Application of Digital Logics in automation of a lift

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Abstract : A re-enactment investigation of lift control of a 3-story building has been introduced in this paper. We have concentrated on logic detailing of the plausible occasions connected with development of the lift and executed the rationale conditions utilizing standard computerized circuit test system programming Proteus 7 Professional. Major areas of the whole circuit structure are info unit, directional control unit, priority encoder, level situating control unit, yield show unit and clock controlling unit. Re-enacted comes about because of the circuit test system programming demonstrate correct match with the craved outcomes which demonstrates our outline legitimacy.

I. INTRODUCTION

Lift is an inseparable part of a building structure. A re-enactment investigation of lift control of a 3- story building has been introduced in this paper utilizing advanced digital circuit. Lift control arrangement of a building has been proposed in a few written works [1][2][3].But, one of a kind part of this work is that we have excluded any Microcontroller or Programmable Logic Controller (PLC) for digital usage in this outline, rather we have accentuated on creating digital conditions by digital calculation and utilizing fundamental advanced digital circuit segments. At to start with, the likely occasions in regards to the up and downwards development of the lift have been distinguished and they have been utilized as factors to shape the digital condition to figure out if the present bearing of the lift will be upward or descending. In this development, the need of the occasions is considered appropriately i.e. the request have been served on need premise. Once the course of the lift is decided, the lift will change its level contingent upon its present position. The information keys from the lift clients remaining inside or outside of the lift and the yield show demonstrating present position of the lift have been exhibited in this paper as saw in a standard 3-story building lift. We have utilized Proteus 7 Proficient programming to reproduce our planned circuit to demonstrate its usefulness.

II. SAMPLE INPUTS GIVEN BY USERS AND LIST OF EVENTS

Inputs offered to a lift client remaining inside or outside of a 3-story building lift have been shown in Table 1:

Table 1.

Position of the client	Symbol	Requested Instruction
Interior of the lift	GF	To go to ground floor
Interior of the lift	1F	To go to first floor
Interior of the lift	2F	To go to second floor
Exterior of the lift	G_UP	To go upwards from ground floor
Exterior of the lift	1_DOWN	To go downwards from first floor
Exterior of the lift	1_UP	To go upwards from first floor
Exterior of the lift	2_DOWN	To go downwards from second

III. LIST OF ALL POSSIBLE EVENTS

Occasions that can occur in operation of a 3-story building lift are recorded in Table 2:

Table.2

POSITION OF LIFT	SYMBOL	EVENT
AT GROUND FLOOR	STATUS_GROUND	1F is pressed from interior
		2F is pressed from interior
		1_DOWN is pressed from exterior
		1_UP is pressed from exterior
		2_DOWN is pressed from exterior
AT 1ST FLOOR	STATUS_1ST	GF is pressed from interior
		2F is pressed from interior
		G_UP is pressed from exterior
		2_DOWN is pressed from exterior
AT 2ND FLOOR	STATUS_2ND	GF is pressed from interior
		1F is pressed from interior
		1_UP is pressed from exterior
		1_DOWN is pressed from exterior
		G_UP is pressed from exterior

IV. LOGIC EQUATIONS

Creating logic conditions for deciding the position of the lift requires three stages logic detailing : at start with, setting the bearing of the lift at a moment i.e. whether the lift will climb or downwards at a moment and besides setting the need of the occasions connected with each of the directional developments lastly, deciding the present position of the lift.

V. LOGIC FORMULATION OF ELEVATOR DIRECTION

We mean the occasion of upward and descending bearing of a lift at a moment to be Y0 and Y1 separately. Thus, the statement of Y0 and Y1 ought to be :

Y0=STATUS_GROUND+(2_DOWN+2F).Y1.STATUS_1(ST)+STATUS_1ST.(2_DOWN+2F).1_UP
Y1=[STATUS_1ST.(G_UP+GF).Y0 (G_UP+GF)+STATUS_1ST.(2_DOWN+2F).1_DOWN+STATUS_2ND].Y0

VI. LOGIC FORMULATION OF PRIORITY OF EVENTS

After the bearing of the lift is resolved, the need of the considerable number of occasions connected with that course should be set to decide the present position of the lift. Need rundown of the occasions in each of the directional developments of the lift is given in Table 3:

PRIORITY OF CASES AT DIFFERENT LIFT DIRECTIONS

Table 3.

