
MODULE *TrafficSignalController*

Design based on *traffic_light8*
EXTENDS *Naturals*, *TLC*
CONSTANT *Directions*
VARIABLE *lights*, *clock*

$TypeInvariant \triangleq \wedge lights \in [Directions \rightarrow \{\text{"red"}, \text{"green"}, \text{"yellow"}\}]$
 $\wedge clock \in Nat$

$Init \triangleq \wedge lights = [dir \in Directions \mapsto \text{"red"}]$
 $\wedge clock = 1$

$LightGreen(dir) \triangleq$
 $\wedge lights[dir] = \text{"green"}$
 $\wedge lights' = [lights \text{ EXCEPT } ![dir] = \text{"yellow"}]$

$LightYellow(dir) \triangleq$
 $\wedge lights[dir] = \text{"yellow"}$
 $\wedge lights' = [lights \text{ EXCEPT } ![dir] = \text{"red"}]$

$LightRed(dir) \triangleq$
 $\wedge lights[dir] = \text{"red"}$
 $\wedge lights' = [lights \text{ EXCEPT } ![dir] = \text{"green"}]$

$NextClock \triangleq clock' = (clock \% 10) + 1$

$DirectionNext(dir) \triangleq \vee LightGreen(dir)$
 $\vee LightYellow(dir)$
 $\vee LightRed(dir)$

$NoAccident \triangleq \forall i \in Directions : (\vee (lights[i] = \text{"green"})$
 $\vee (lights[i] = \text{"yellow"})) \Rightarrow$
 $\forall j \in Directions : \vee i = j$
 $\vee lights[j] = \text{"red"}$

$Next \triangleq \wedge (\exists dir \in Directions : DirectionNext(dir))$
 $\wedge PrintT(lights)$
 $\wedge PrintT(NoAccident)$
 $\wedge NextClock$

$Accident(t) \triangleq (\quad clock > t$
 $\wedge NoAccident = \text{TRUE})$

$Spec \triangleq Init \wedge \Box [Next]_{\langle lights, clock \rangle}$

THEOREM $Spec \Rightarrow \Box TypeInvariant$

\ * Modification History

* Last modified *Mon* May 25 16:37:19 *PDT* 2015 by Me
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