Virtual / Digital ATM Machine

Here we are implementing a virtual / Digital ATM machine using the Mealy model, with the following features;

i) flashes a green light when cash is available and the machine is ready.

ii) flashes a red light when cash is not available or there is a machine defect.

iii) when a card is inserted, it asks for a pin if the card is legal or undamaged, else returns a message asking for resubmission

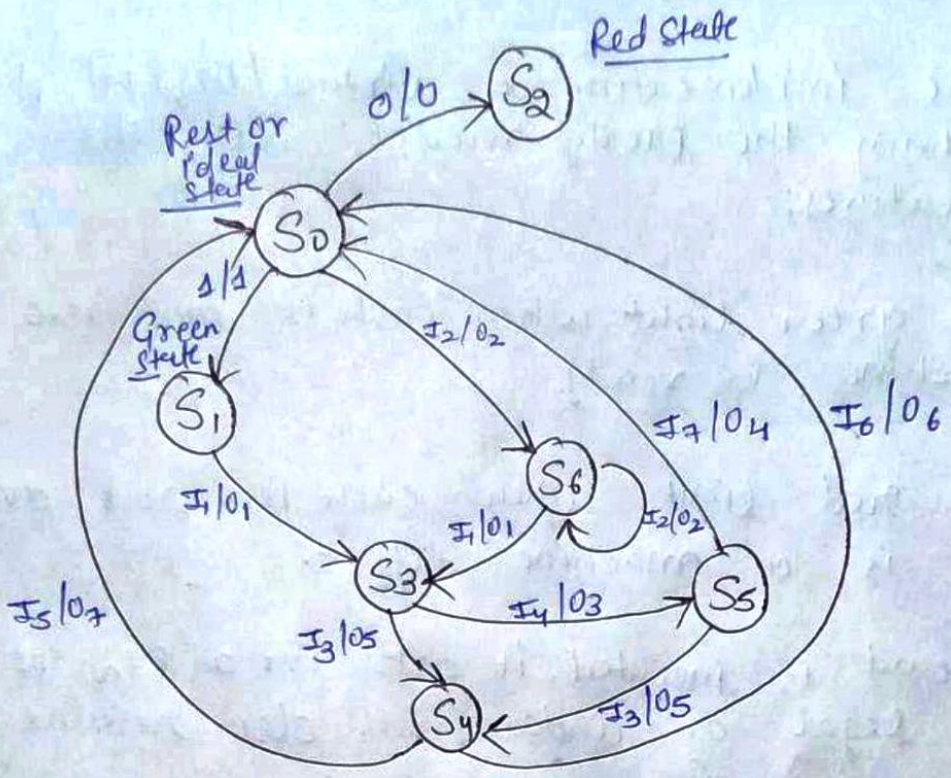
iv) If the wrong pin is entered, asks for re-entry of the pin at the 1st instant, when the 2nd entry is also wrong, takes the card in, raises an alarm, and goes back to the rest state.

v) If the pin is right, prompts for an amount to be dispensed

vi) If the amount is more than in-store, gives a sign of not enough cash and goes to rest state.

vii) If the amount is less than in-store, dispense the amount and get back to the rest state.

↳ State diagram



→ Inputs are declared as 3-bit binary numbers, along with an X-flash

→ X-flash, if it is 0 (zero), it means that the machine is defected or cash is not available, means the output will be a red signal.

→ X-flash if it is 1 (one), it means that the machine is perfectly fine and in working condition, hence the output will be a green signal.

→ The output of green and red signal is given in the form of a binary bit 0/1, 0 for Red flag & 1 for green flag.

(*) Inputs

Parameters	Inputs	
000	I_1	→ Card Inserted and right
001	I_2	→ Card inserted and wrong
010	I_3	→ Valid Pin entered
011	I_4	→ Invalid Pin entered
100	I_5	→ Given amount by user is less than cash available
101	I_6	→ Given amount by user is more than cash available
110	I_7	→ Invalid Pin entered twice

