GAZİ UNIVERSITY

FACULTY OF ENGINEERING

EEE306 / CENG318 - MICROPROCESSORS PROJECT

ELECTRICAL ELECTRONICS ENGINNERING - COMPUTER ENGINEERING DEPARTMENTS

INTERDISCIPLINARY WORK REPORT

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1. INTRODUCTION

The purpose of this project is to create different shapes and patterns using 4x4 keypads in the binary number system and 8-bit light patterns. In this project, we aim to use the values read from the 4x4 keypads, which are simple input devices, to generate various shapes and patterns. The binary number system forms the foundation of modern computers, representing numbers using only the digits 0 and 1. In this project, we read values based on this binary system through 4x4 keypads and used these values to create different shapes and patterns. Additionally, we utilized 8-bit light patterns in our project. These patterns consist of sequences of lights that represent specific shapes or patterns. By using these sequences, we be able to generate different light patterns based on the binary values read from the keypads. The objective of this project is to allow users to select different binary values using the keypads and based on these values, produce aesthetically pleasing patterns and shapes. Our project can be seen as a creative fusion of the binary number system and light patterns. Users will be able to choose different binary values through a simple keypad and enjoy the visual spectacle that emerges as a result. Following this introduction, we delved into the details of the project, explaining how we utilized the binary number system and light patterns to create different shapes and patterns.

2. HARDWARE REQUIREMENTS

The hardware requirements to be used in this project require certain components for 4x4 keypads and light patterns to be read and visually presented correctly. Here are the hardware requirements for the project:

- ARDUINO UNO: Arduino UNO is a development board that used as the microcontroller in the project. Arduino UNO process the values read from the keypad and control the light patterns.
- ARDUINO BREADBOARD: An Arduino breadboard is used for connecting and prototyping the components in the project. It allows for easy connection of components and building the circuit.
- JUMPER WIRES: Jumper wires used to establish connections between the components. Arduino require jumper wires to connect the keypad, light modules, and resistors.

- 8 x 220 OHM RESISTANCE: One 220-ohm resistor used for each LED. These resistors ensured the proper operation of the LEDs with Arduino and help prevent excessive current.
- 8 x LED: Eight LEDs use to create the light patterns. Each LED illuminated in a specific color and contributed to forming the desired shapes and patterns.
- 4 x 4 KEYPAD: The 4x4 keypad is the main input device used for reading the binary values. Users select binary numbers using the keypad and control the generated patterns.

3. SOFTWARE REQUIREMENTS

The software requirements for this project involve the following components:

- Arduino IDE (Integrated Development Environment): It is the software used to program the Arduino microcontroller. We used the latest version of Arduino IDE for this project.
- Arduino Libraries: The Arduino IDE comes with various libraries, and relevant libraries need to be added to control the components used in this project, such as the keypad and LEDs. For example, we used the "Keypad" library for reading the 4x4 keypad.
- Arduino Programming Language: The Arduino IDE utilizes the Arduino Programming Language for programming the Arduino microcontroller. In this project, we wrote Arduino code using the Arduino Programming Language to read binary values and control the light patterns.
- Computer Operating System: A computer is required to develop the project and program the Arduino microcontroller.

4. COMBINATION OF LIGHT PATTERNS

The definition of light patterns is completed by considering the LEDs as an 8-bit number. These are determined states of light patterns.

'A'	RESET
'B'	1111 1111
'C'	1010 1010
'D'	0101 0101

LIGHT PATTERN 1	LIGHT PATTERN 2	LIGHT PATTERN 3
1000 0000	0000 0001	1111 1110
0100 0000	0000 0010	1111 1101
0010 0000	0000 0100	1111 1011
0001 0000	0000 1000	1111 0111
0000 1000	0001 0000	1110 1111
0000 0100	0010 0000	1101 1111
0000 0010	0100 0000	1011 1111
0000 0001	1000 0000	0111 1111

