

## Accepted Manuscript

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PII: S1047-3203(17)30088-3  
DOI: <http://dx.doi.org/10.1016/j.jvcir.2017.03.020>  
Reference: YJVCI 1990

To appear in: *J. Vis. Commun. Image R.*

Received Date: 15 November 2016  
Revised Date: 9 January 2017  
Accepted Date: 22 March 2017

Please cite this article as: M.R. Asif, Q. Chun, S. Hussain, M.S. Fareed, S. Khan, Multinational vehicle license plate detection in complex backgrounds, *J. Vis. Commun. Image R.* (2017), doi: <http://dx.doi.org/10.1016/j.jvcir.2017.03.020>

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# Multinational vehicle license plate detection in complex backgrounds

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**Abstract:** Many methods for multinational License Plate Detection (LPD) have been proposed in recent times but most of them are not sophisticated enough to handle complex backgrounds. Moreover, their ability to handle various environmental and illumination conditions has been limited and still needs improvement. In this paper, we propose a novel technique to detect license plates of vehicles regardless of their color, size, and content. As the rear vehicle lights are an essential part of any vehicle, we reduce the image processing area to eliminate the complex background by detecting the rear-lights as the license plates are in a certain range of these lights. Heuristic Energy Map (HEM) of the vertical edge information in the Region of Interest (ROI) is calculated and area with the dense edges is selected using a unique histogram approach which is considered to be the license plate. The proposed algorithm is tested on 855 images from various countries including China, Pakistan, Serbia, Italy and various states of America. Experimental results show that the proposed method is able to detect license plates 90.4% of times despite of complex backgrounds in 0.25 seconds on average that can achieve real time performance.

**Key-words:** License plate detection; Traffic surveillance; Intelligent transport systems; Color space conversion; adaptive thresholding; Vehicle identification

## 1. Introduction

A well-known problem in the field of Intelligent Transportation Systems (ITS) is the Automatic License Plate Recognition (ALPR) which is a mass surveillance technique used to recognize vehicle license plates for vehicle identification. It is a technology that allows computer systems to read the license plate registration numbers automatically from digital images. These systems assume that the identity of each vehicle is already available by means of license plate.

This topic has been the center of attention among researchers due to its vast potential applications. It can be used by the law enforcing authorities for locating stolen vehicles' and automatic toll payment without human interference. It can also be used for security control in restricted areas and for border control systems. This system would be helpful in preventing traffic congestion and play an effective role in reducing car crimes. A parking lot equipped with ALPR system can offer numerous benefits (i) Automatic and flexible vehicle entry and exit from parking lot (ii) Data collection regarding car park usage for management (iii) Enhanced security (iv) Improved traffic flow.

ALPR is a combination of four processes that includes image acquisition, license plate detection, character extraction and its recognition. Each process has its own importance but LPD plays a pivotal role

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