ARDUINO CONTROLLER PROGRAMMING & ITS APPLICATIONS

Day-Two

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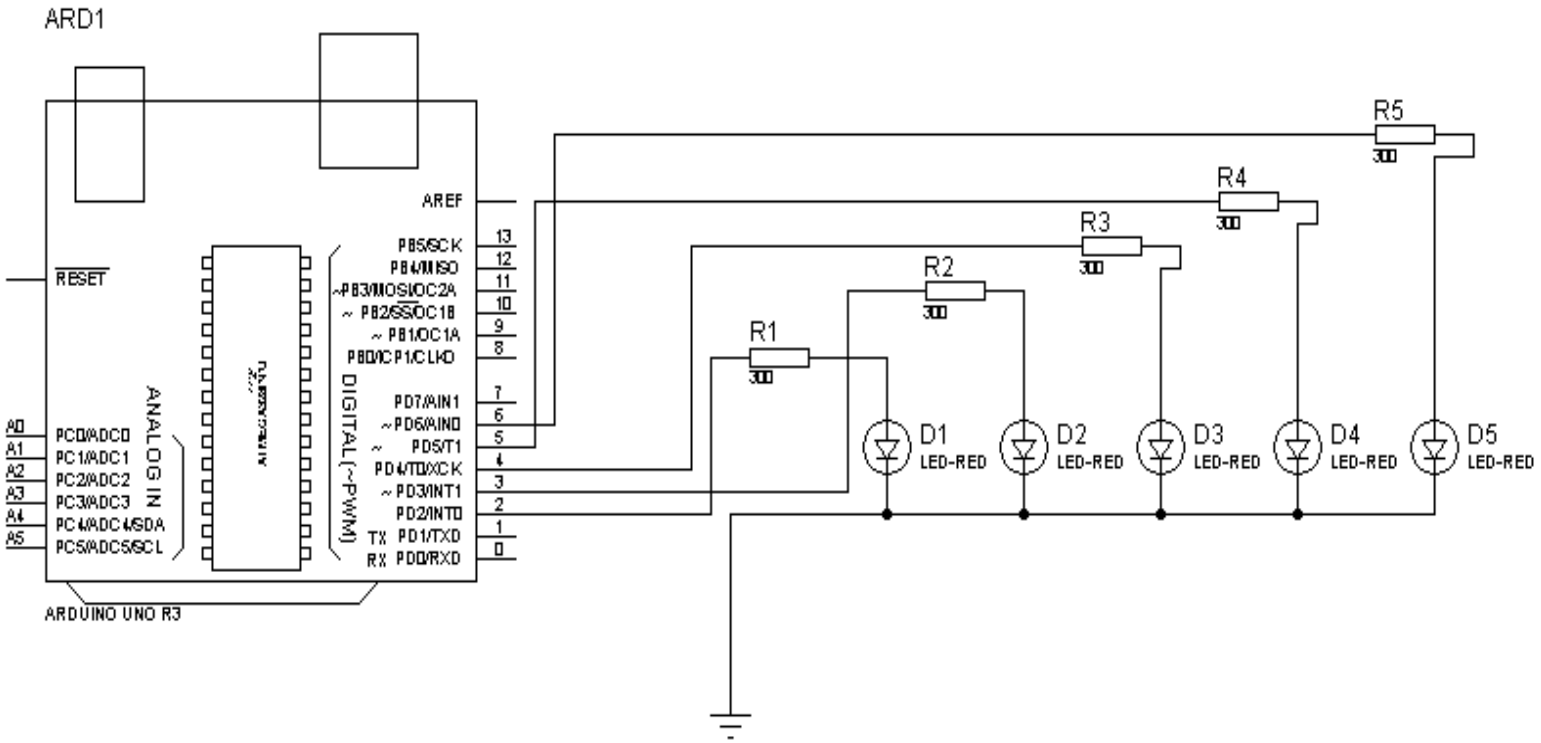
Outline

Day	Activity
1	i. Introduction to Arduino development board and Arduino IDE ii. C/C++ language overview iii. Basic input / output with Arduino iv. Overview of Proteus simulation software for Arduino simulation
2	i. Interfacing and glowing LEDs with different pattern ii. Interfacing push button and piezo buzzer iii. Interfacing a temperature sensor with Arduino
3	i. Familiarization with Serial Monitor for input and for output ii. Interfacing LDR sensor with Arduino iii. Interfacing PIR motion sensor with Arduino
4	i. Interfacing Arduino with LCD (16x2), relay and Servo motor ii. Interface Arduino with Sonic Sensor for obstacle detection
5	i. Interfacing shift register and 7-segment display with Arduino ii. Interfacing HC-05 Bluetooth module with Arduino iii. Driving GSM modem with Arduino
Prerequisites: - Knowledge of C++ - Knowledge of basic electronic components	