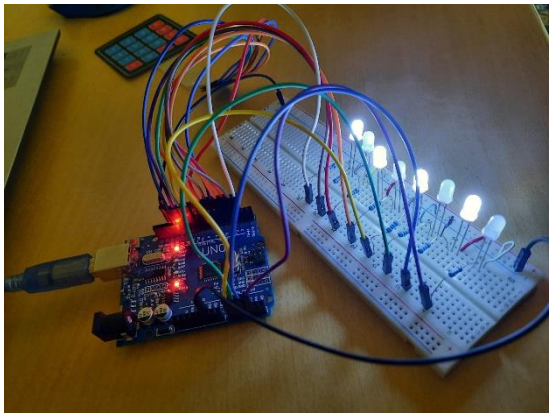
LIGHT PATTERN 5	LIGHT PATTERN 5	LIGHT PATTERN 6
0111 1111	1000 0000	0000 0001
1011 1111	1100 0000	0000 0011
1101 1111	1110 0000	0000 0111
1110 1111	1111 0000	0000 1111
1111 0111	1111 1000	0001 1111
1111 1011	1111 1100	0011 1111
1111 1101	1111 1110	0111 1111
1111 1110	1111 1111	1111 1111

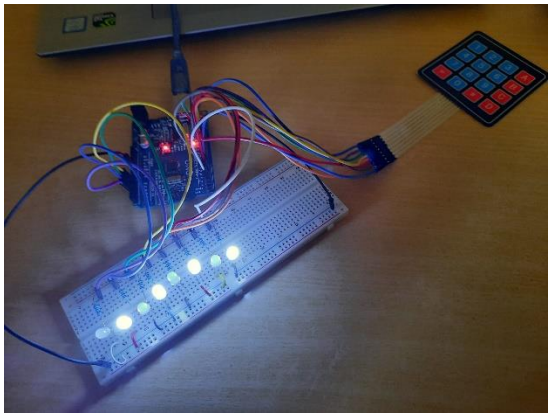
LIGHT PATTERN 7	LIGHT PATTERN 8	LIGHT PATTERN 9
0001 1000	1000 0001	1010 1010
0011 1100	1100 0011	0101 0101
0111 1110	1110 0111	1010 1010
1111 1111	1111 1111	0101 0101
1110 0111	1110 0111	1010 1010
1100 0011	1100 0011	0101 0101
1000 0001	1000 0001	1010 1010
0000 0000	0000 000	0101 0101

LIGHT PATTERN 10	LIGHT PATTERN 11	LIGHT PATTERN 12
0101 0101	0000 0001	1000 0000
1010 1010	0000 0101	1010 0000
0101 0101	0010 0101	1010 1000
1010 1010	0101 0101	1010 1010
0101 0101	1000 0000	0000 0001
1010 1010	1010 0000	0000 0101
0101 0101	1010 1000	0001 0101
1010 1010	1010 1010	0101 0101

5. HARDWARE SYSTEM

This is the final version of the circuit example with hardware part.

