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FPGA BASED SMART TRAFFIC LIGHT CONTROLLER SYSTEM

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Abstract: - The traffic at road crossings/junctions is controlled by using switching on/off red, green, yellow in a particular sequence. The Smart Traffic Light Controller (TLC) is designed to generate a specific sequence of digital data called switching sequences that can be used to control the traffic lights of a typical four roads junction in a fixed sequence. The normal function of traffic lights requires sophisticated control and coordination to ensure the traffic moves as smoothly and safely as possible and that pedestrians are protected when they cross the road.

The main purpose of the traffic light control system is to control the congestion of vehicles at the junctions and also for safer pedestrian crossing. There have been many technologies used for implementing a traffic light controller all over the world. It is also proposed to implement the day mode and night mode operations for a specific area according to the traffic density. The most critical among the consequences is the delay of emergency vehicles such as ambulances and police cars leading to the increased deaths on roads and substantial financial losses. To alleviate the impact of this response in smart cities while maintaining a minimal increase in congestion level around the route of emergency vehicles. This can be achieved with a Traffic Management System (TMS) capable of implementing changes to the road networks control and driving policies following an appropriate and well-tuned adaptation strategy. In this system, MATLAB software is used for image processing to determine the density of vehicles.

Keywords:- *Traffic Light Controller, MATLAB*

I INTRODUCTION

Traffic congestion has been causing many setbacks and challenges in the most occupied cities all over the globe. People lose time, money and most importantly energy resources will be exhausted due to continual use in the automobiles. To solve these congestion problems, we have to build new facilities and infrastructure but at the same time make it smart. The disadvantage of making new infrastructure is that it makes the surroundings more congested so, for that reason we need to change the system rather than making new infrastructure twice. Therefore, many countries are working to manage their existing transportation systems to improve mobility, safety and traffic flows in order to reduce the demand of vehicle use. Much recent research about traffic light system have been done in order to overcome some complicated traffic scenarios considering the present infrastructure, facilities and traffic densities. Traffic congestion directly impacts the human life and workforce productivity. The emergence of new smart cities, IT hubs and Detroit cities across the country and the world pose new challenges to the existent transportation and mobility so, there is a need of intelligent systems in near future.

II PROPOSED SYSTEM

To design a FPGA based Smart Traffic Light Controller (TLC) System to manage the road traffic and also it is proposed to implement the day mode and night mode operations for a specific area according to the traffic density

The proposed system uses MATLAB software to perform image processing. The camera is used to capture the image and for real time implementation high-resolution cameras with night vision can be used. Camera can capture any object which is at a distance greater than 4 cm. The camera can be interfaced using USB 2.0 port Field Programmable Gate Arrays (FPGAs) are extensively used in rapid prototyping and verification of a conceptual design and also used in electronic systems when the mask-production of a custom IC becomes prohibitively expensive due to the small quantity. Many system designs that used to be built in custom silicon VLSI are now implemented in Field Programmable Gate Arrays. This is because of

the high cost of building a mask production of a custom VLSI especially for small quantity . MATLAB software displays the count of vehicles for further processing by the FPGA .

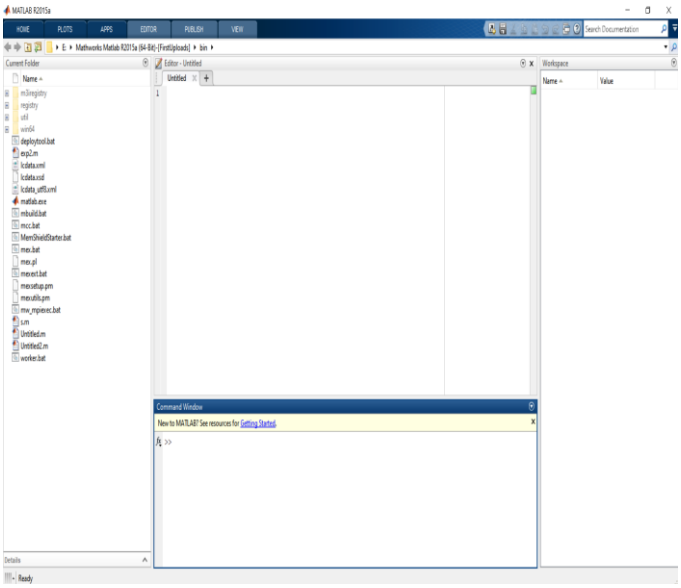

Figure 1: MATLAB

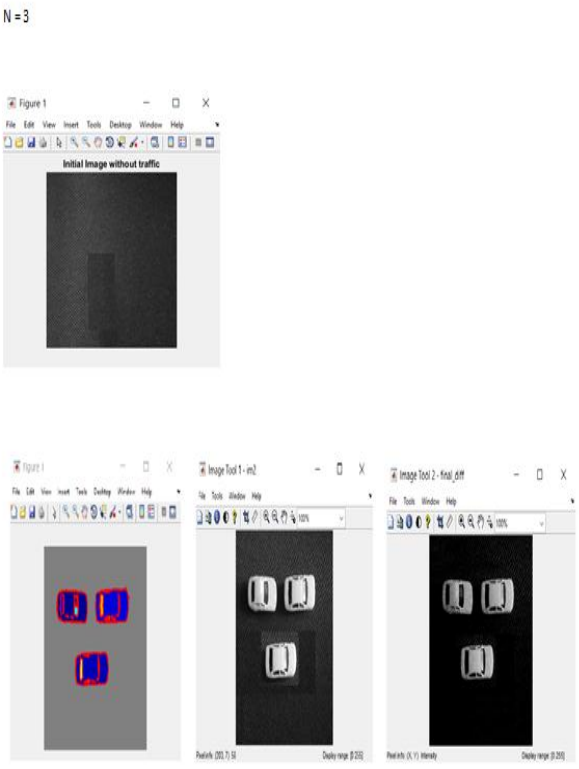

Figure 2 Output

III ADVANTAGES & APPLICATION

Advantages:-

The advantages of the system are as mentioned below.

- Improving Traffic Safety.
- Faster, more enjoyable commutes during rush hour travel times.
- Reduce accidents and make the streets safer for drivers and pedestrians.
- Improves city driving by reducing travel time and stress.
- Reduced air pollutants along congested city streets.
- Reduced cost of operating vehicles on city streets.
- It helps in reducing the average waiting time at red lights thus, decreasing the loss of time and increasing the workforce productivity.

Application:-

Some of the applications are as mentioned below.

- Traffic Light Controller (TLC) System can be used for better management of traffic flow leading to greener environment and reducing the pollution.
- Traffic management optimization.
- It could be used in urban areas and in the smart cities for efficient management of assets and resources.

IV CONCLUSION

The modern ways of four-way junction traffic light controller improves the traffic condition up to a large extent. Advanced signaling controllers contribute to the improvement of the urban traffic which is proportional to the complexity and also prevention of road accidents. These more complex controllers can be handled using state machines. Methods to reduce the states in the state machine also helps in reducing the required hardware thus leading to low power and area efficient design.

The future scope of this system is that it can be directly applied in real time by employing more number of such circuits. It can also be used on a larger scale in the near future. It can overcome the limitations of the conventional Traffic Light Controllers.

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