Example 1: LED Wave

Circuit



Example 1: LED Wave

Code

```
void setup() {
pinMode(2,OUTPUT);
pinMode(3,OUTPUT);
pinMode(4,OUTPUT);
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
}
void loop() {
digitalWrite(2,HIGH);
delay(50);
digitalWrite(2,LOW);
digitalWrite(3,HIGH);
delay(50);
digitalWrite(3,LOW);
digitalWrite(4,HIGH);
delay(50);
digitalWrite(4,LOW);
digitalWrite(5,HIGH);
delay(50);
digitalWrite(5,LOW);
digitalWrite(6,HIGH);
delay(50);
digitalWrite(6,LOW);
digitalWrite(5,HIGH);
delay(50);
digitalWrite(5,LOW);
digitalWrite(4,HIGH);
delay(50);
digitalWrite(4,LOW);
digitalWrite(3,HIGH);
delay(50);
digitalWrite(3,LOW);
delay(50);
}
```

Randomize Function

- Arduino can't choose a purely random number by itself
- Pseudo Random function is used to generate random numbers
- The algorithm requires a seed (starting point) to generate random numbers
  - It is better technique to use an ambient current as seed from free analog pin

```
randomSeed(analogRead(0));
```

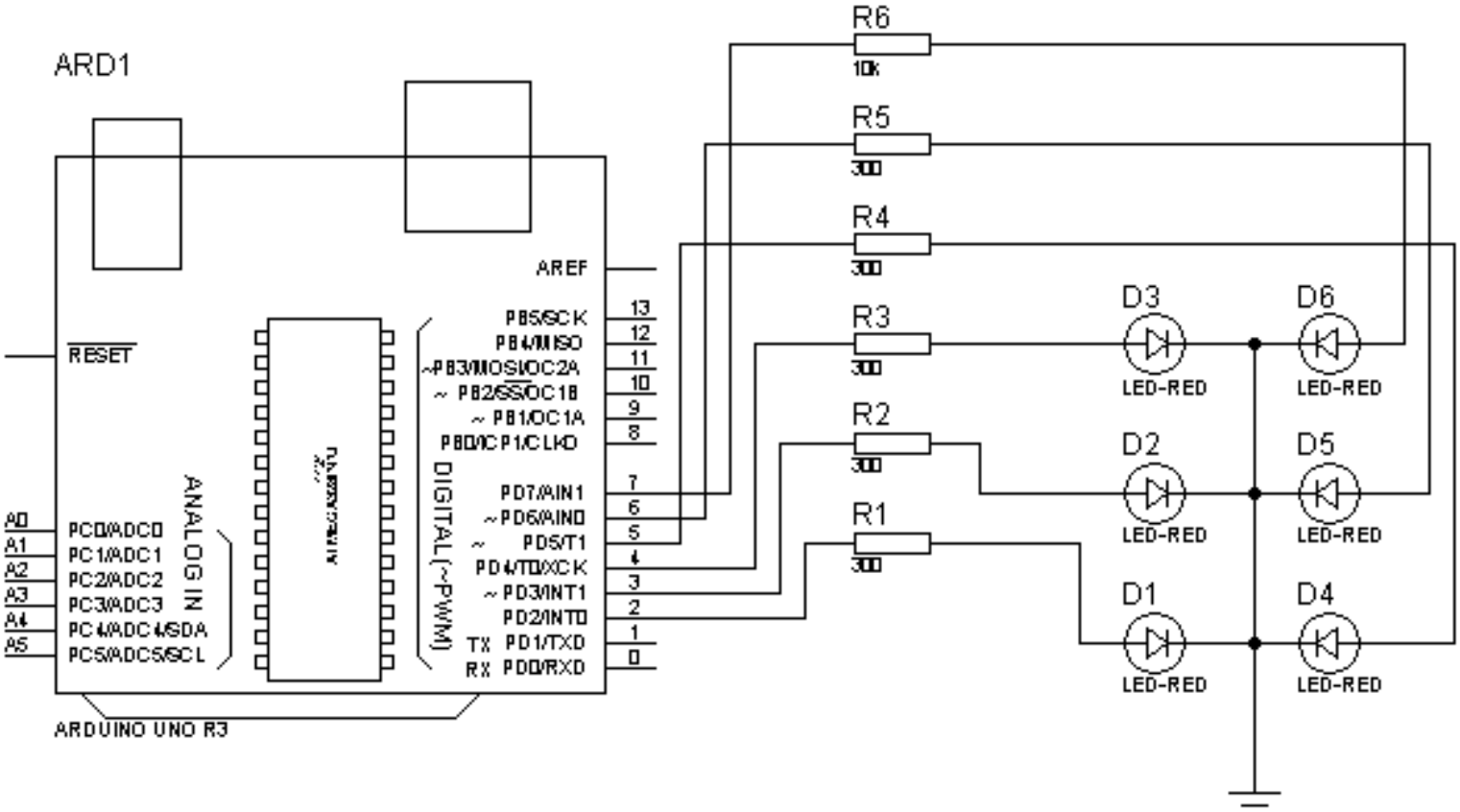
- While, random function can be called to generate random number in range

```
random(a,b);
```

