# Cyclometer Project Software Architecture Discussion

1. List the tasks/threads, or other independent execution streams, you think you need for this project. If it runs periodically, what is the period? If it is triggered by an event, what is the event and what are the event’s characteristics? What priorities must these have relative to each other?

Threads: UI thread, main thread, separate threads for calculations, event handler.

Period: If you are polling for the events through the sensor, we need to know how fast to ask them to not miss any events. Poll every millisecond.

Event: If it is triggered by an interrupt, the event is the interrupt.

Priorities: Input handler has the highest priority, since there is only one sensor. The display/UI is the second highest priority. Priority inversion, semaphores, etc.

2. What data is exchanged between these tasks?

If I have an interrupt task and it says it has data, assuming there are more than one thread, it could interrupt another thread. You don’t want to handle an interrupt inside another interrupt. Nested interrupts have their uses, but they are too complicated. You can signal another task instead. They are called synchronization points (“swim lanes”).

3. What synchronization or timing mechanisms will the tasks use?

For synchronization, semaphores, condition variables, etc. For timing mechanisms, built-in QNX timers, alarm timers, spins, nanosleeps, yields, etc.

4. Will you scan all inputs at the same rate? Will you use a scanner for all inputs?

You wouldn’t because you won’t be pressing the button at the same rate. You won’t catch all of them at the same rate. You won’t use a scanner, you can poll, use a timer, an interrupt, etc.

5. How often will you perform calculations?

Perform calculations as often as you get data, or at a set rate, or when the user wants to see the data. You do need to count as fast as possible. Average speed and current speed can be calculated more often.

# Handling the 7-segment Displays

1. How fast must the 7-segment displays be refreshed for a stable display? What is the refresh rate for analog TV, movies, computer displays?

For a stable display, 45-60 Hertz is needed. Analog TV is typically 30, movies 24, computer displays 60.

2. What will be the duty cycle of the anode signals that you generate to select the display being refreshed?

The duty cycle depends on the tolerance of the brightness of the signals, like 50%.