

Advanced Embedded Software Development

Homework 5

Tanmay Chaturvedi

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GitHub Link: <https://github.com/TanmayChaturvedi1/Advanced-Embedded-Software-Development/tree/master/Assignment%205%20FreeRTOS>

References

[1] https://github.com/akoby1/TM4C129_FreeRTOS_Demo

[2] <https://www.digikey.com/eewiki/display/microcontroller/I2C+Communication+with+the+TI+Tiva+TM4C123GXL>

In Normal Operation, the frequency of LED task reporting LED count, time stamp and Name is 10Hz and temperature task reporting Temperature Value and timestamp is 1Hz

```
[0 ms]      Temp value = 25.202

[100 ms]    Toggle Count = 1      Name = Tanmay Chaturvedi
[200 ms]    Toggle Count = 2      Name = Tanmay Chaturvedi
[300 ms]    Toggle Count = 3      Name = Tanmay Chaturvedi
[400 ms]    Toggle Count = 4      Name = Tanmay Chaturvedi
[500 ms]    Toggle Count = 5      Name = Tanmay Chaturvedi
[600 ms]    Toggle Count = 6      Name = Tanmay Chaturvedi
[700 ms]    Toggle Count = 7      Name = Tanmay Chaturvedi
[800 ms]    Toggle Count = 8      Name = Tanmay Chaturvedi
[900 ms]    Toggle Count = 9      Name = Tanmay Chaturvedi

[1000 ms]   Temp value = 25.202

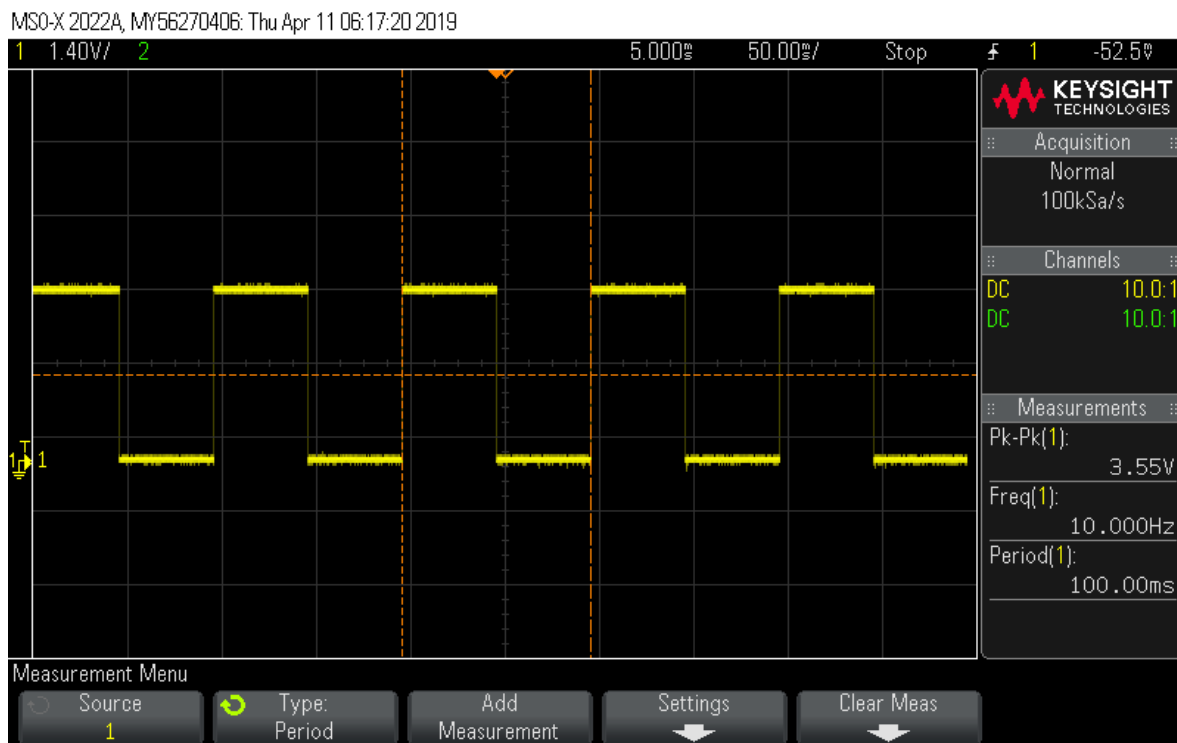