  - The random function returns an integer value in range from a to b-1

Example 2: LED Dice

Circuit



Example 2: LED Dice

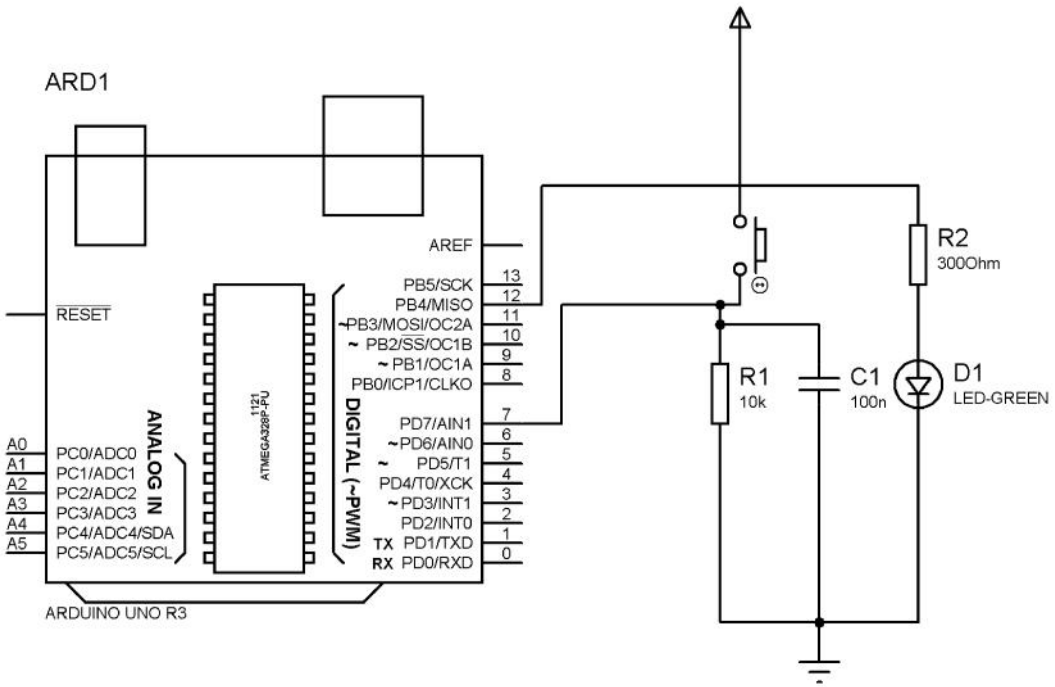
Code

```
void setup()
{
  randomSeed(analogRead(0));
  for ( int z = 1 ; z < 7 ; z++ )
        pinMode(z+1, OUTPUT);
}
void randomLED(int del)
{
  int r;
  r = random(1, 7);
  for (int i = 1; i<=r; i++ )
       digitalWrite(r+1, HIGH);
  delay(del);
  for (int i = 1; i<=r; i++ )
      digitalWrite(r+1, LOW);
}
```

```
void loop()
{
  int a;
   for ( a = 0 ; a < 100 ; a++ )
  {
    randomLED(50);
  }
}
```

