ECE 254: Prelab 1

1. What are the purpose of p\_lnk, p\_rlnk, p\_dlnk, and p\_blnk variables in

struct OS\_TCB?

* **p\_lnk:** Link pointer for ready/sem, used for waitlist
* **p\_rlnk**: Link pointer for semaphore / mailbox list, implemented backwards backwards
* **p\_dlnk**: Link pointer for the delay list
* **p\_blnk:** Link pointer for delay list, implemented backwards
* **ret\_val:** It is the return value upon the completion of a wait

1. Read the rt\_Task.c and RTX\_lib.c \_les and answer the following question. What is the purpose of variables mp\_tcb and mp\_stk?

* mp\_tcb is the name for the memory pool to allocate the TCB in memory
* mp\_stk is the name of the memory pool for the os\_idle\_demon and system allocation of the stack

1. Read the HAL\_CM3.c \_le and answer the following questions. What registers are saved on the task stack? (Hint: check init\_stack function). How to determine the start and end address of a task stack? How to determine the current stack pointer of a task?

* R1-R12, PSR, LR, and initial PC task\_body
* To get end address of task stack, use p\_task->stack and start address can be found by end address of stack + stack size
* To get the current stack pointer, use p\_task->tsk\_stack for a non-running task, and current\_stack\_ptr = rt\_get\_PSP() for a running task

1. OS\_R\_TMO; Yes, the answer to above question is OS\_R\_TMO because that is what is returned after the task is resumed, if the task was blocked before. Hence, once it resumes, it stops waiting on WAIT\_MBX and returns that instead.
2. The ordered list, **os\_dly** is incharge of setting up the delay list and initially sets it up to be empty. It can later be used to enqueue TCBs which are waiting to get access to the memory pool with the os\_dly.p\_dlink pointer to the delay list. Since tasks are run and unblocked based on priorities, TCB entering the os\_dly are also enqueued based on the priorities set by their calling tasks.
3. os.dly sets up the delay list and sets it up as initially empty .It can be used to en-queue TCBs that are waiting for memory block with os\_dly.p\_dlnk which is a Link pointer to a delay list. The tasks are enqueued based on priorities of the tasks that are run, and need to delay.