**RT Concepts Final Project**

STM

"Police"

"Fire"

"Ambulance"

"City"











TIMER:

Time: xTicks

Code: Police, Ambulance, …

Description: random number







City Log









**Project: City dispatcher simulation**

For your final project in RT Concepts, you need to simulate a "City Dispatch" unit.   
Different Events come into the centralized city "dispatcher", the events should be sent to the required departments (just as the figure above).

your project is to simulate (implement) the system, You need to determine the queues needed , task priorities, locking mechanisms ..etc.   
You can implement the project using a simulator (Windows \ Linux based) or the **Nucleus board ( which might require some embedded knowledge).**

1. you can simulate (implement) the events using a **timer with random expiration** times that generates random messages and sends them through a queue to the dispatcher thread.  
    **if you're using the Nucleus board you'll need to send the messages from an ISR (NVIC)**

**Interupt of the timer**

HAL\_TIM\_Base\_Start\_IT(&htim3);

**static** **void** **MX\_TIM3\_Init**(**void**)

1. The dispatcher (list2: head2) thread should periodically read from the queue (list1: head1), check the type of the message (its code) and send the message to the relevant task.
2. Each Department thread (ambulance, police,…) will get out of blocking mode, receive the dispatcher's request and take a random number of time (ticks ) to complete, when done it'll go back to blocking mode.
3. Each Department **thread** (ambulance, police,…) has a limited number of resources It can use concurrently, so you need to implement your simulation accordingly (hint: use counting semaphores)
   1. Ambulance – 4
   2. Police – 6
   3. Fire department – 5
   4. City – 4
4. In addition, each Department thread and the dispatcher have to write an entry in a logging area (Global Memory), a logger task will periodically read the content of the logging area and print it (**for Nucleus users – send it through UART)** .

The project will be presented on the 27th of February.

**GOOD LUCK**