Direction of lift	Logic state	Events arranged in descending order of priority
Upward	Y0=1, Y1=0	1F
		1_UP
		2F
		2_DOWN
		1_DOWN
Downward	Y0=0, Y1=1	1F
		1_DOWN
		GF
		G_UP
		1_UP

The truth table of the priority encoder for upward direction can be given in Table IV

Table 4.

1_DOWN	2_DOWN	2F	1_UP	1F	Q2	Q1	Q0
x	x	x	x	1	1	1	1
x	x	x	1	0	1	1	0
x	x	1	0	0	1	0	1
x	1	0	0	0	1	0	0
1	0	0	0	0	0	1	1

The logic function for Q2, Q1 and Q0 thus can be written as:

$Q2=1F+\overline{1\_UP}.\ \square 1F\square+\overline{2F}.\square\overline{1\_UP}\square.\square 1F\square\ \square\ 2\ \_\ DOWN.\square 2F\square.\square 1\_UP\square.\square\ 1F\square$

$Q1=\overline{1F+1\_UP}.\ \square\overline{1F}\square\square\ \overline{1\_DOWN}.\square 2\ \_\ DOWN\square.\square 2F\square.\square 1\_UP\square.\square 1F\square$

$Q0=1F+2F.\ \square 1\_UP\ \square.\square 1F\square\ \square\ 1\_\ DOWN.\square 2\ \_\ DOWN\square.\square 2F\square\ .\square\ 1\_UP\square.\square\ 1F\square$

The truth table of the priority encoder for downward direction can be given in Table V

Table 5.

1_UP	G_UP	GF	1_DOWN	1F	Q2	Q1	Q0
x	x	x	x	1	1	1	1
x	x	x	1	0	1	1	0
x	x	1	0	0	1	0	1
x	1	0	0	0	1	0	0
1	0	0	0	0	0	1	1

2= Y4+Y5 .Y0.Y1

$$Q2=1F+1\_DOWN.(\overline{1F})+GF.(\overline{1\_DOWN}).(\overline{1F})+G\_UP.(\overline{GF}).(\overline{1\_DOWN}).(\overline{1F})$$

$$Q1=1F+1\_DOWN.(\overline{1F})+1\_UP.(\overline{G\_UP}).(\overline{GF}).(\overline{1\_DOWN}).(\overline{1F})$$

$$Q0=1F+GF.(\overline{1\_DOWN}).(\overline{1F})+1\_UP.(\overline{G\_UP}).(\overline{GF}).(\overline{1\_DOWN}).(\overline{1F})$$

Rationale condition to locate the present lift position. The three parallel bits S2, S1 and S0 signify the position of the lift. Relating truth tables for up and descending course are displayed in Table 6.

Table 6.

Q2	Q1	Q0	Y7	Y6	Y5	Y4	S2	S1	S0	Location
1	1	1	1	0	0	0	0	0	1	1st Floor
1	1	0	0	1	0	0	0	0	1	1st Floor
1	0	1	0	0	1	0	1	0	0	2nd Floor
1	0	0	0	0	0	1	1	0	0	2nd Floor

In this way, the statement of S2 and S0 can be given by:

$$S2=(Y4+Y5).Y0.\overline{Y1}$$

$$S1=(Y6+Y7).Y0.\overline{Y1}$$

The overall expression is

$$S0=(Y4+Y5).Y1.\overline{Y0}$$

$$S1=(Y6+Y7).Y0.\overline{Y1}+(Y6+Y7).Y1.\overline{Y0}$$

$$S2=(Y4+Y5).Y0.\overline{Y1}$$

VII. CIRCUIT DESIGN DESCRIPTION

In this segment, the whole circuit plan design has been depicted segment wise. Figure. 1 demonstrates the aggregate circuit graph. Our proposed outline design can be separated into five units: Input unit, Directional control unit, Priority Encoder, Level situating control unit, Output show unit and clock controlling unit.

