**數位系統導論期末範例3**

**電梯控制器離散事件建模和電路合成**

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**1.機器人運動控制規格**

設計一個兩層樓的電梯控制器，規格如下：

─電梯按鈕有三個按鍵，U(上樓)、D(下樓)、S(緊急停止)；

─兩個sensor L1(L1=1, 表示等候者在一樓，L1=0, 表示等候者在二樓)，L2(L2=1, 表示電梯目前在一樓，L2=0, 表示電梯目前在二樓)

─兩個馬達M1(M1=1, 電梯向上；M1=0, 電梯向下),M2(M2=1, 電梯開門；M2=0, 電梯關門)

**2、Grafcet離散事件建模**



**4. 電梯控制器電路合成**

**Grafcet控制器電路合成**

grafcet: process(CLK,RST)

begin

if RST='0' then

X0<='1'; X1<='0'; X2<='0'; X3<='0';

X4<='0'; X5<='0'; X6<='0'; X7<='0'; X8<='0';

elsif CLK'event and CLK='1' then

if X0='1' and L1='1' and U='1' and L2='1' then

X0 <= '0'; X3 <='1';

elsif X0='1' and L1='1' and U='1' and L2='0' then

X0 <= '0'; X1 <='1';

elsif X0='1' and L1='0' and D='1' and L2='1' then

X0 <= '0'; X2 <='1';

elsif X0='1' and L1='0' and U='1' and L2='0' then

X0 <= '0'; X3 <='1';

elsif X1='1' and L2='1' then

X1 <= '0'; X3<='1';

elsif X2='1' and L2 = '0' then

X2 <= '0'; X3 <= '1';

elsif X3='1' then

X3 <= '0'; X4 <= '1';

elsif X4='1'and U='1'then

X4 <= '0'; X5 <= '1';

elsif X4='1' and D='1' then

X4 <= '0'; X6 <= '1';

elsif X5='1' and L2='0'then

X5 <= '0'; X7<='1';

elsif X6='1' and L2='1' then

X6 <= '0'; X7<='1';

elsif X7='1' then

X7 <= '0'; X8 <= '1';

elsif X8='1' then

X8 <= '0'; X0 <= '1';

end if;

end if;

end process;

**Datapath電路合成**

datapath: process(CLK,RST)

begin

if CLK'event and CLK='1' then

if X1='1' then

M1 <= '0';

elsif X2='1' then

M1 <= '1';

elsif X3='1' then

M2 <= '1';

elsif X4='1' then

M2 <= '0';

elsif X5='1' then

M1 <= '1';

elsif X6='1' then

M1 <= '0';

elsif X7='1' then

M2 <= '1';

elsif X8='1' then

M2 <= '0';

end if;

end if;

end process;

**系統合成**

LIBRARY IEEE;

USE IEEE.STD\_LOGIC\_1164.all;

USE IEEE.STD\_LOGIC\_ARITH.ALL;

USE IEEE.STD\_LOGIC\_UNSIGNED.ALL;

entity grafcet\_vhdl1 is

port(

clk : in std\_logic;

rst : in std\_logic;

L1 : in std\_logic;

L2 : in std\_logic;

U : in std\_logic;

D : in std\_logic;

M1: out std\_logic;

M2 : out std\_logic

);

end grafcet\_vhdl1;

architecture arch of grafcet\_vhdl1 is

signal X0,X1,X2,X3,X4,X5,X6,X7,X8 : std\_logic;

begin

grafcet: process(CLK,RST)

begin

……

end process;

datapath: process(CLK,RST)

begin

…..

end process;

end arch;