you do not need to modify the core, updates are not required and the existing net list is used during implementation.

Table 1: Tabular Form of States

Input as Clock and reset		Directions of lanes			
S	S	North	East	South	West
Initial Condition		Red	Red	Red	Red
0	0	Green	Yellow	Red	Red
0	1	Red	Green	Yellow	Red
1	0	Red	Red	Green	Yellow
1	1	Yellow	Red	Red	Green

4. Hardware Implementation

4. 1. TLC Structure

Figure 2 shows the structure of the four roads (square) that has been used as a to design proposed system. In this structure four traffic signals are present. Road structure shows four traffic lane represented by north side lane, east side lane, south side lane and west side lane. Every lane has their own separate traffic light system which is having regular as usual red, yellow and green lights. the north side lane has north green ,north red, and north yellow light which is presented by NG,NR,NY respectively. Similarly east side also having EG, ER, EY respectively. And the lights of south side are presented by SG, SR, SY. Similarly the west side lights also presented as WG, WR, WY.

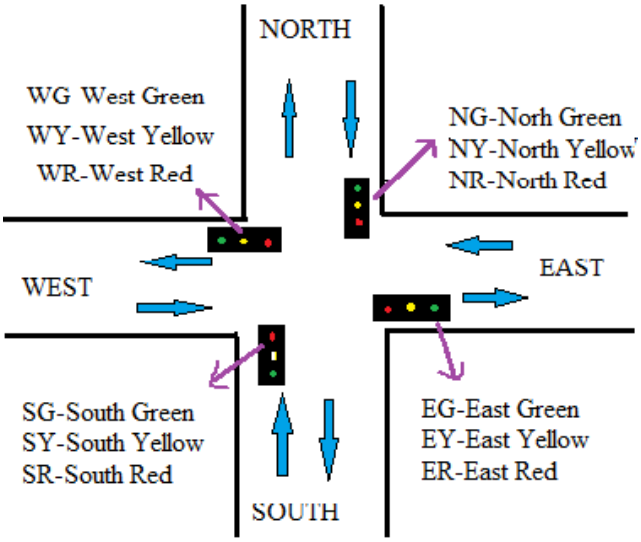

Figure 2: Four Road of TLC Structure

Traffic Light Controller can be designed by starting with certain assumptions. Initially Red signal is ON in North East, West and South direction.

There are four traffic light signals, in the below figure which are to be controlled. These four signals have same priority as they all are main roads. Now when the Reset is made high the North traffic will be allowed to move and traffic in all the remaining directions are stopped. Later the traffic in all the other direction is allowed to move in the sequence.

4. 2. State Description

The sequence of traffic is as shown in Figure4 fist North rode allow to move the traffic after that East rode allow traffic to reach their place . After east South rode allow moving the traffic on rode and then West rode allow to move the vehicles. The advantage of this particular Traffic Light Controller program is that modification can be done easily as per the requirements i.e., suppose the traffic on main road and the side road can be controlled by changing the states accordingly, when the main road traffic is heavy as compared to the side road traffic at that time the time simulation of main road is large than side rode means green light glowing time of main side rode is large than side rode because number of vehicles are more than side rode.

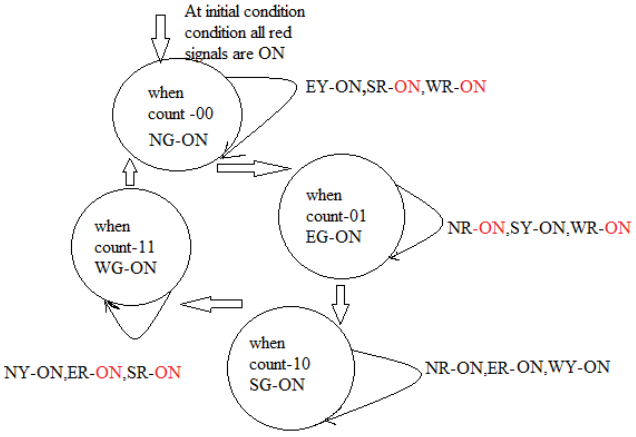

Figure 3: State Diagram

There is two inputs are present namely clock and reset. The TLC states shown in Figure3 which works on the changing count of given inputs. Initially the all side rode signals was red which is initial condition after that execution of program is started as shown in fig4.Whenever cnt=00 and dir=00,then green light in north direction will be ON for few seconds and red signal light in all other directions namely west, south and east will be ON. When cnt=01 and dir=00 then yellow li ON for few seconds and pedestrian north will be ON and then dir is incremented by one and cnt is assigned to zero. So when cnt=00 and dir=01, the green light in east direction will be ON for few seconds and all red lights in other directions be ON Whenever cnt=01 and dir=01 then yellow will be ON for few seconds and pedestrian east will be ON and then dir is incremented by one and cnt is assigned to zero. So whenever cnt=00 and dir=10, the green light in south direction will be ON for few seconds and all red lights in other directions will be ON. Whenever cnt=01 yellow light (y1) will be ON for few seconds and pedestrian south will be ON and then dir is incremented by one and cnt is assigned to zero. So whenever cnt=00 and dir=11, the green light in west direction will be ON for few seconds and all red lights in other directions will be ON. Whenever cnt=01 then yellow light (y1) will be ON for few seconds and pedestrian west will be ON and then dir is assigned to 00 and cnt is assigned to zero. This sequence repeats and the traffic flow will be controlled by assigning time periods in all the four directions.