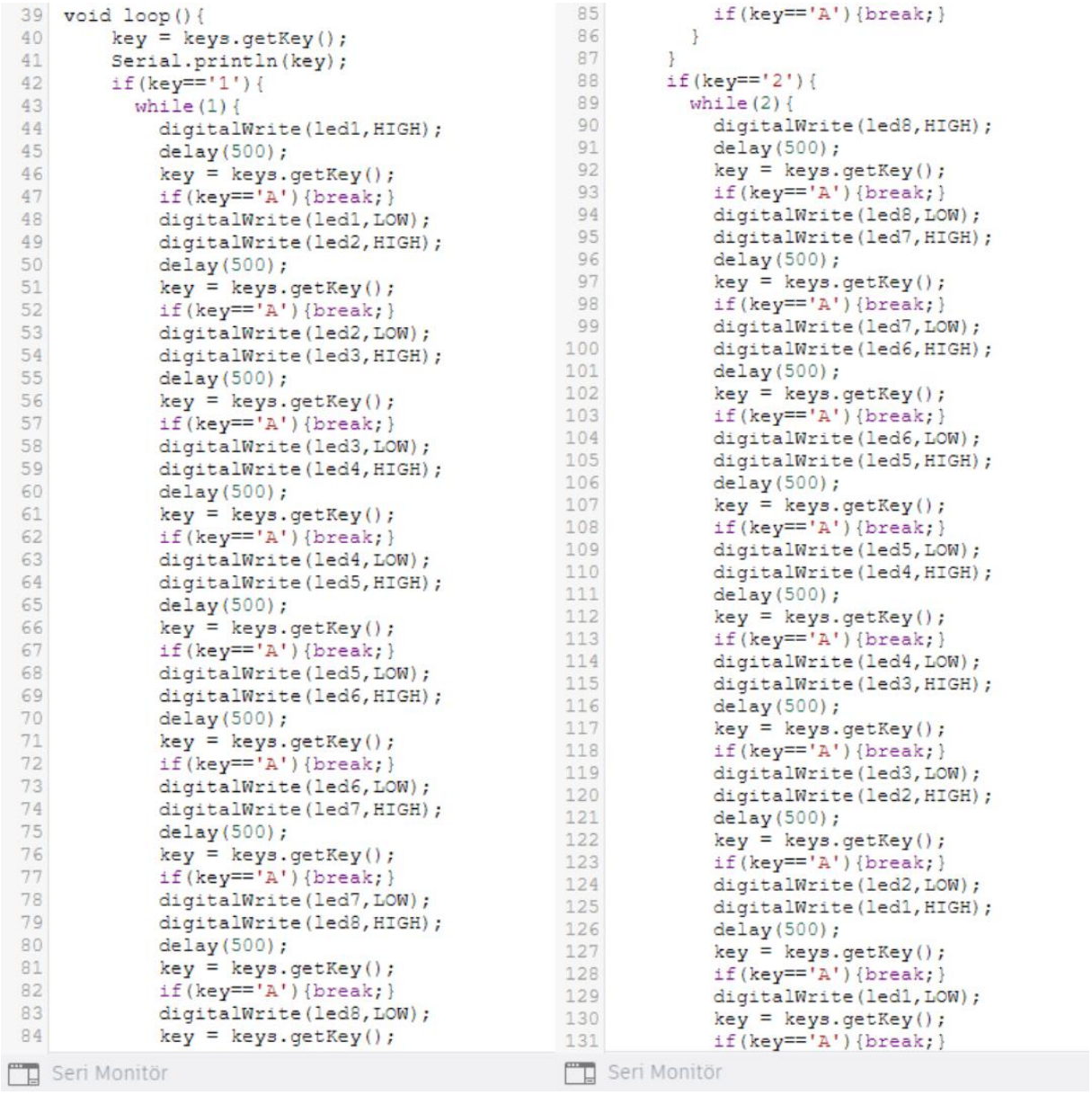




6. SOFTWARE FUNCTIONS

```
#include <Keypad.h>
char  key;
const byte rows=4;
const byte coloums=4;

int led1=2;
int led2=3;
int led3=4;
int led4=5;
int led5=A0;
int led6=A1;
int led7=A2;
int led8=A3;

char keypad[rows][coloums]=
{
  {'1','2','3','A'},
  {'4','5','6','B'},
  {'7','8','9','C'},
  {'*','0','#','D'}
};

byte rowsPin[rows]={13,12,11,10};
byte coloumsPin[coloums]={9,8,7,6};

Keypad keys = Keypad(makeKeymap(keypad),rowsPin,coloumsPin,rows,coloums);

void setup(){
  Serial.begin(9600);
  pinMode(led1,OUTPUT);
  pinMode(led2,OUTPUT);
  pinMode(led3,OUTPUT);
  pinMode(led4,OUTPUT);
  pinMode(led5,OUTPUT);
  pinMode(led6,OUTPUT);
  pinMode(led7,OUTPUT);
  pinMode(led8,OUTPUT);
}
```

