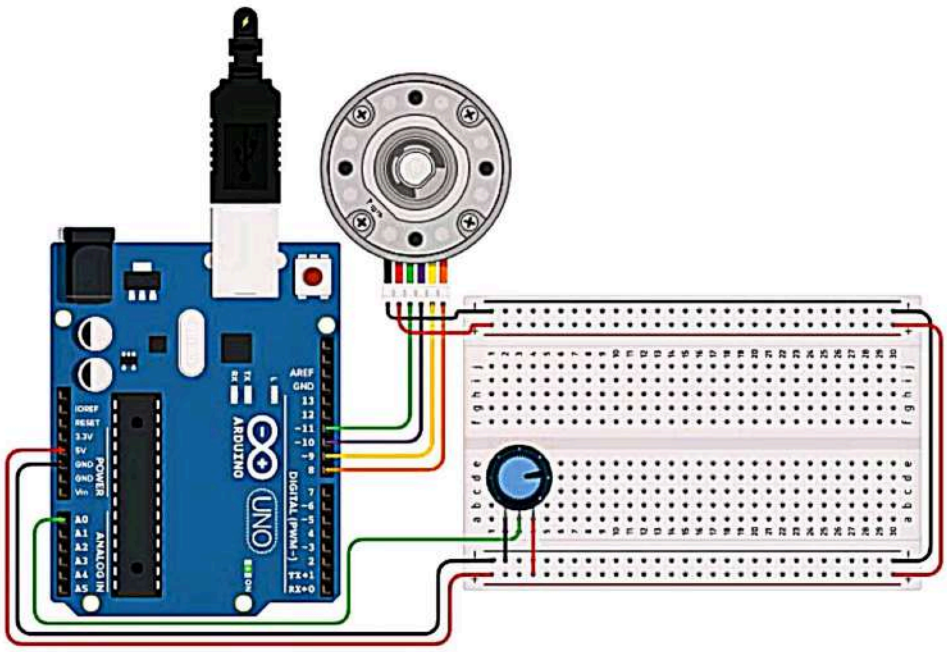
Practical 5

Aim - Interfacing of Stepper Motor.

Apparatus Required – Arduino uno, Stepper motor, wires.

Code –

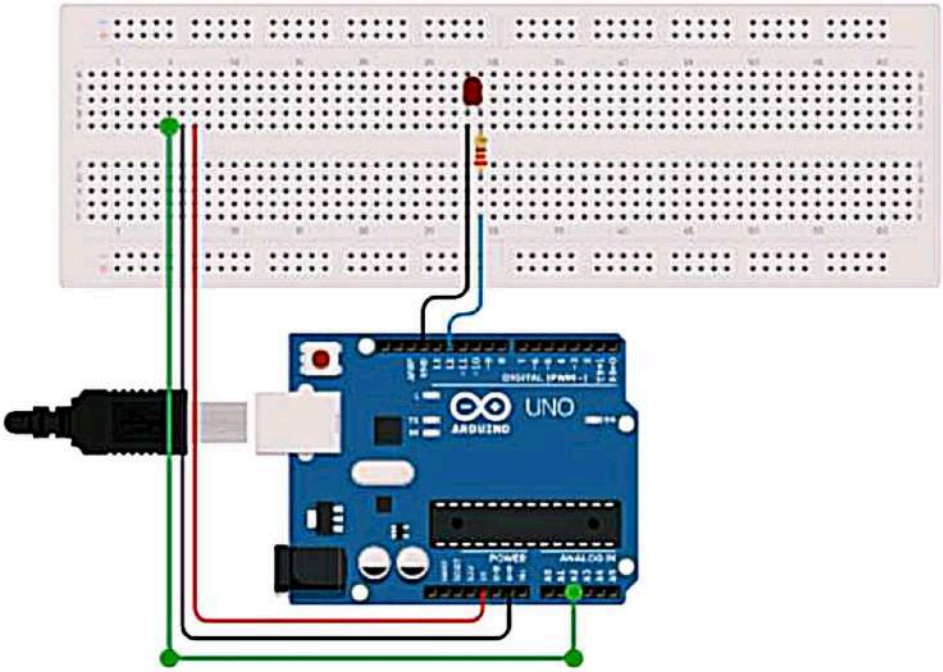
```
#include <Stepper.h>


const int stepsPerRevolution = 200;

Stepper myStepper(stepsPerRevolution, 8, 9, 10, 11);


void setup() {

}

void loop() {

  int sensorReading =
analogRead(A0);

  int motorSpeed =
map(sensorReading, 0, 1023,
0, 100);

  if (motorSpeed > 0) {

    myStepper.setSpeed(motorSpeed);

    myStepper.step(stepsPerRevolution / 100);

  }

}
```



Practical 6

Aim: LED control using sound sensor.

