Real-time operating systems project

Implementing EDF scheduler based on FREE RTOS

Analytical Calculations: -

Task	Task Period (ms)	Execution Time (ms)
Button 1	50	0.013
Button 2	50	0.013
Periodic Transmitter	100	0.018
UART Receiver	20	0.015
Load 1 Simulation	10	5
Load 2 Simulation	100	12

1. System Hyper Period = 100 ms.
2. $CPU = \frac{\sum Task\ Execution\ Time}{\sum Task\ Period}$

   $= \frac{13}{50000} + \frac{13}{50000} + \frac{18}{100000} + \frac{15}{20000} + \frac{5000}{10000} + \frac{12000}{100000}$

   = 62.14 %
3. System Schedulability
   - Urm Analysis:

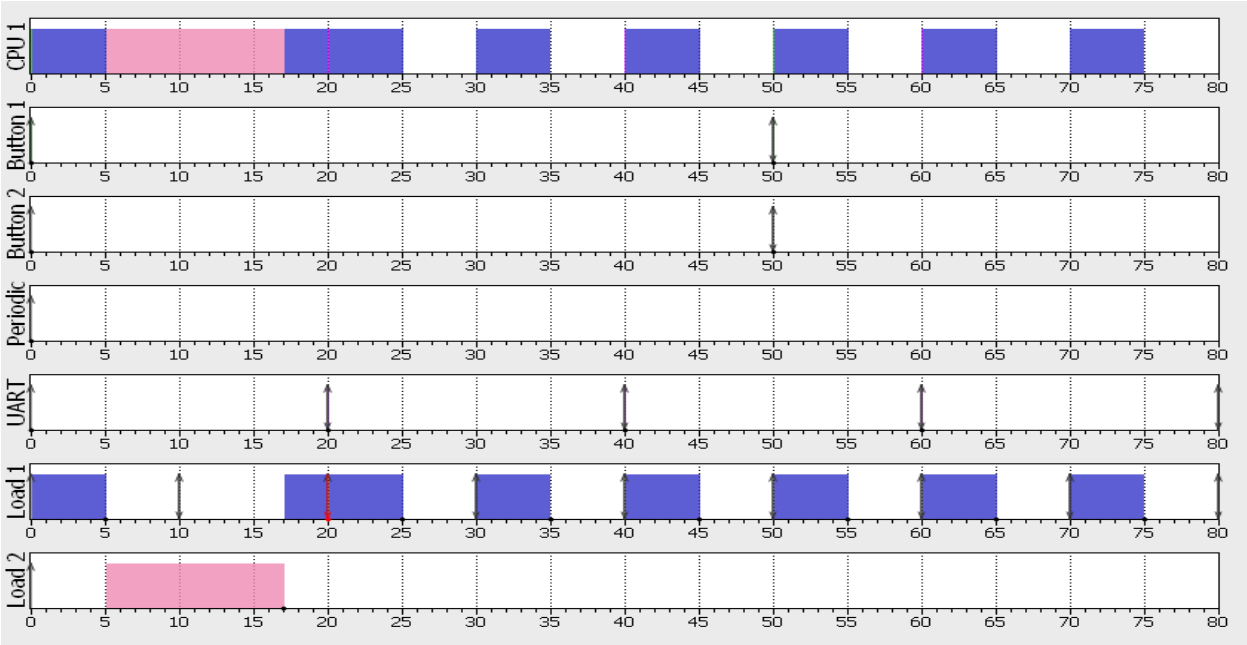
     URM = n [$2^{1/n}$ – 1] = 0.7347

     ∵ U < URM.

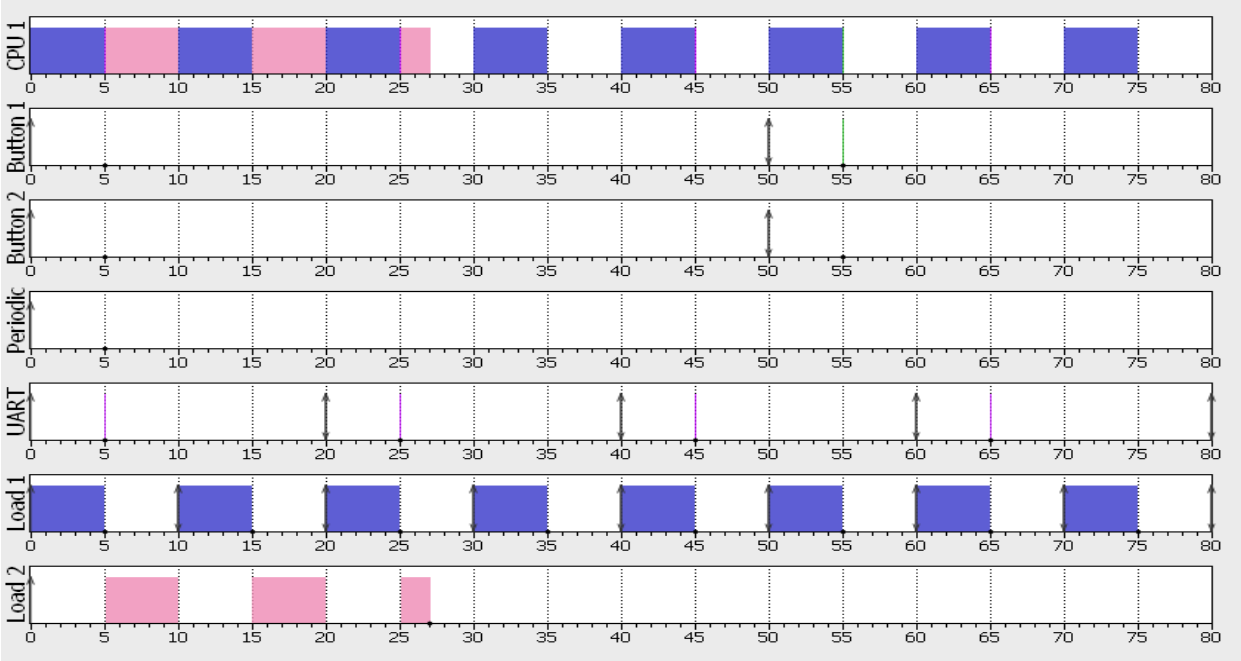
     ∴ System is Schedulable.

Simso Offline Simulator: -

- Fixed Priority Rate Monotonic Schedule.



- EDF Schedule.



Keil Simulation: -

1. CPU load and time.

Name	Value
Task_1_Total_Time	405
Task_2_Total_Time	412
Task_3_Total_Time	383
Task_4_Total_Time	615
Task_5_Total_Time	166624
Task_6_Total_Time	40151
System_Time	331790
CPU_Load	62
<Enter expression>	

2. Logic Analyzer.

- Signal 1: - Button 1 Task.
- Signal 2: - Button 2 Task.
- Signal 3: - Period Transmitter Task.
- Signal 4: - Uart Receiver Task.
- Signal 5: - Load 1 Simulation Task.
- Signal 6: - Load 2 Simulation Task.