[1000 ms]   Toggle Count = 10     Name = Tanmay Chaturvedi
[1100 ms]   Toggle Count = 11     Name = Tanmay Chaturvedi
[1200 ms]   Toggle Count = 12     Name = Tanmay Chaturvedi
[1300 ms]   Toggle Count = 13     Name = Tanmay Chaturvedi
[1400 ms]   Toggle Count = 14     Name = Tanmay Chaturvedi
[1500 ms]   Toggle Count = 15     Name = Tanmay Chaturvedi
[1600 ms]   Toggle Count = 16     Name = Tanmay Chaturvedi
[1700 ms]   Toggle Count = 17     Name = Tanmay Chaturvedi
[1800 ms]   Toggle Count = 18     Name = Tanmay Chaturvedi
[1900 ms]   Toggle Count = 19     Name = Tanmay Chaturvedi

[2000 ms]   Temp value = 26.46

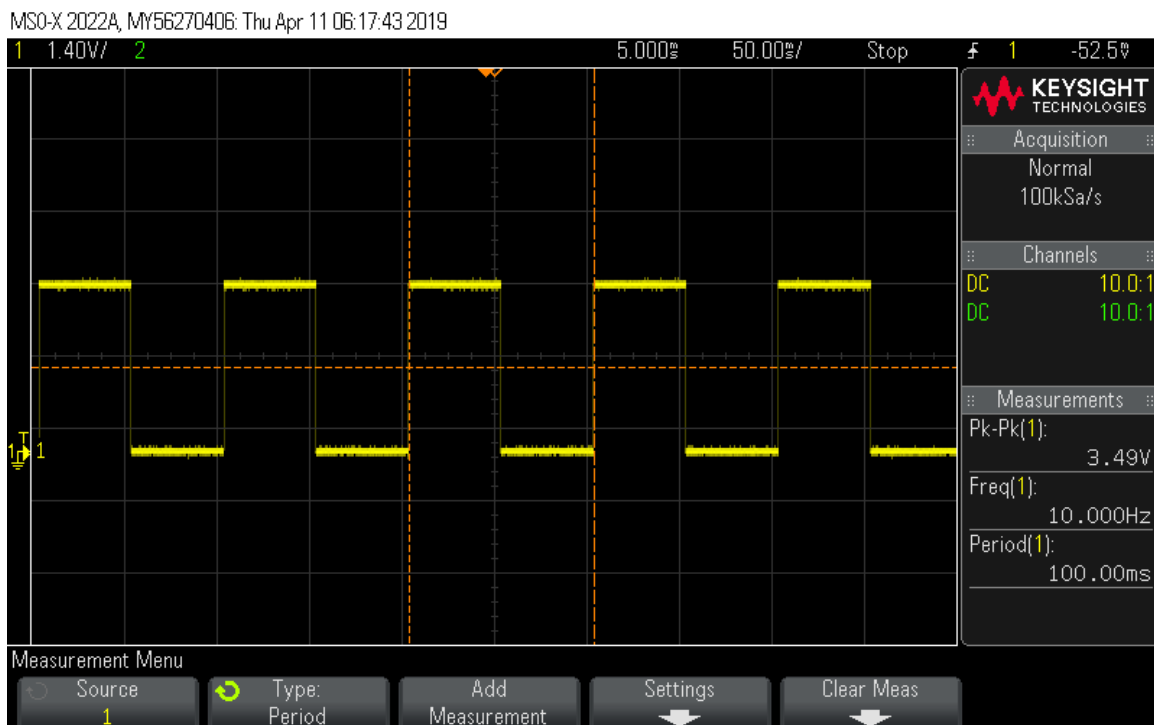
[2000 ms]   Toggle Count = 20     Name = Tanmay Chaturvedi
[2100 ms]   Toggle Count = 21     Name = Tanmay Chaturvedi
[2200 ms]   Toggle Count = 22     Name = Tanmay Chaturvedi
[2300 ms]   Toggle Count = 23     Name = Tanmay Chaturvedi
[2400 ms]   Toggle Count = 24     Name = Tanmay Chaturvedi
[2500 ms]   Toggle Count = 25     Name = Tanmay Chaturvedi
[2600 ms]   Toggle Count = 26     Name = Tanmay Chaturvedi
[2700 ms]   Toggle Count = 27     Name = Tanmay Chaturvedi
[2800 ms]   Toggle Count = 28     Name = Tanmay Chaturvedi
[2900 ms]   Toggle Count = 29     Name = Tanmay Chaturvedi
```