Example 3: Push Button

Circuit

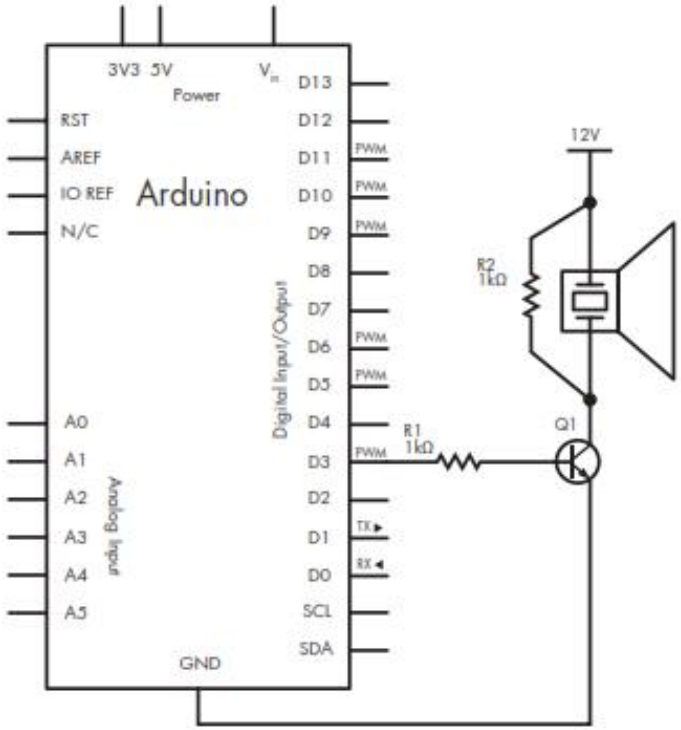


Code

```
#define LED    12
#define BUTTON 7
void setup()
{
   pinMode(LED, OUTPUT);
   pinMode(BUTTON, INPUT);
}
void loop()
{
  if ( digitalRead(BUTTON) == HIGH )
  {
    digitalWrite(LED, HIGH);
    delay(500);
    digitalWrite(LED, LOW);
  }
}
```

Example 4: Piezo buzzer

Circuit

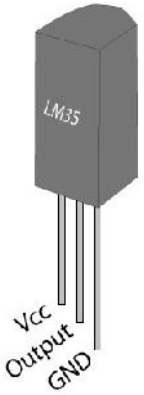


Code

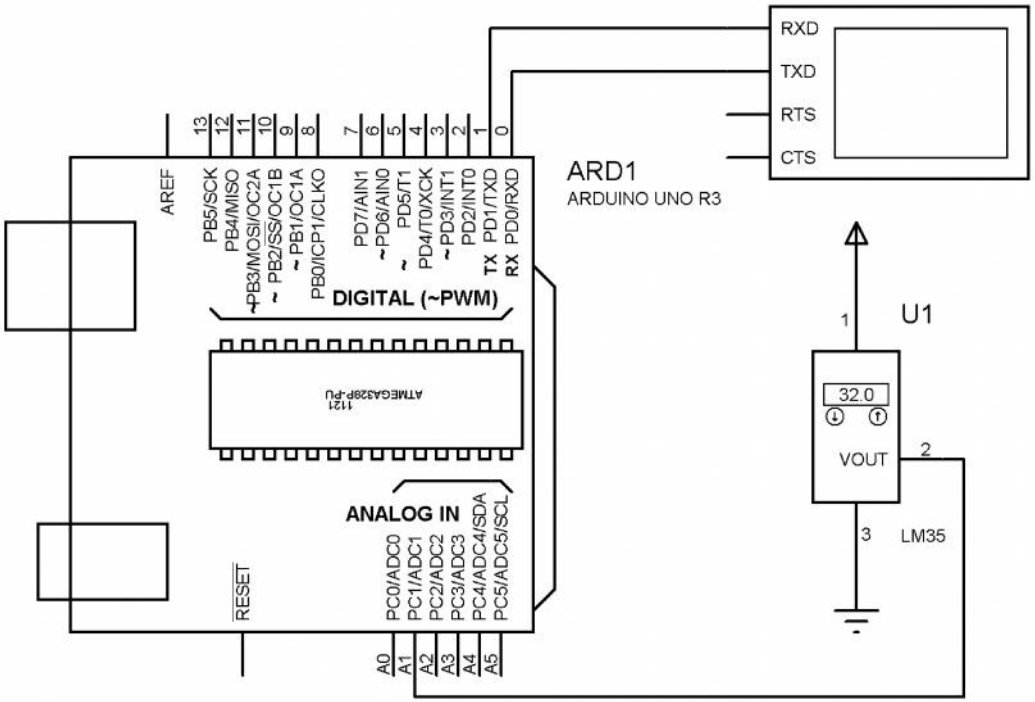
```
#define PIEZO 3
int del = 500;
void setup()
{
  pinMode(PIEZO, OUTPUT);
}
void loop()
{
  analogWrite(PIEZO, 128);
  delay(del);
  digitalWrite(PIEZO, LOW);
  delay(del);
}
```

Example 5: Temperature Sensor

- LM35 temperature sensor can be used to measure temperature
- Returns analog voltage value w.r.t temperature
- Analog value can be converted into Celsius i.e. (val/1024)*500



Circuit



Code

```
int val;
int tempPin = 1;
void setup()
{
Serial.begin(9600);
}
void loop()
{
val = analogRead(tempPin);
float cel = (val/1024.0)*500;
Serial.print("TEMPRATURE = ");
Serial.print(cel);
Serial.print("*C");
Serial.println();
delay(1000);
}
```

Exercise

- Simulate Arduino Thermometer using Proteus

Questions