Microcontrollers WS2022/23

Lab Report 2

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Task 1:

Arrangement:
- Pin B0 → red LED

Red LED blinks after 1 sec.
Timer 1 is used, and the timer/counter unit: 125000
Duty Cycle: 50%
So we have to divide Timer1 unit by 2 which gives us the unit 62500

Task 2:

Arrangement:
- Pin B0 → red LED

Matriculation Number: 27594

Frequency: 394 Hz ($\frac{8000000}{(2*394)} = 10152$)

Brightness of the LED seems to be dimmer than in the previous case when the code is first executed because the human eye cannot see the LED being turned on and off since it is very fast (394 Hz).
When connected to the Summer it could be heard.

Task 5:

Arrangement:
- Pin D2 → Key 1
- Pin D3 → Key 2
- Pin B0 → red LED
- Pin B1 → yellow LED

Yellow LED starts blinking. On for 0.5 secs and Off for 0.5 seconds.
When we press Key 1 the red LED lights up and stays on.
When we press Key 2 the red LED switches off.
When we press Key 1 and Key 2 back and forth we can clearly see the delay because no interrupts were used in the code.

Task 6:

Arrangement:

- Pin D2 → Key 1
- Pin D3 → Key 2
- Pin B0 → red LED
- Pin B1 → yellow LED

Yellow LED starts blinking. On for 0.5 secs and Off for 0.5 seconds.

When we press Key 1 the red LED lights up and stays on.

When we press Key 2 the red LED switches off.

When we press Key 1 and Key 2 back and forth we can clearly see that there is no delay (unlike in the previous task) because interrupts were used in the code.

The if statement inside the ISR is not necessary to check if the button is pressed.

Task 8:

Arrangement:

- Pin D2 → Key 1
- Pin D3 → Key 2
- Pin B0 → red LED
- Pin B1 → yellow LED
- Pin B1 → green LED

Same as Task 6.

But the green LED lights up whenever the overflow condition becomes true i.e. it goes beyond 256bits.

Task 9:

Arrangement:

- Pin D2 → Key 1
- Pin D3 → Key 2
- Pin B0 → red LED
- Pin B1 → yellow LED
- Pin B1 → green LED

Same as Task6.

But whenever the overflow condition becomes true the green LED turns on.

When a compare match occurs between Timer/Counter 0 and OCR0A then the interrupt condition turns the green LED off.

Hence it seems as if the green LED is blinking.

Task 10:

Arrangement:

- Pin D2 → Key 1
- Pin D3 → Key 2
- Pin B0 → red LED
- Pin B1 → yellow LED
- Pin B1 → green LED
- Pin C0 → Poti 1

No (Prescaler value 1).

It is not always possible to see the flickering of the LEDs as the flickering depends on the Prescaler values set by the Potentiometer.

Higher Prescaler values lead to longer on and off periods (phases), therefore one can notice the flickering more easily.

Task 12:

Arrangement:

- Pin B0 → Key 1
- Pin B1 → Key 2

Case1: for a lower number of bounces the counting is relatively accurate, but as the number increases the counting becomes more inaccurate.
Case2: every touch of the 2 wires gives random values.

Task 13:

Arrangement:

- Pin B1 → Output (Servomotor/LED/Summer)
- Pin C3 → Poti 1

Timer 0 with Prescaler 64 used.
The shaft of the servomotor rotates 90° (45° clockwise and 45° anti-clockwise from the neutral position).