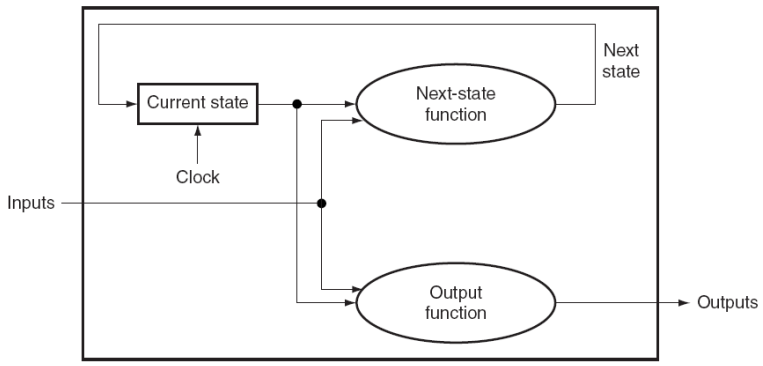
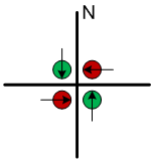
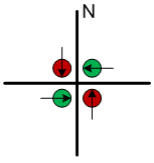
Finite state machine (FSM)



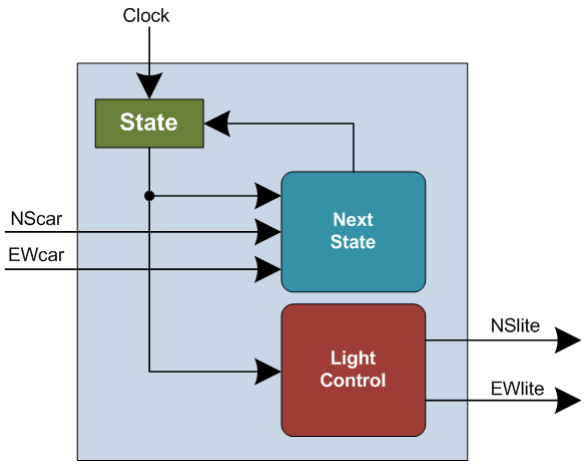
Traffic light control example

- Two states
  - NSgreen: green light on North-South road
  - EWgreen: green light on East-West road
- Sensors (**inputs**) in each lane to detect car
  - NScar: a car in either the north or south bound lanes
  - EWcar: a car in either the east or west bound lanes
- Control signals (**outputs**) to each light
  - NSlite: 0 is red, 1 is green
  - EWlite: 0 is red, 1 is green
- Current state goes for 30 seconds, then
  - Switch to the other state if there is a car waiting
  - Current state goes for another 30 seconds if not
- We use 1/30 Hz clock (Hz is clock cycles per second)
  - I.e., determine a new state (possibly current one) every thirty seconds





Traffic light control example

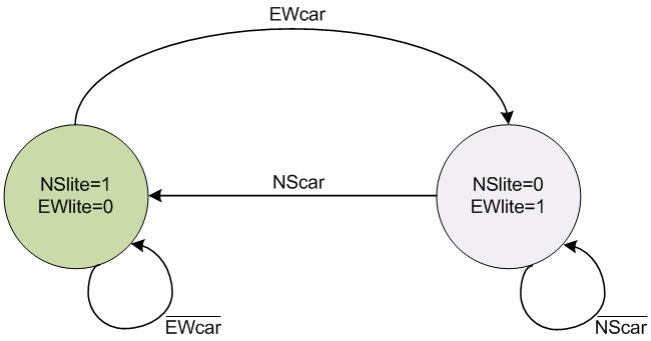


Traffic light control example

Current state	Inputs		Next state
	NScar	EWcar	
NSgreen	0	0	NSgreen
NSgreen	0	1	EWgreen
NSgreen	1	0	NSgreen
NSgreen	1	1	EWgreen
EWgreen	0	0	EWgreen
EWgreen	0	1	EWgreen
EWgreen	1	0	NSgreen
EWgreen	1	1	NSgreen

Current state	Outputs	
	NSlite	EWlite
NSgreen	1	0
EWgreen	0	1

Traffic light control example



Traffic light control example

- Let's assign "0" to NSlite and "1" to EWlite initially
- NextState = CurrentState'·EWcar + CurrentState·NScar'
- NSlite = CurrentState'
- EWlite = CurrentState