4. 3. FPGA Model

Spartan -3 families offers densities ranging from 50,000 to five million system gates. It is programmed by loading configuration data into robust, reprogrammable, static CMOS configuration latches (CCL) that collectively control all functional elements and routing resources. Spartan-3 FPGA platform also allows the user to make significant changes while keeping original device pin outs thus eliminating the need to re-tool PC boards.

Figure 4: FPGA Spartan-3E Development Kit

We can easily upgrade, modify, and test the designs even in the field itself. Embedded capabilities make Spartan-3 devices ideal as coprocessors or pre-and post-processors, offloading highly computational functions from a programmable DSP to enhance system performance.

Contemporary FPGAs have large resources of logic gates and RAM blocks to implement complex digital computations. As FPGA designs employ very fast I/Os and bidirectional data buses it becomes a challenge to verify correct timing of valid data within setup time and hold time.

5. Simulation Result

Figure 6.Shows the simulation results for the controller with sensors output = logic '0', i.e. when traffic is slag, and the transition time will be less.

Figure7 Shows the simulation results for the controller with sensors output = logic '1', i.e. when traffic is crowded, the transition time will be more.

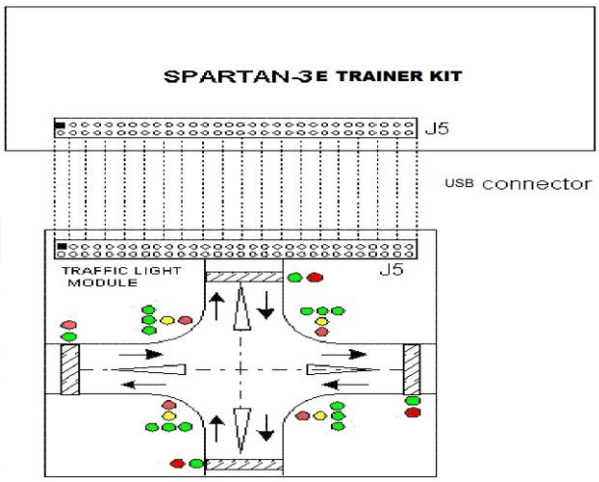

Figure 5: FPGA Implementation with TLC Model

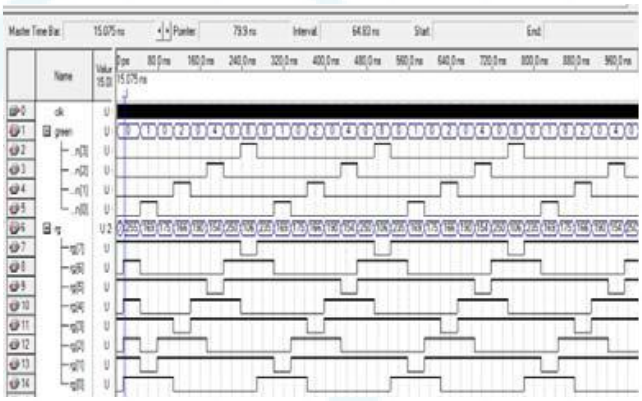

Figure 6: Simulation Result "S" ='0'

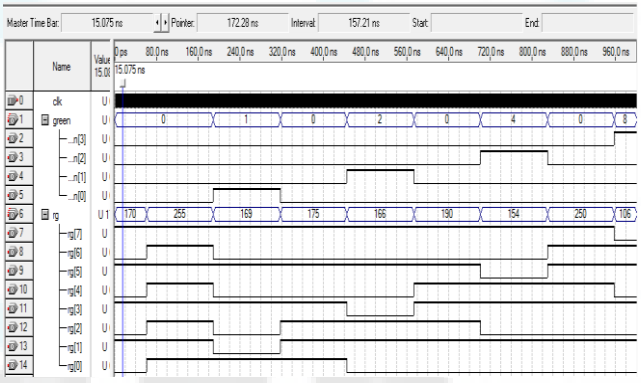

Figure 7: Simulation Results "S" ='1'

6. Conclusion

The proposed system implemented advanced traffic light control system which control complex traffic in modern cities. This system uses FPGA which made this system advanced FPGA is device which is configured by designer or user. The very useful application of FPGA is that designer can change the program at any instant which is easy to reprogram. User can change the program as per requirement. Verilog HDL is used to circuit description, code is generated which is dumped in to the FPGA by using Xilinx. Spartan 3E FPGA series is used as development kit. Now a day's problems related to traffic are very serious issue due this problems number of accidents increases rapidly in modern cities. Because of lack of management in TLC system road user loss their valuable time. So to

overcome these disadvantages we need some what advanced TLC system. FPGA is very good replacement for that traditional TLC systems with microcontroller having fixed time slots. This four rode TLC structure with FPGA can solve any complexity related to traffic .FPGA is many times advantageous than microcontroller, ASIC designs and also having low cost.

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