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┌──────────────────────────── MODULE EnergyMeter ────────────────────────────┐
EXTENDS Integers, Sequences, TLC
CONSTANTS Sensors, MaxEvents
VARIABLES sensorStates, events

Init ≜ ∧ sensorStates = [s ∈ Sensors ↦ "normal"]
       ∧ events = ⟨⟩

 AActions    :
SensorReportAnomaly ≜ ∃ s ∈ Sensors :
                          ∧ sensorStates[s] = "normal"
                          ∧ sensorStates′ = [sensorStates EXCEPT ![s] = "anomaly"]
                          ∧ Len(events) < MaxEvents
                          ∧ events′ = Append(events, "anomaly_detected:" ∘ ToString(s))

Remove(seq, idx) ≜ [j ∈ 1 . . (Len(seq) − 1) ↦ IF j < idx THEN seq[j] ELSE  seq[j + 1]]

FixAnomaly ≜ ∃ i ∈ 1 . . Len(events), s ∈ Sensors :
                 ∧ events[i] = "anomaly_detected:" ∘ ToString(s)
                 ∧ sensorStates[s] = "anomaly"
                 ∧ events′ = Remove(events, i)
                 ∧ sensorStates′ = [sensorStates EXCEPT ![s] = "normal"]

 Specification
Next ≜ SensorReportAnomaly ∨ FixAnomaly


Spec ≜ ∧ Init
       ∧ □[Next]_⟨sensorStates, events⟩
       ∧ WF_⟨sensorStates, events⟩(SensorReportAnomaly)
       ∧ WF_⟨sensorStates, events⟩(FixAnomaly)

 Properties
TypeOK ≜ ∧ sensorStates ∈ [Sensors → {"normal", "anomaly"}]
         ∧ events ∈ Seq(STRING)

 Safety Properties
AnomalyAlwaysReportedInv ≜ ∀ s ∈ Sensors :
                               sensorStates[s] = "anomaly"
                                ⇒ ∃ i ∈ 1 . . Len(events) :
                                      events[i] = "anomaly_detected:" ∘ ToString(s)
AnomalyAlwaysReported ≜ ∀ s ∈ Sensors :
                            sensorStates[s] = "anomaly"
                             ⇒ □∃ i ∈ 1 . . Len(events) :
                                   events[i] = "anomaly_detected:" ∘ ToString(s)
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(* *)