

Embedded Systems

Problem 1 (Statechart)

[42.195 points]

Draw a statechart implementing a pedometer. A pedometer is a device that counts each step a person make. Your statechart needs to handle at least the following events/variables:

- an input floating-pointing variable `step_length` whose value is the length of a single step;
- an input boolean variable `signal`, equal to `true` when a step is detected;
- an input event `tick` periodically generated every 0.1 seconds;
- output floating-point variables `distance`, `time`, and `speed`.

At your leisure, add features for turning the pedometer on and off, starting it, and pausing it.

Problem 2 (Kahn process networks)

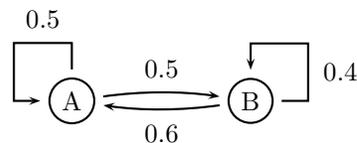
[21.0975 points]

Draw a Kahn process network generatic the sequence of quadratic numbers $\frac{n(n-1)}{2}$. Use basic processes that add two numbers, multiply two numbers, or duplicate a number. You can also use initialization processes that generate a constant and then simply forward their input. Finally, you can use a sink process.

Problem 3 (Markov processes)

[10 points]

Given the following Markov process, compute $s_{\lim}(A)$ and $s_{\lim}(B)$.



Problem 4 (Scheduling)

[5 points]

Formally prove: RM scheduling is not optimal.

Problem 5 (Büchi Automata)

[1.609 points]

Draw a Büchi automata accepting the language $(ab)^*c^\omega$.