

**Design and Simulation of a Fuzzy Logic Traffic Signal Controller for a Signalized
Intersection**

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**A thesis submitted in partial fulfillment for the degree of Master of Science in Electrical
Engineering in the Jomo Kenyatta University of Agriculture and Technology**

2012

ABSTRACT

Traffic control poses a major problem in many cities, especially in rapidly growing and motorizing cities like Nairobi, Kenya. Inflexible traffic control systems have culminated in most intersections within the city almost grinding to a halt especially during peak hours. The efficiency of traffic flow through an intersection depends on the phases, sequence and timing of the traffic signals installed.

This research has developed a Fuzzy Logic Controller (FLC) to control traffic flow on a signalized intersection. The controller controls the traffic light timings and phase sequence to ensure smooth flow of traffic and thus increasing the intersectional capacity. In the design, the FLC uses vehicle detectors placed strategically upstream to determine the traffic density and delay on each approach. This traffic data is then used to determine whether to extend or to terminate the current green phase and to select the appropriate phase sequence.

A simulation model has been developed and tested using MATLAB software to evaluate the performance of the Fuzzy Logic traffic controller under different traffic conditions. The simulation results indicate that the performance of the FLC is superior to the Fixed-cycle controller. The performance of FLC in normal traffic conditions is similar to that of the fixed controller. However, in heavy traffic conditions, FLC results shows 22% decrease on average delay of vehicles and 6% increase in total traffic volumes served at the intersection over the fixed cycle controller.