LED sequence V3.0

Anas Mahmoud Gamal

1. Project Description

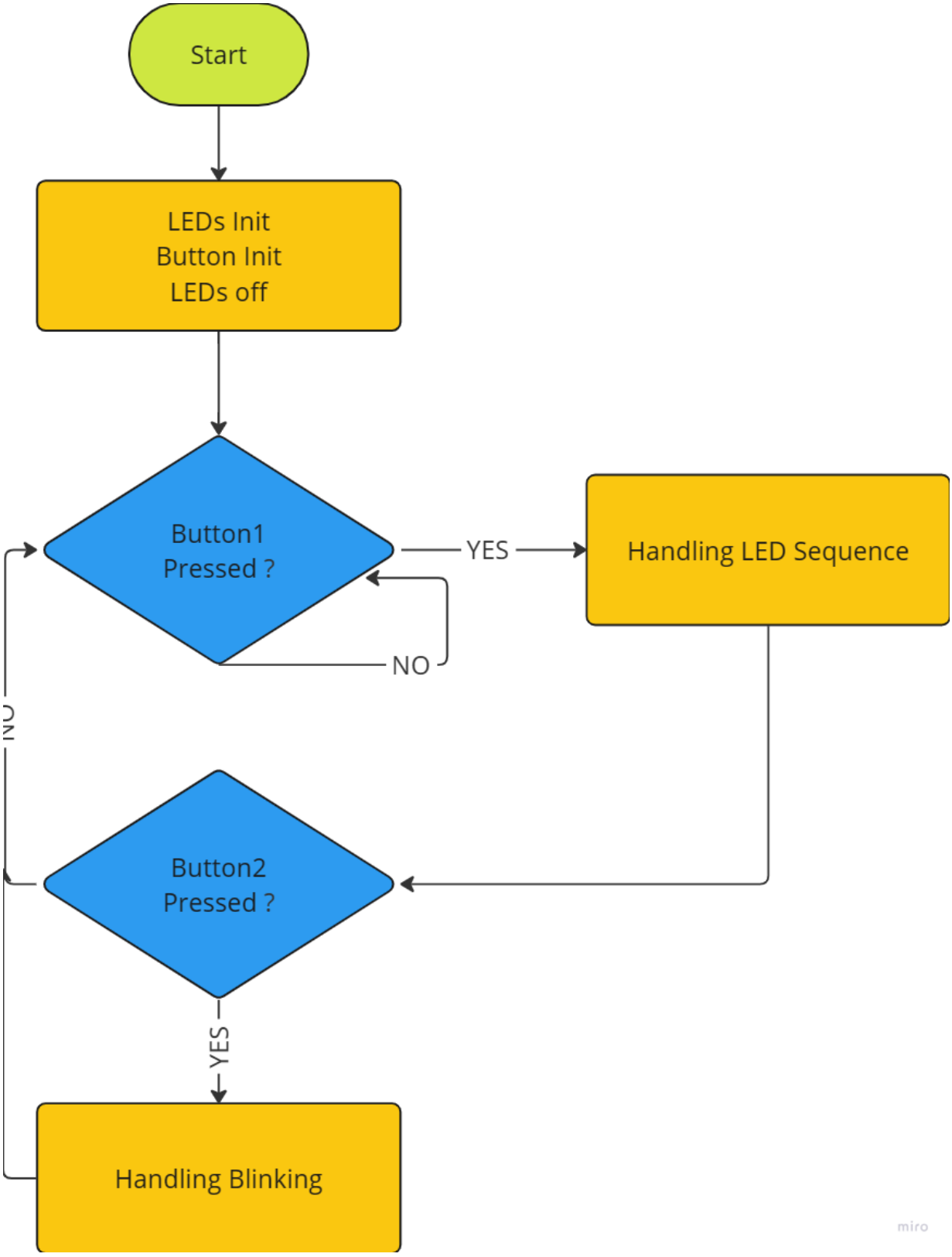
It's an embedded system consist of microcontroller (ATMEGA 32a), 4 LEDs & 2 button.

