

ABSTRACT

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Title : Traffic Light Control System With Image Segmentation
Technique and Pattern Matching Technique Using NI myRIO

Many existing traffic light control systems still use fixed timing, making it less effective in adjusting the duration of the green light to dynamic traffic conditions. This study aims to design and analyze the performance of an automatic and adaptive traffic light control system using image segmentation and pattern matching techniques with NI myRIO as the main processor. The tests include selecting the optimal resolution based on the balance between processing time per frame and vehicle detection performance, the influence of hardware by comparing the output fps from webcam and AVI video, determining the best camera angle, and testing the system in various conditions namely bright, dim, empty streets, and early morning conditions. The test results show that 176×144 resolution and 90° camera angle provide the best performance. AVI video can be used as an alternative in testing the system as the results are similar to webcam. The system performed optimally in bright conditions with an F-1 Score of 79.33% and a match rate score of 100% with an average fps of 9.93 fps. However, in dim conditions the performance decreased with an F-1 Score of 69.33% and a Match Rate Score of 41.67% with an average fps of 10.25 fps. In empty streets and early morning conditions, the system can still operate but sometimes experiences processing delays. Therefore, a more responsive system is needed to reduce delay and improve traffic light control performance.

Keywords: Image Segmentation, NI myRIO, Pattern Matching, Traffic Light Control