VIII. INPUT UNIT

Input unit comprises of two important subsections: Request getting section, latching section. The requests recorded in Table 1 are taken from the client utilizing LOGICTOGGLE accessible at Proteus 7 Professional. They serve as the demand attending segment of the information unit. They can give a solitary pulse to ask for an occasion. Figure. 2 demonstrates this sub-sec. Since various guidelines can be asked for at the same time and they should be served on need premise, so whatever remains of the directions must be spared utilizing a hooking area. In our outline, we have utilized J-K flip-flop as the locking area. Since the two contributions of the flip-flop are shorted together and allocated a consistent rationale level 1, so it basically fills in as a T flip flop. The contributions from the demand getting area act as the clock of the flip-flops. On the off chance that a specific demand is made twice sequentially, the clock beat of the flip-flops works a similar way successively and as a result of the back to back toggling of information at J-K flip-flop, that specific demand is reset. It is an occasion if a client mistakenly asks for an occasion and needs to scratch off the demand by squeezing the demand catch for the second time. The hooking segment has been delineated in Figure. 3.

IX. DIRECTIONAL CONTROL UNIT

Directional control unit comprises of logic circuit for Eq. 1-2. This unit decides the assend or descending course of the lift at any moment. The yields of this unit, Y0 and Y1 are utilized as the empowering agents of the cradles used to pass the level situating information to the focal transport. These cradles are utilized to keep away from the race condition (two logical levels at a similar node) since at every moment Y0 and Y1 are changed by Eq. 1-2 and just a single of them ought to send level situating information to bus. This control unit has been is in Figure. 4.

