Exercises – OS and Programming

Exercise 1

Consider a sensor node S equipped with a temperature sensor (with an analog output).
S reads data from the temperature sensor every second.
1. Write a Finite State Machine representing the states that characterize S and the transition between them.
2. What are the hardware components needed to sample data from the temperature sensor?

Exercise 2

Consider a sensor node S equipped with a temperature sensor (with an analog output).
S reads data from the temperature sensor every second.
S receives data from other sensor nodes.
S maintains the average temperature of all the temperature measurements it obtains (locally and from remote nodes)
1. Write a Finite State Machine representing the states that characterize S and the transition between them.
2. Describe a possible graph of components (including commands, events and tasks) implementing this state machine. How many data buffers are necessary for this app?

Exercise 3

Consider a sensor network where each node is sampling its temperature sensor at 100 Hz.
Each node sends on the network all the temperature measurements it collects.
The sampling task is executed in 5 msec.
The package (before send) task is executed in 1 msec.
The unpackaging (after receive) task is executed in 1 msec.

How many neighbors can each node support without thrashing? What are the requirements in terms of buffers?