Circuit



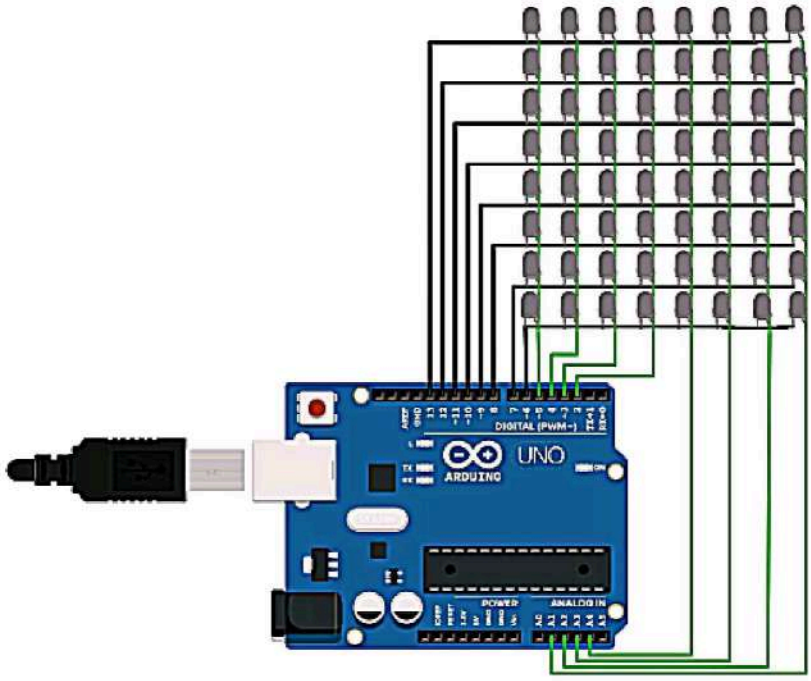
Code

```
const int ledpin=12; // led is connected to pin 12
const int soundpin=A2; // sound sensor AO pin is connected to pin A2
const int threshold=520; // sets threshold value for sound sensor

void setup()
{
  Serial.begin(9600);
  pinMode(ledpin,OUTPUT);
  pinMode(soundpin,INPUT);
```

Practical 7

Aim: Interfacing of LED matrix.

Circuit



Code

```
#define ROW1 13

#define ROW2 12

#define ROW3 11

#define ROW4 10

#define ROW5 9

#define ROW6 8

#define ROW7 7

#define ROW8 6
```

```
#define COL1 5
#define COL2 4
#define COL3 3
#define COL4 2
#define COL5 A4
#define COL6 A3
#define COL7 A2
#define COL8 A1

const int row[] = {ROW1, ROW2, ROW3, ROW4, ROW5,
ROW6, ROW7, ROW8};
const int col[] = {COL1,COL2, COL3, COL4, COL5, COL6, COL7,
COL8};
int A[8][8] = {{1,1,1,1,1,1,1,1},
               {1,1,1,0,0,1,1,1},
               {1,1,0,1,1,0,1,1},
               {1,1,0,1,1,0,1,1},
               {1,1,0,0,0,0,1,1},
               {1,1,0,1,1,0,1,1},
               {1,1,0,1,1,0,1,1},
               {1,1,1,1,1,1,1,1}};
void setup() {
 Serial.begin(9600);
 for (int i = 2; i <= 13; i++) {
  pinMode(i, OUTPUT);
  digitalWrite(i, LOW);
 }
 pinMode(A1, OUTPUT);
 digitalWrite(A1, LOW);
 pinMode(A2, OUTPUT);
 digitalWrite(A2, LOW);
 pinMode(A3, OUTPUT);
 digitalWrite(A3, LOW);
 pinMode(A4, OUTPUT);
 digitalWrite(A4, LOW);
}
void loop() {
 delay(10);
 yaz(A);
```

```
}
void  yaz(int matrix[8][8]){
  for (int c=0; c<8; c++){
    digitalWrite(col[c], HIGH);
    for (int r = 0; r < 8; r++){
      digitalWrite(row[r], 255*matrix[r][c]);
     delay(1);
    }
    for (int r = 0; r < 8; r++){
      digitalWrite(row[r], HIGH);
     delay(1);
    }
    digitalWrite(col[c], LOW);
  }
}
```