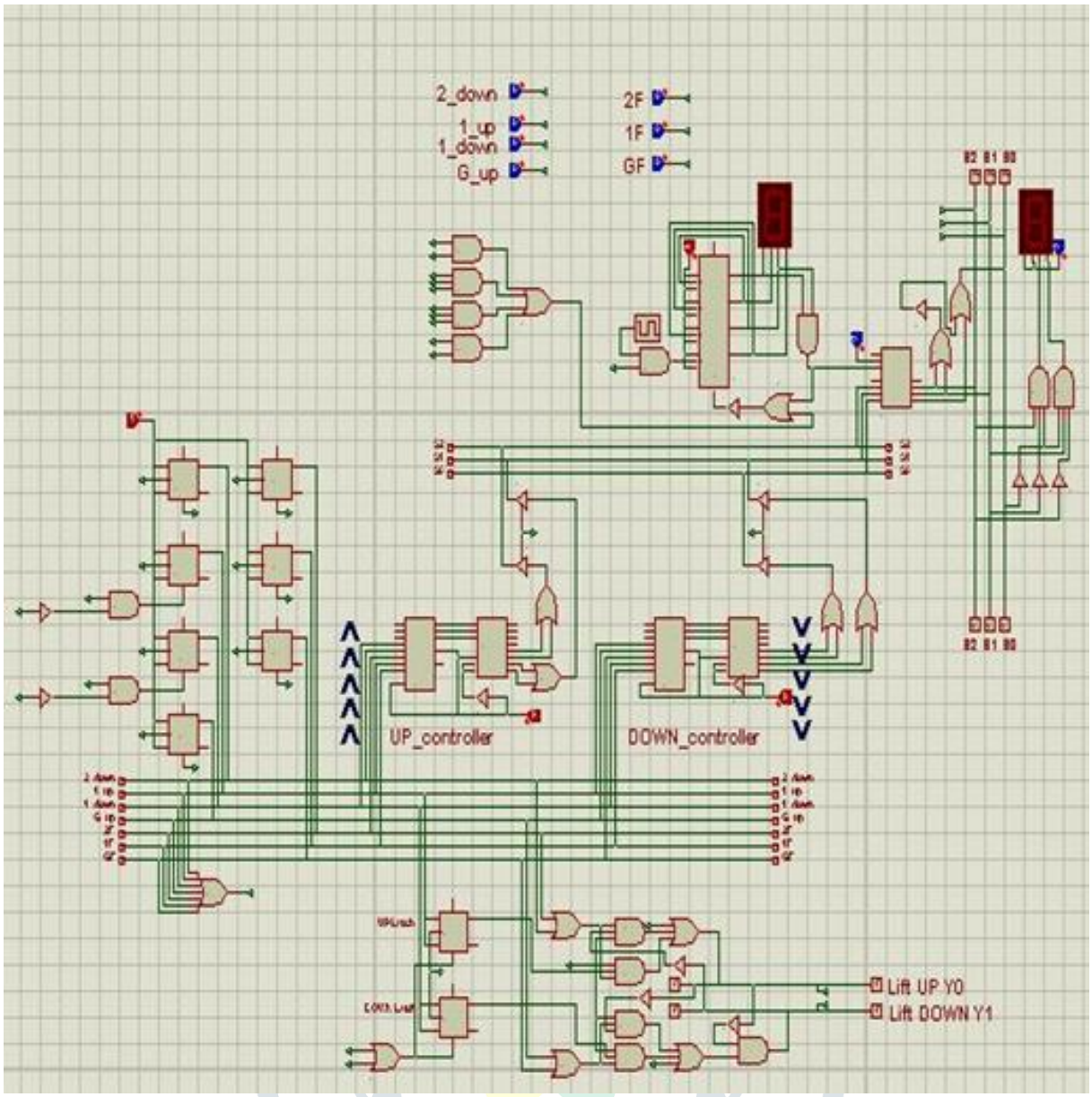

Figure1.-Total circuit architecture of the elevator control design

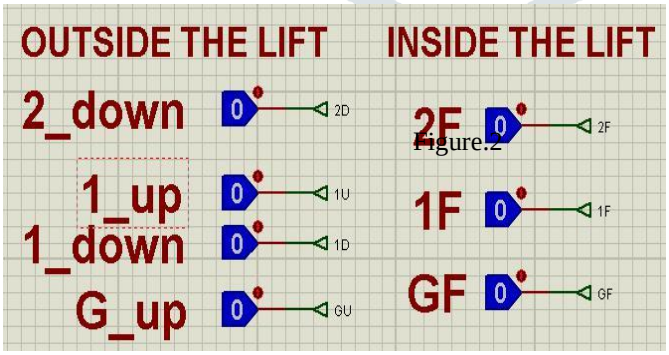

Figure.2

Figure2.-Sub sec

PRIORITY ENCODER:

After the heading of the movement of the lift is chosen, the following step is to set the priority of the demands put away in the latching section. Need encoder fills this need. Two need encoders have been used to dole out the need of the occasions recorded in Table III connected with both the upward and the descending bearing of the lift. The 3 bit yields from both the need encoder constructs the level situating control unit to decide the present position of the lift. Fig. 5 demonstrates the need encoder area of the circuit outline.

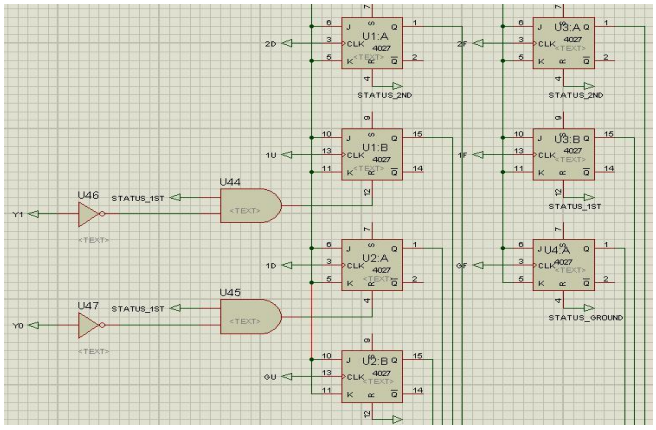

Figure 3.-Hooking Segment

X. LEVEL POSITIONING CONTROL UNIT

Level situating control unit comprises of two decoders and circuits(buffer). This is the unit which decides the present level position and sends the information to focal transport to show it to the yield area. This segment is guided by the logical conditions displayed at Eqs. 13-15. S2, S1 and S0 indicate the present level position of the lift. Buffers are empowered by logic condition of Y0 and Y1 so that two distinctive logic level are not experienced at focal transport ie at central bus. The Figure. 6 demonstrates the level situating control unit.