(*) Outputs

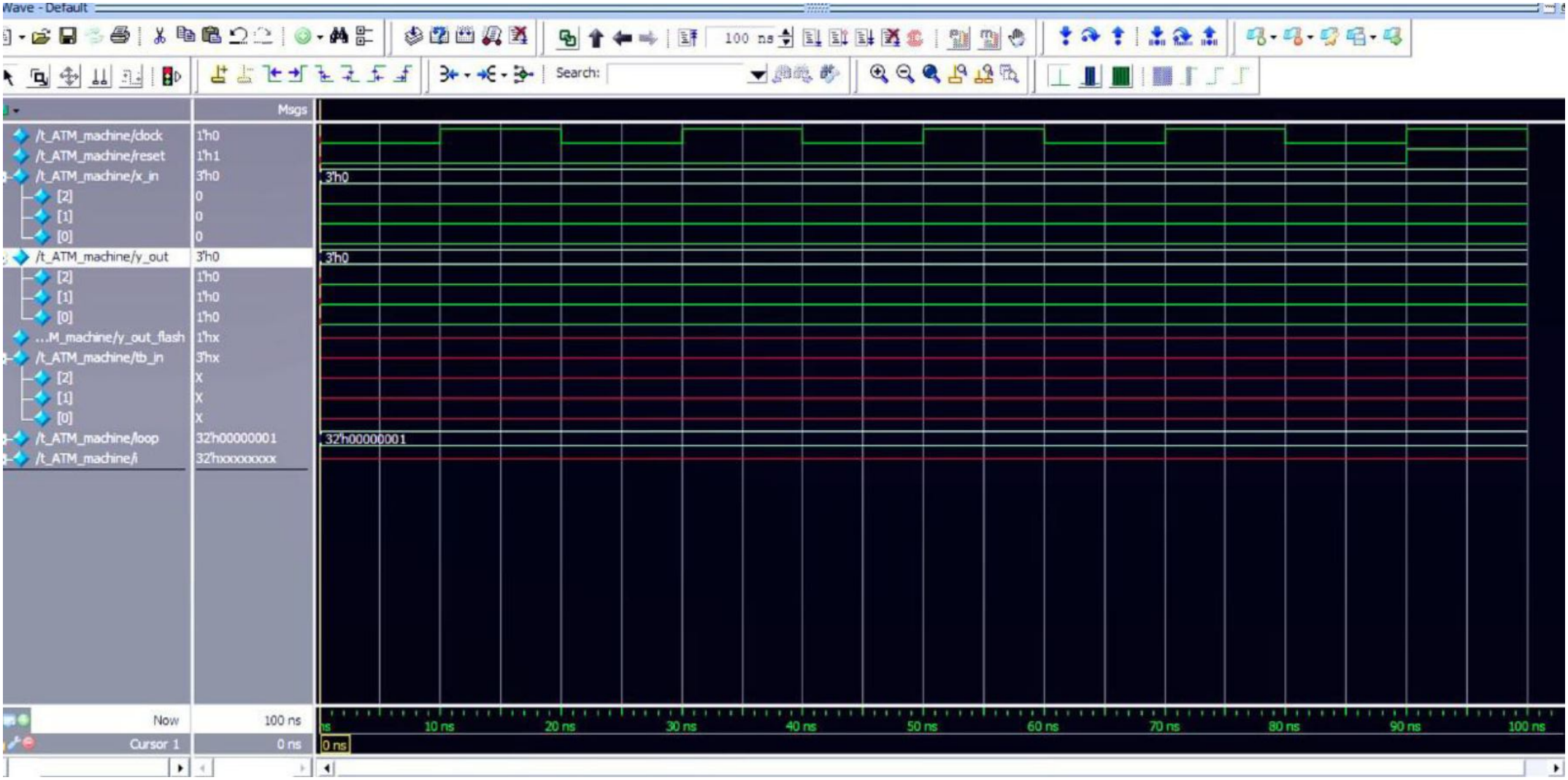
Parameters	outputs	
000	O_1	→ Machine asks for Pin
001	O_2	→ Machine asks for resubmission of c
010	O_3	→ Machine asks for retry of Pin after 1st time wrongly entered Pin
011	O_4	→ After 2nd wrong Pin machine raises an alarm
100	O_5	→ Prompts for amount to be dispensed
101	O_6	→ Gives a sign of not enough cash (rest state)
110	O_7	→ Gives the amount, goes back to rest st

(x) States

000	S_0	→	Real / Ideal state
001	S_1	→	Green state / Ready state
010	S_2	→	Red / not ready state
011	S_3	→	Ask for Pin state
100	S_4	→	Machine asking for amount to be dispensed.
101	S_5	→	Ask for retry of Pin after 1st wrong Pin
110	S_6	→	Machine asking for resubmission of Card state.

(x) State table

Present state	Input	Next state	Output
S_0 (000)	1	S_1 (001)	1
S_0 (000)	0	S_2 (010)	0
S_1 (001)	000	S_3 (011)	000
S_1 (001)	001	S_6 (110)	001
~~S_2 (010)~~	~~010~~		
~~S_2 (011)~~	~~011~~		
S_3 (011)	0100	S_4 (100)	100
S_3 (011)	011	S_5 (101)	010
S_4 (100)	100	S_0 (000)	110
S_4 (100)	101	S_0 (000)	101
S_5 (101)	010	S_4 (100)	100
S_5 (101)	110	S_0 (000)	011
S_6 (110)	000	S_3 (010)	000
S_6 (110)	001	S_6 (110)	001


Wave - Default
100 ns
Search:
Msgs
/t_ATM_machine/clock
/t_ATM_machine/reset
/t_ATM_machine/x_in
[2]
[1]
[0]
/t_ATM_machine/y_out
[2]
[1]
[0]
...M_machine/y_out_flash
/t_ATM_machine/tb_in
[2]
[1]
[0]
/t_ATM_machine/loop
/t_ATM_machine/i
1'h0
1'h1
3'h0
0
0
0
3'h0
1'h0
1'h0
1'h0
1'hx
3'hx
X
X
X
32'h00000001
32'hxxxxxxxx
3'h0
3'h0
32'h00000001
Now
100 ns
Cursor 1
0 ns
10 ns
20 ns
30 ns
40 ns
50 ns
60 ns
70 ns
80 ns
90 ns
100 ns
0 ns