- The code includes the Keypad library, which provides functionality for interfacing with the keypad.
- The key variable is declared as a character to store the pressed key.
- Eight LED pins (led1 to led8) are defined and assigned to specific Arduino pins.
- Two arrays, rowsPin and columnsPin, are defined to store the Arduino pins connected to the rows and columns of the keypad.
- In the setup function, the serial communication is initialized, and all LED pins are set as output pins.



```
void loop(){
    key = keys.getKey();
    Serial.println(key);
    if(key=='1'){
      while(1){
        digitalWrite(led1,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led1,LOW);
        digitalWrite(led2,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,LOW);
        digitalWrite(led3,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,LOW);
        digitalWrite(led4,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,LOW);
        digitalWrite(led5,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,LOW);
        digitalWrite(led6,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,LOW);
        digitalWrite(led7,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,LOW);
        digitalWrite(led8,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='2'){
      while(2){
        digitalWrite(led8,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,LOW);
        digitalWrite(led7,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,LOW);
        digitalWrite(led6,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,LOW);
        digitalWrite(led5,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,LOW);
        digitalWrite(led4,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,LOW);
        digitalWrite(led3,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,LOW);
        digitalWrite(led2,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,LOW);
        digitalWrite(led1,HIGH);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led1,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
```

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- The loop function is where the main logic of the code resides.
- The while loop runs indefinitely, waiting for a key to be pressed.
- When a key is pressed, its value is stored in the key variable and printed to the serial monitor.
- The code then checks which key was pressed using a series of if statements.
- For each key, there is a corresponding block of code that controls the LEDs based on the key press.

- For example, If the key is '1', enter a loop that cycles through the LEDs from led1 to led8, turning them on one at a time for 500 milliseconds. Pressing 'A' breaks the loop and returns to the keypad input.

```
    }
  }
  if(key=='3'){
    while(3){
      digitalWrite(led1,HIGH);
      digitalWrite(led2,HIGH);
      digitalWrite(led3,HIGH);
      digitalWrite(led4,HIGH);
      digitalWrite(led5,HIGH);
      digitalWrite(led6,HIGH);
      digitalWrite(led7,HIGH);
      digitalWrite(led8,LOW);
      key = keys.getKey();
      if(key=='A'){break;}
      delay(500);

      digitalWrite(led8,HIGH);
      digitalWrite(led7,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led7,HIGH);
      digitalWrite(led6,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led6,HIGH);
      digitalWrite(led5,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led5,HIGH);
      digitalWrite(led4,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led4,HIGH);
      digitalWrite(led3,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led3,HIGH);
      digitalWrite(led2,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led2,HIGH);
      digitalWrite(led1,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}
    }
  }
  if(key=='4'){
    while(4){
      digitalWrite(led1,LOW);
      digitalWrite(led2,HIGH);
      digitalWrite(led3,HIGH);
      digitalWrite(led4,HIGH);
      digitalWrite(led5,HIGH);
      digitalWrite(led6,HIGH);
      digitalWrite(led7,HIGH);
      digitalWrite(led8,HIGH);
      key = keys.getKey();
      if(key=='A'){break;}
      delay(500);

      digitalWrite(led1,HIGH);
      digitalWrite(led2,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led2,HIGH);
      digitalWrite(led3,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led3,HIGH);
      digitalWrite(led4,LOW);
      delay(500);
      key = keys.getKey();
      if(key=='A'){break;}

      digitalWrite(led4,HIGH);
```

```
        digitalWrite(led5,LOW);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}

        digitalWrite(led5,HIGH);
        digitalWrite(led6,LOW);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}

        digitalWrite(led6,HIGH);
        digitalWrite(led7,LOW);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}

        digitalWrite(led7,HIGH);
        digitalWrite(led8,LOW);
        delay(500);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='5'){
      while(5){
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
```

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```
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,LOW);
       key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
      }
    }
    if(key=='6'){
      while(6){
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led7,HIGH);
```

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```
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
```

```
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
      }
    }
    if(key=='7'){
      while(7){
        digitalWrite(led4,HIGH);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led6,HIGH);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led7,HIGH);
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led8,HIGH);
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led4,LOW);
        digitalWrite(led5,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led6,LOW);
        digitalWrite(led3,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
```

```
        digitalWrite(led7,LOW);
        digitalWrite(led2,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led1,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
      }
    }
    if(key=='8'){
      while(8){
        digitalWrite(led1,HIGH);
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,HIGH);
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led3,HIGH);
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led4,HIGH);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led8,LOW);
        digitalWrite(led1,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led7,LOW);
        digitalWrite(led2,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
```

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```
        digitalWrite(led6,LOW);
        digitalWrite(led3,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);

        digitalWrite(led4,LOW);
        digitalWrite(led5,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
      }
    }
    if(key=='9'){
      while(9){
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        digitalWrite(led3,LOW);
        digitalWrite(led5,LOW);
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led4,HIGH);
```