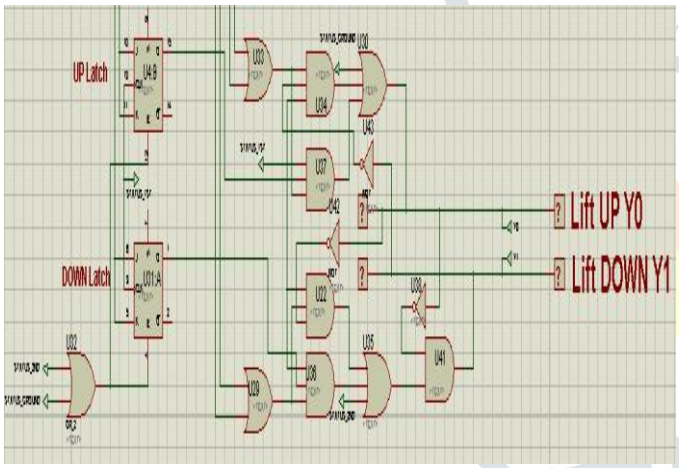

Figure.4- Control Unit

XI. OUTPUT DISPLAY UNIT

Current level position controlled by the level situating control unit will be shown in the yield show. Since the solicitations are served successively, the level positions yield from the level situating control unit are first set as input(S2, S1 and S0) of an enlist and they are sent to conclusive yield display(s2, s1 and s0) with a settled deferral between back to back yields. This settled postponement is set by a timing control unit. Last yield show is appeared in a BCD 7-fragment show. Fig. 7 demonstrates the yield show unit.

XII. CLOCK CONTROL UNIT

Clock controlling unit controls settled postponement between continuous solicitations. Progressive solicitations are presented with a 10s postponement in the middle of them which look like to move of the lift between the floors. This control unit is appeared in Figure. 8.

