An adaptive real-time uncommon-speed alarm
☞ to all students of ANU/FEIT/DCS/COMP4330

An on-line, adaptive “unusual speed in specific places” alarm system, based on the data from a 2-D laser range scanner is to be designed and implemented. The internal structure of your system needs to represent the typical motions (paths) in the environment and serves as a base to detect unusual patterns. This could be motion in the opposite direction on a well established path (☞ perhaps a car on the wrong side of the road?) or a slow motion on an established fast path (☞ a kid on the road?) etc.

1. Inputs

The only employed input is a laser range finder delivering live data of a scene on the campus (actually in front of RSISE) at an average frequency of \( f_s = 4.7 \text{Hz} \) (the laser is tilted down by 15°).

2. Output

An alarm signal is to be given, whenever a currently measured speed diverges significantly from the average speed in a specific area (the alarm signal should also indicate this specific area). The alarm signal should be delivered at the earliest possible time.

3. Constraints

a. Assume a multiprocessor environment, i.e. employ potentially parallel tasks in your design.

b. Achieve the maximal accuracy under the given timing constraints.

Hint 1: whenever comparing different correlation values in your system (possibly calculated by different processors, in parallel, or at different times), make sure that the accuracy of correlation is identical.

Hint 2: you can of course make use of code fragments, which you produced (or were given) for previous assignments, but a consistent overall design might be more useful in the end than a maximal code re-usage.

4. Deliverables

a. Architecture documentation:

   a-1 functional/logical:
   describe your architecture as a static entity fulfilling all functional/logical constraints.

   a-2 temporal:
   describe the design and behaviour of your architecture in the time domain.

Both perspectives can be handled in one description, but compactness does not necessarily improve clarity.

b. Design priorities/principles/decisions:
do not use buzz words only — explain and motivate!

5. Evaluation

Your solution will be evaluated in terms of:

• reliability/predictability
• clarity/maintainability/expandability
• transferrable to other systems?

Your documentation does not necessarily need to be fully self-explaining. You will have an opportunity to explain/defend/promote your design. Nevertheless the delivered documentation should be very supportive.

6. Dates

Due dates for the written documentation as well as the oral examination will be on the web-site. The documentation need to be delivered two days before the examination at the latest.