```
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,LOW);
        digitalWrite(led4,LOW);
        digitalWrite(led6,LOW);
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='0'){
      while(10){
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,LOW);
        digitalWrite(led4,LOW);
        digitalWrite(led6,LOW);
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
```

```
        delay(500);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        digitalWrite(led3,LOW);
        digitalWrite(led5,LOW);
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='A'){

        digitalWrite(led1,LOW);
        digitalWrite(led2,LOW);
        digitalWrite(led3,LOW);
        digitalWrite(led4,LOW);
        digitalWrite(led5,LOW);
        digitalWrite(led6,LOW);
        digitalWrite(led7,LOW);
        digitalWrite(led8,LOW);

    }
    if(key=='B'){
      while(12){
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,HIGH);
```

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```
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='C'){
      while(13){
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,LOW);
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,LOW);
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,LOW);
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='D'){
      while(14){
        digitalWrite(led1,LOW);
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,LOW);
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,LOW);
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,LOW);
```

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```
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
    if(key=='*'){
      while(15){
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,LOW);
        digitalWrite(led4,LOW);
        digitalWrite(led6,LOW);
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        digitalWrite(led3,LOW);
        digitalWrite(led5,LOW);
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
      }
    }
```

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```
    }
    if(key=='#'){
      while(16){
        digitalWrite(led1,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led3,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led5,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led7,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led1,LOW);
        digitalWrite(led3,LOW);
        digitalWrite(led5,LOW);
        digitalWrite(led7,LOW);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led2,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led4,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led6,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        digitalWrite(led8,HIGH);
        key = keys.getKey();
        if(key=='A'){break;}
        delay(500);
        digitalWrite(led2,LOW);
        digitalWrite(led4,LOW);
        digitalWrite(led6,LOW);
        digitalWrite(led8,LOW);
        key = keys.getKey();
        if(key=='A'){break;}}
    }
}
```