1. **Hardware Requirements**
    1. Four LEDs (**LED0**, **LED1**, **LED2**, **LED3**)
    2. **Two** buttons (**BUTTON0** and **BUTTON1**)
2. **Software Requirements**
    1. Initially, all LEDs are OFF
    2. Once **BUTTON0** is pressed, **LED0** will blink with **BLINK_1** mode
    3. Each press further will make another LED blinks **BLINK_1** mode
    4. At the **fifth press**, **LED0** will changed to be **OFF**
    5. Each **press further** will make only one LED is **OFF**
    6. This will be repeated forever
    7. The sequence is described below
        1. Initially (OFF, OFF, OFF, OFF)
        2. Press 1 (BLINK_1, OFF, OFF, OFF)
        3. Press 2 (BLINK_1, BLINK_1, OFF, OFF)
        4. Press 3 (BLINK_1, BLINK_1, BLINK_1, OFF)
        5. Press 4 (BLINK_1, BLINK_1, BLINK_1, BLINK_1)
        6. Press 5 (OFF, BLINK_1, BLINK_1, BLINK_1)
        7. Press 6 (OFF, OFF, BLINK_1, BLINK_1)

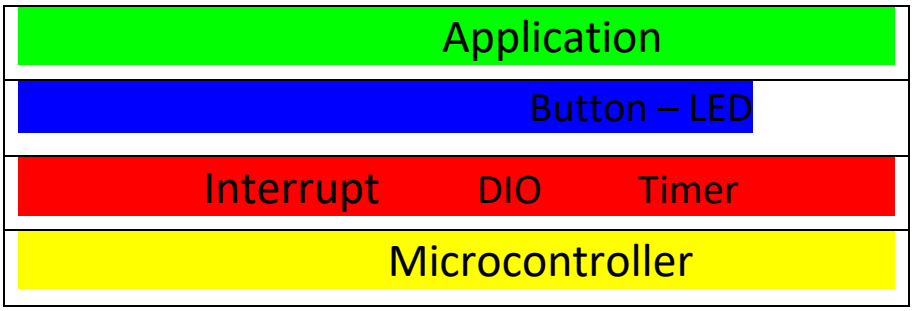
8. Press 7 (OFF, OFF, OFF, BLINK_1)
9. Press 8 (OFF, OFF, OFF, OFF)
10. Press 9 (BLINK_1, OFF, OFF, OFF)

8. When BUTTON1 has pressed the blinking on and off durations will be changed
    1. No press → **BLINK_1** mode (**ON**: 100ms, **OFF**: 900ms)
    2. First press → **BLINK_2** mode (**ON**: 200ms, **OFF**: 800ms)
    3. Second press → **BLINK_3** mode (**ON**: 300ms, **OFF**: 700ms)
    4. Third press → **BLINK_4** mode (**ON**: 500ms, **OFF**: 500ms)
    5. Fourth press → **BLINK_5** mode (**ON**: 800ms, **OFF**: 200ms)
    6. Fifth press → **BLINK_1** mode
9. **USE EXTERNAL INTERRUPTS**

2.Project Flowchart



3 Layered Architecture



4- API's

4.1 DIO

```
void DIO_init(uint8_t portNumber ,uint8_t pintNumber , uint8_t direction);

void DIO_write(uint8_t portNumber ,uint8_t pintNumber , uint8_t value);

void DIO_toggle(uint8_t portNumber ,uint8_t pintNumber);

void DIO_read(uint8_t portNumber ,uint8_t pintNumber , uint8_t* value);
```

4.2 LEDs

```
void LED_init(uint8_t LedPort, uint8_t LedPin );

void LED_on(uint8_t LedPort, uint8_t LedPin );

void LED_off(uint8_t LedPort, uint8_t LedPin );

void LED_toggle(uint8_t LedPort, uint8_t LedPin );
```

4.3 Button

```
void BUTTON_init(uint8_t buttonPort, uint8_t buttonPin );

void BUTTON_read(uint8_t buttonPort, uint8_t buttonPin, uint8_t *value );
```

4.4 Timer

```
void Timer0_init();

void Timer0_prescaler (uint16 prescaler);

void Timer0_delay(uint16 time_ms);
```

4.5 Interrupt

```
void Interrupt_Enable(uint8_t ID, uint8_t Mode);

void Interrupt_Disable(void);
```

4. Application

```
void V3_AppInit();

void V3_AppStart();
```