

Group Name: Juvenile Jumpers

Assignment-9

Watchdog

1. Sensor log updates

Following data was logged in file from on-board accelerator sensor.

Time 14100, x:0 y:-8 z:6
Time 14200, x:-302 y:-308 z:-293
Time 14300, x:-36 y:-41 z:-29
Time 14400, x:58 y:53 z:63
Time 0, x:63 y:60 z:58
Time 14500, x:73 y:67 z:78
Time 14600, x:39 y:33 z:45
Time 14700, x:85 y:80 z:90
Time 14800, x:56 y:52 z:62
Time 0, x:63 y:60 z:58
Time 14900, x:98 y:92 z:102
Time 15000, x:171 y:165 z:177
Time 15100, x:181 y:174 z:188
Time 15200, x:172 y:165 z:176

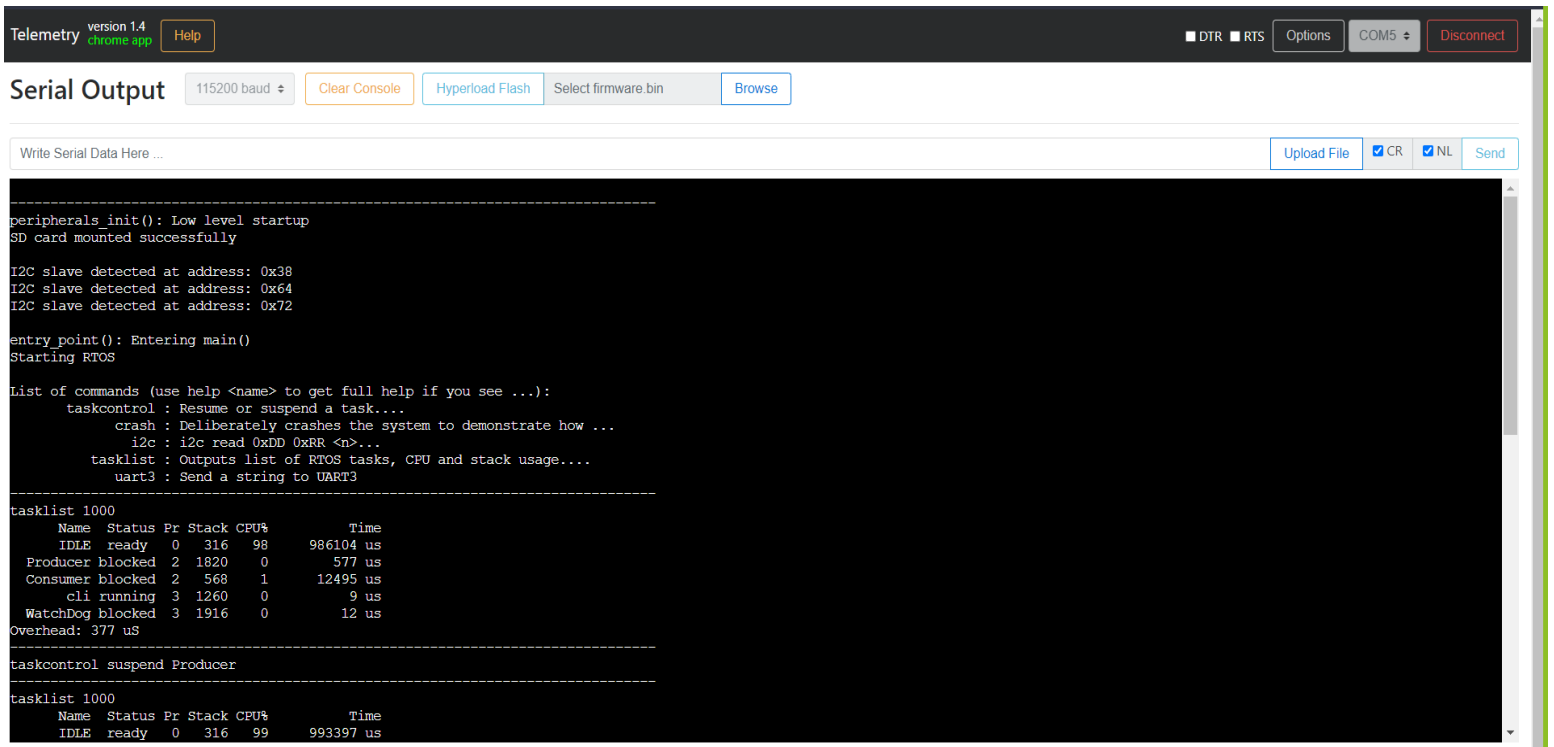
2. Stuck log updates correctly

In the following scenario after suspending the producer task, the software watchdog was fired for both producer and consumer tasks. The reason for this is that, if the producer is suspended- the consumer would be stuck indefinitely waiting for the data in the xQueueReceive(), thus a watchdog for consumer task was also triggered.