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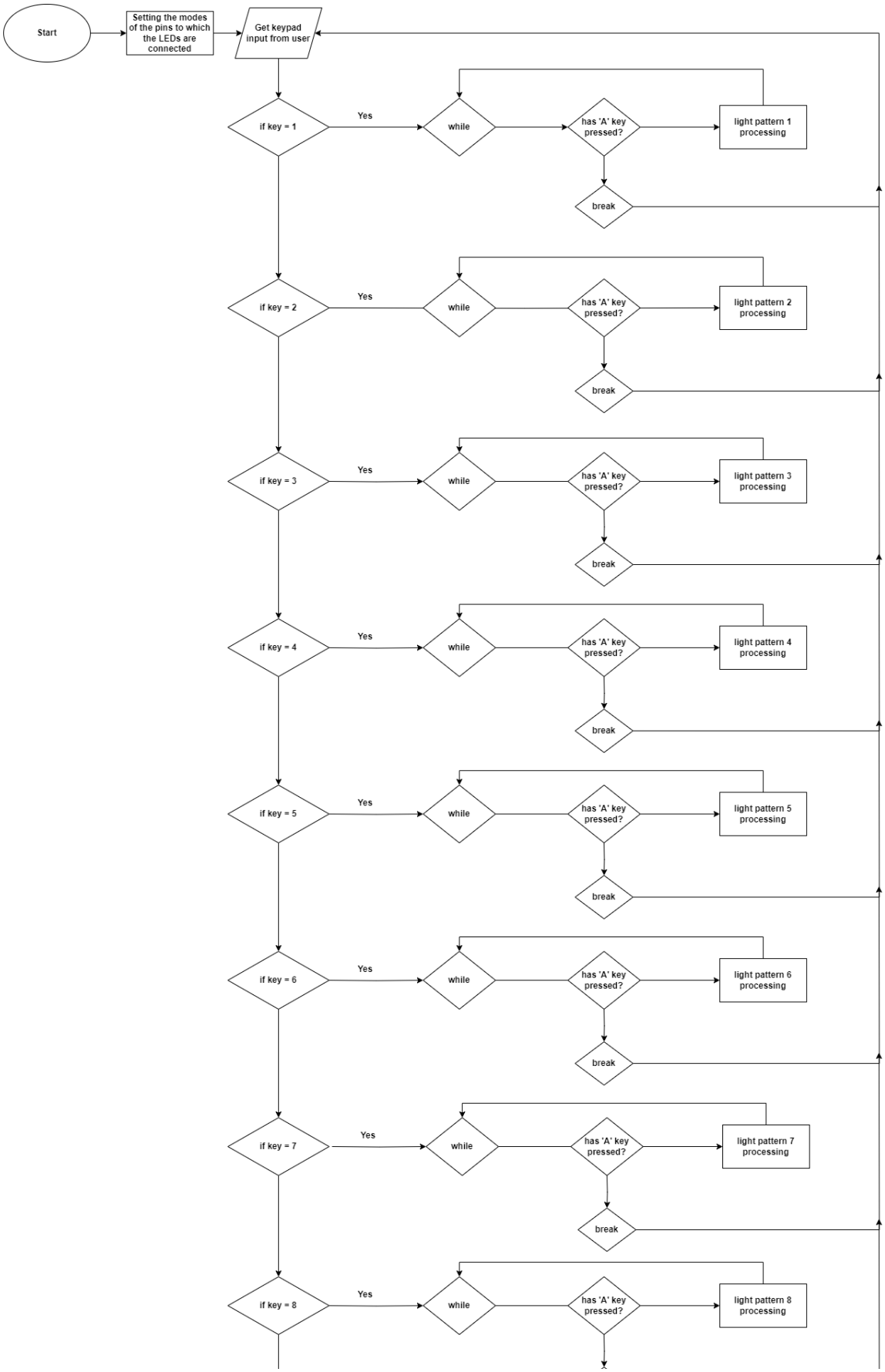
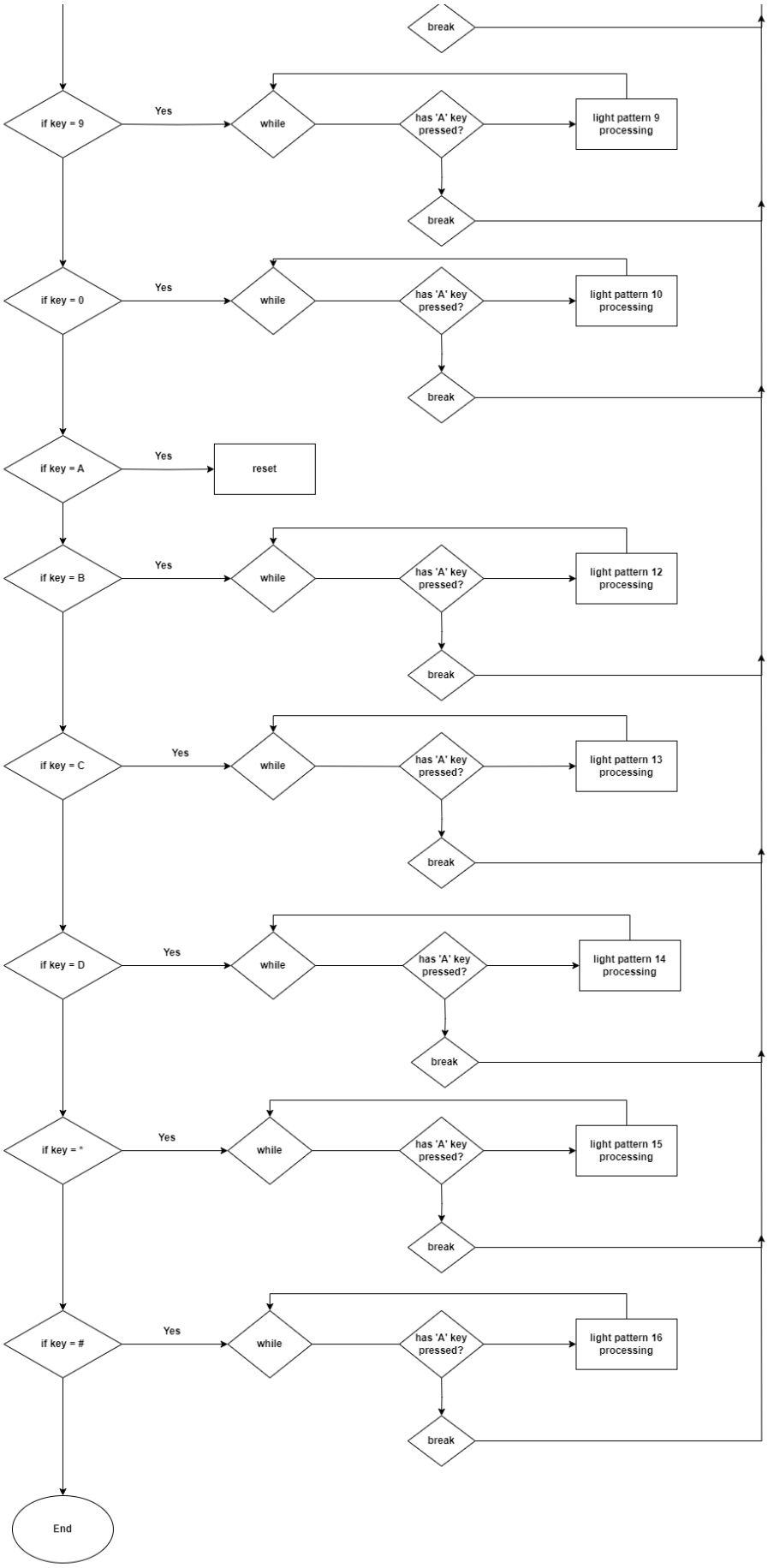
- The code follows a similar pattern for keys '2', '3', '4', '5', '6', '7', and '8', but with different light patterns.
- The code uses the delay function to create delays between LED changes. It continuously checks for key presses and performs the corresponding actions based on the key value.