Both LEDs, LED 1 and LED 2, connected with pins PN0 and PN1, respectively, toggles at a frequency of 10Hz with a time period of 100ms for each toggle.

Scope shot of LED 1:



Scope shot of LED 2:



For Temperature Alert functionality, `xTaskNotify()` and `xTaskNotifyWait()` APIs of FreeRTOS are used.

In `xTaskNotify()`, `xAlertTaskHandle` is used as a handle parameter generated from the last argument to `xTaskCreate()`.

I programmed my temperature threshold to 29.0 Deg Celsius which is defined in *main.h*.

When temperature value goes above TEMP_TH, Alert Task is notified which then informs Logger Task to generate an alert and also print the current temperature values.

Output:

```
[44000 ns]      Temp value = 28.246
[44000 ns]      Toggle Count = 440      Name = Tanmay Chaturvedi
[44100 ns]      Toggle Count = 441      Name = Tanmay Chaturvedi
[44200 ns]      Toggle Count = 442      Name = Tanmay Chaturvedi
[44300 ns]      Toggle Count = 443      Name = Tanmay Chaturvedi
[44400 ns]      Toggle Count = 444      Name = Tanmay Chaturvedi
[44500 ns]      Toggle Count = 445      Name = Tanmay Chaturvedi
[44600 ns]      Toggle Count = 446      Name = Tanmay Chaturvedi
[44700 ns]      Toggle Count = 447      Name = Tanmay Chaturvedi
[44800 ns]      Toggle Count = 448      Name = Tanmay Chaturvedi
[44900 ns]      Toggle Count = 449      Name = Tanmay Chaturvedi
[44900 ns]      Toggle Count = 449      Name = Tanmay Chaturvedi
[45000 ns]      Toggle Count = 450      Name = Tanmay Chaturvedi

[45000 ns]      *****Temperature Beyond Threshold!*****      Temp value = 29.90
[45100 ns]      Toggle Count = 451      Name = Tanmay Chaturvedi
[45200 ns]      Toggle Count = 452      Name = Tanmay Chaturvedi
[45300 ns]      Toggle Count = 453      Name = Tanmay Chaturvedi
[45400 ns]      Toggle Count = 454      Name = Tanmay Chaturvedi
[45500 ns]      Toggle Count = 455      Name = Tanmay Chaturvedi
[45600 ns]      Toggle Count = 456      Name = Tanmay Chaturvedi
[45700 ns]      Toggle Count = 457      Name = Tanmay Chaturvedi
[45800 ns]      Toggle Count = 458      Name = Tanmay Chaturvedi
[45900 ns]      Toggle Count = 459      Name = Tanmay Chaturvedi
[46000 ns]      Temp value = 28.246
```