Time 23400, x:115 y:118 z:124
Time 23500, x:116 y:119 z:125
Time 23600, x:121 y:124 z:130
Time 25301: WatchDog Fired for both Producer and Consumer
Time 26505: WatchDog Fired for both Producer and Consumer
Time 27709: WatchDog Fired for both Producer and Consumer
Time 28913: WatchDog Fired for both Producer and Consumer
Time 30123: WatchDog Fired for both Producer and Consumer
Time 31328: WatchDog Fired for both Producer and Consumer
Time 39756: WatchDog Fired for both Producer and Consumer
Time 0, x:-213 y:-216 z:-203
Time 58942, x:202 y:211 z:203

3. Suspend Resume Task

Positive test case scenario with serial terminal indicating tasks are running normally



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Serial Output 115200 baud Clear Console Hyperload Flash Select firmware bin Browse

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```
-----
peripherals_init(): Low level startup
SD card mounted successfully

I2C slave detected at address: 0x38
I2C slave detected at address: 0x64
I2C slave detected at address: 0x72

entry_point(): Entering main()
Starting RTOS

List of commands (use help <name> to get full help if you see ...):
taskcontrol : Resume or suspend a task....
  crash : Deliberately crashes the system to demonstrate how ...
  i2c : i2c read 0xDD 0xRR <n>...
  tasklist : Outputs list of RTOS tasks, CPU and stack usage....
  uart3 : Send a string to UART3
-----

tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316  98   986104 us
  Producer blocked 2 1820  0     577 us
  Consumer blocked 2  568  1   12495 us
  cli running  3 1260  0      9 us
  WatchDog blocked 3 1916  0     12 us
Overhead: 377 uS

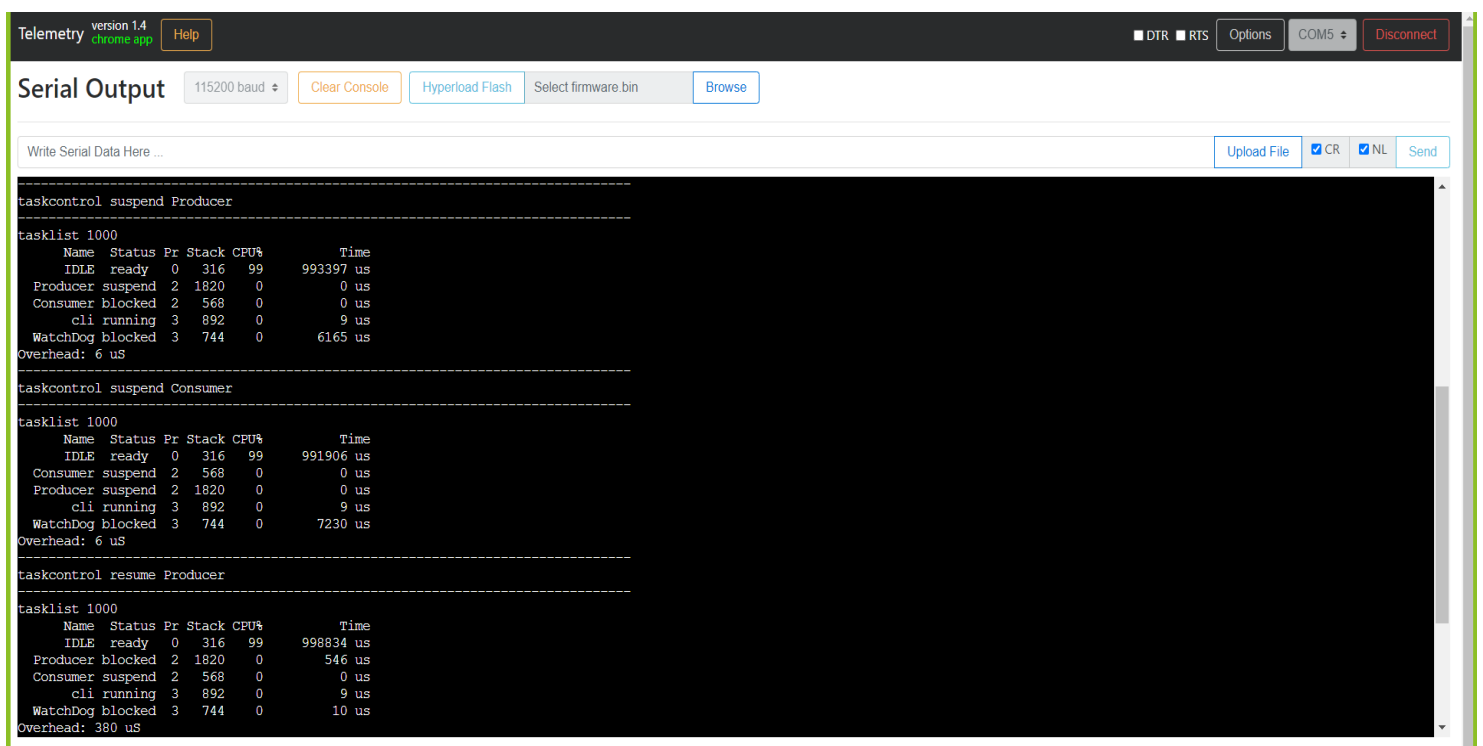
-----

taskcontrol suspend Producer

-----

tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316  99   993397 us
```

Producer task Suspended: When suspended producer task goes in suspended state as show in the screenshot below



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Write Serial Data Here ... Upload File CR NL Send