Overall, the code allows the user to control the LEDs by pressing different keys on the keypad. The behavior of the LEDs depends on the key pressed and can include different sequences and patterns.

7. FLOWCHART


Start
Setting the modes of the pins to which the LEDs are connected
Get keypad input from user
if key = 1
Yes
while
has 'A' key pressed?
light pattern 1 processing
break
if key = 2
Yes
while
has 'A' key pressed?
light pattern 2 processing
break
if key = 3
Yes
while
has 'A' key pressed?
light pattern 3 processing
break
if key = 4
Yes
while
has 'A' key pressed?
light pattern 4 processing
break
if key = 5
Yes
while
has 'A' key pressed?
light pattern 5 processing
break
if key = 6
Yes
while
has 'A' key pressed?
light pattern 6 processing
break
if key = 7
Yes
while
has 'A' key pressed?
light pattern 7 processing
break
if key = 8
Yes
while
has 'A' key pressed?
light pattern 8 processing


break
if key = 9
Yes
while
has 'A' key pressed?
light pattern 9 processing
break
if key = 0
Yes
while
has 'A' key pressed?
light pattern 10 processing
break
if key = A
Yes
reset
if key = B
Yes
while
has 'A' key pressed?
light pattern 12 processing
break
if key = C
Yes
while
has 'A' key pressed?
light pattern 13 processing
break
if key = D
Yes
while
has 'A' key pressed?
light pattern 14 processing
break
if key = *
Yes
while
has 'A' key pressed?
light pattern 15 processing
break
if key = #
Yes
while
has 'A' key pressed?
light pattern 16 processing
break
End

8. INTERDISCIPLINARY WORK MEETING

4rd Meeting of The Project

Project Topic: Different Light Patterns

Meeting Date: 10.06.2023

Meeting Agenda: On the agenda of the fourth meeting. General evaluations and final touches were made for the project.

Participants

181110059 Fatma Başak ÖZKASAP [Electrical-Electronics Eng.]

Supply of Required Hardware Components, Preparation of the Circuit

C191130040 Metehan ERKAN [Electrical-Electronics Eng.]

Preparation of the Circuit, Running Software on the Board

191180005 Selin Cansu AKBAŞ [Computer Eng.]

Determination of Software Requirements, Program Writing

191180006 Mert AKGÜÇ [Computer Eng.]

Debugging, Program Writing