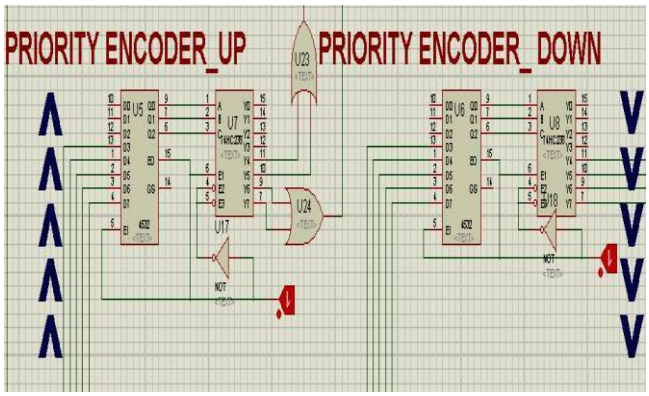

Figure.5- Priority Encoder

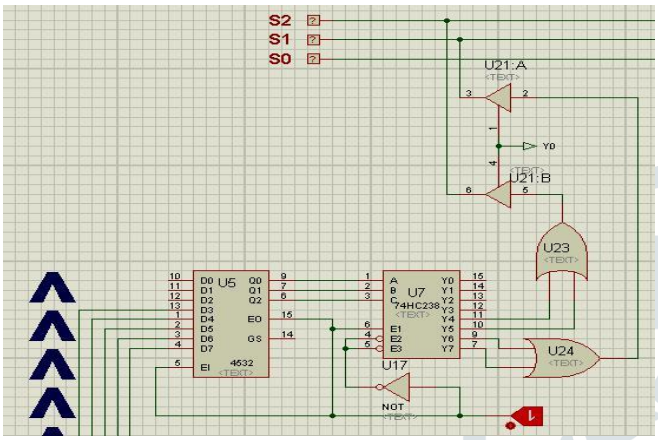

Figure.6- level situating control unit

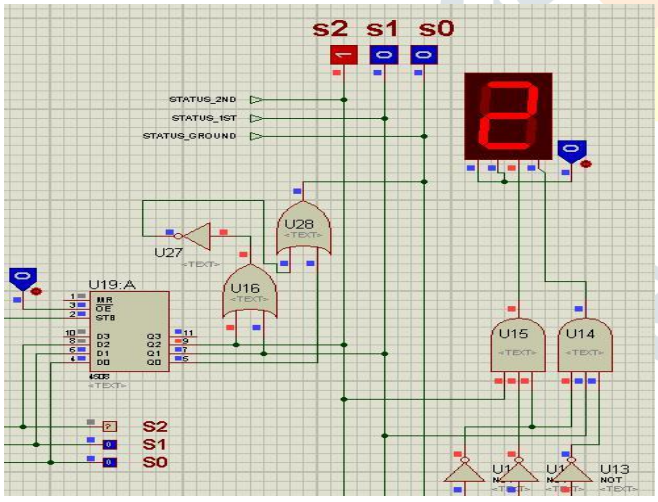

Figure.7- yield show unit

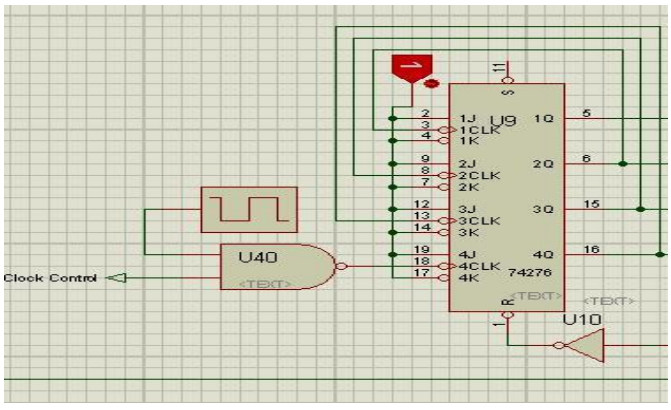

Figure.8- Clock control Unit

The functional block diagram of the lift control circuit is presented in Figure. 9.

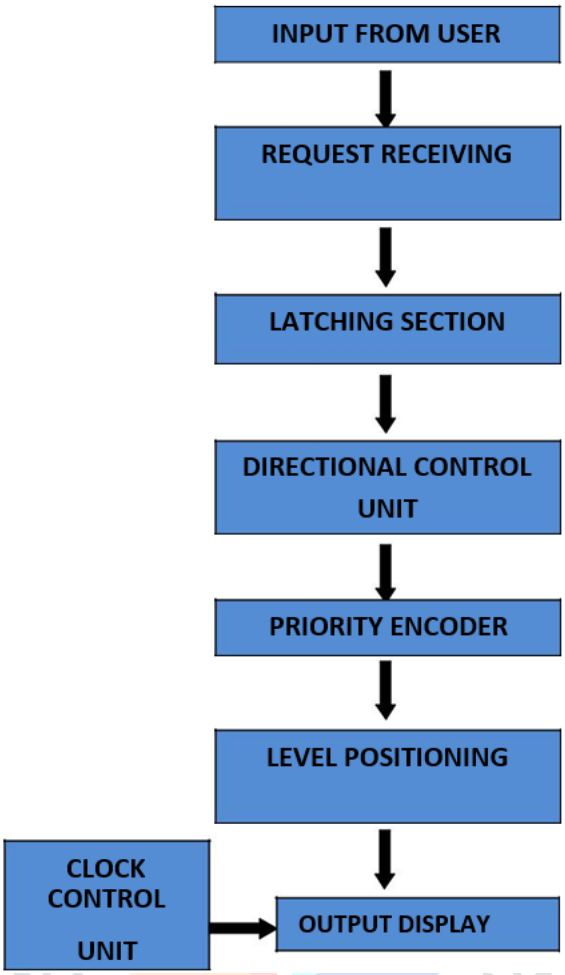

Figure9.- lift control circuit

XIII. CONCLUSION:

An advanced logic circuit based lift control framework outline of a 3-story building has been introduced in this paper. Considering the likely occasions, connected with the development of the lift, as factors, logical detailing has been finished. In light of those logical conditions, the circuit has been reproduced with proper circuit segments accessible at Proteus 7 Professional programming bundle. We have gotten sought yield at the yield show area which demonstrates the legitimacy of our proposed circuit plan

XIV. REFFERENCES:

[1] Colmerauer A. "Metamorphosis Grammars" in natural language communication with computers
Kitch [1974]
[2] The representation of Meaning in Memory (Lawrence Erlbaum Associates, Inc, Hillsdale, New Jersy)