```
-----

taskcontrol suspend Producer

-----

tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316  99   993397 us
  Producer suspend 2 1820  0      0 us
  Consumer blocked 2  568  0      0 us
  cli running  3  892  0      9 us
  WatchDog blocked 3  744  0   6165 us
Overhead: 6 uS

-----

taskcontrol suspend Consumer

-----

tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316  99   991906 us
  Consumer suspend 2  568  0      0 us
  Producer suspend 2 1820  0      0 us
  cli running  3  892  0      9 us
  WatchDog blocked 3  744  0   7230 us
Overhead: 6 uS

-----

taskcontrol resume Producer

-----

tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316  99   998834 us
  Producer blocked 2 1820  0     546 us
  Consumer suspend 2  568  0      0 us
  cli running  3  892  0      9 us
  WatchDog blocked 3  744  0     10 us
Overhead: 380 uS
```

Producer task Resume: When resumed producer task goes in blocked state as show in the screenshot below.

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■ DTR ■ RTS Options COM5 Disconnect

Serial Output 115200 baud Clear Console Hyperload Flash Select firmware.bin Browse

Write Serial Data Here ... Upload File ☒ CR ☒ NL Send

```
-----
tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316   99  991906 us
  Consumer suspend 2  568    0    0 us
  Producer suspend 2 1820    0    0 us
    cli running  3  892    0    9 us
  WatchDog blocked 3  744    0   7230 us
Overhead: 6 uS
-----
taskcontrol resume Producer
-----
tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316   99  998834 us
  Producer blocked 2 1820    0    546 us
  Consumer suspend 2  568    0    0 us
    cli running  3  892    0    9 us
  WatchDog blocked 3  744    0   10 us
Overhead: 380 uS
-----
taskcontrol resume Consumer
-----
tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316   98  980191 us
  Producer blocked 2 1820    0    577 us
  Consumer blocked 2  568    1   18091 us
    cli running  3  892    0    9 us
  WatchDog blocked 3  744    0   12 us
Overhead: 372 uS
-----
```

4. CPU Utilization

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■ DTR ■ RTS Options COM5 Disconnect

Serial Output 115200 baud Clear Console Hyperload Flash Select firmware.bin Browse

Write Serial Data Here ... Upload File ☒ CR ☒ NL Send

```
-----
peripherals init(): Low level startup
SD card mounted successfully

I2C slave detected at address: 0x38
I2C slave detected at address: 0x64
I2C slave detected at address: 0x72

entry_point(): Entering main()
Starting RTOS

List of commands (use help <name> to get full help if you see ...):
  taskcontrol : Resume or suspend a task....
  crash       : Deliberately crashes the system to demonstrate how ...
  i2c         : i2c read 0xDD 0xRR <n>...
  tasklist    : Outputs list of RTOS tasks, CPU and stack usage....
  uart3       : Send a string to UART3
-----
tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316   98  986104 us
  Producer blocked 2 1820    0    577 us
  Consumer blocked 2  568    1   12495 us
    cli running  3 1260    0    9 us
  WatchDog blocked 3 1916    0   12 us
Overhead: 377 uS
-----
taskcontrol suspend Producer
-----
tasklist 1000
  Name  Status Pr Stack CPU%    Time
  IDLE  ready  0  316   99  993397 us
```

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Options

COM5 ▾

Disconnect

Serial Output

115200 baud ▾

Clear Console

Hyperload Flash

Select firmware bin

Browse

Write Serial Data Here ...

Upload File

☒ CR

☒ NL

Send

taskcontrol suspend Producer

tasklist 1000

Name	Status	Pr	Stack	CPU%	Time
IDLE	ready	0	316	99	993397 us
Producer	suspend	2	1820	0	0 us
Consumer	blocked	2	568	0	0 us
cli	running	3	892	0	9 us
WatchDog	blocked	3	744	0	6165 us

Overhead: 6 us

taskcontrol suspend Consumer

tasklist 1000

Name	Status	Pr	Stack	CPU%	Time
IDLE	ready	0	316	99	991906 us
Consumer	suspend	2	568	0	0 us
Producer	suspend	2	1820	0	0 us
cli	running	3	892	0	9 us
WatchDog	blocked	3	744	0	7230 us

Overhead: 6 us

taskcontrol resume Producer

tasklist 1000

Name	Status	Pr	Stack	CPU%	Time
IDLE	ready	0	316	99	998834 us
Producer	blocked	2	1820	0	546 us
Consumer	suspend	2	568	0	0 us
cli	running	3	892	0	9 us
WatchDog	blocked	3	744	0	10 us

Overhead: 380 us

In this scenario, when the tasks are in running state the CPU Utilization of the consumer task is 1% and the time taken by this task is 12495 us. This is because the consumer task is responsible for writing the data to the file.

5. Excel Graph

