

National Applied R&D Centre

Mi-LPR enables the accurate digitisation and recognition of complex vehicle number plates. The technology platform can be integrated with existing vehicle and traffic management systems.

MIMOS in Public Safety

Efficient management of public safety and security demands law enforcement departments that are equipped with the most dependable mission-critical technologies; smart analysis of relevant data, high-speed communications across multiple jurisdictions, trusted information system, and efficient respond mechanisms with reliable decision-making capabilities.

MIMOS is Malaysia's national applied research and development centre that focuses on generating technology solutions that enable the Government to provide better services, and Industry to achieve continued growth. In the areas of public safety and security, MIMOS develops intelligent and scalable technology solutions that are supporting the efficient and uncompromising delivery of public safety services across various needs.

Backed by strong capabilities in Artificial Intelligence, Data Analytics, Internet of Things, Edge Computing and Simulation, MIMOS is committed to driving responsive and efficient public safety solutions for Malaysia.

Mi-LPR is a scalable automated licence plate recognition platform that processes and analyses video input from surveillance systems. The platform can be integrated with existing vehicle management systems to provide realtime alerts as well as forensics capability to retrace events. Audit trails can be generated from records on vehicles entries and exits. The platform can also provide instant checks on vehicle registration numbers against watch lists. This enables authorities to intercept and stop vehicles for inspection.

VALUE

A smart solution for vehicle identification will serve as an effective asset protection mechanism. With real-time alerts and forensic capabilities, Mi-LPR can provide long-term added-value to existing vehicle management systems such as those used by enforcement authorities, car parks, toll plazas, industrial plant checkpoints, petrol stations and gated residential access control.







TECHNOLOGY BENEFITS

- Standard interface enables easy integration with third party clients.
- Hardware independence allows integration with different cameras and IO controllers.
- Intelligent engine minimises non-recognition of complex and foreign number plates.
- Al-assisted video analytics enable fast recognition without human intervention.
- High hardware adaptability allows operation on CPU-only machines or a machine with Intel or NVIDIA GPUs.

FEATURES

Mi-LPR offers intelligent features that enable thorough and efficient management of vehicle access:

- **High adaptability** The Mi-LPR platform is capable of operation in various environments and lighting conditions.
- Irregular plate detection The Mi-LPR engine is able to recognise complex, irregular or fancy number plates that are non-compliance to motor vehicle authority guidelines.
- Al-assisted noise filtration and recognition system

 Proprietary Al techniques filter out noises and
 increases the recognition accuracy level, thereby
 reducing processing time.
- **Self-learning ability** The system's self-learning ability memorises noise features and feedbacks to the detection module for added noise-filtering reference.
- Novel image-processing algorithms Robust and scalable platform for high clarity and enhanced image even with plates that are hard to capture using conventional systems.

- International Unicode compliance The system recognises international Unicode characters and numbers.
- **Configuration-friendly platform** Highly configurable platform enables operation on LAN/Cloud and various machine specifications.
- **System auto connection** Robust system stability with auto reconnection whenever the system is down, and provides online updates of the watch list.
- Integration with system client Equipped with a system client where live camera view is overlaid with real-time recognition of the live event.
- Event Information in standard formats Detected event information can be sent to external system in a standard format such as Windows Socket API in the forms of visual and audio.
- Forensic capabilities for events The platform system client is able to provide a chronological event list to enable quick checks on recent events and further enable forensic search and retrieval of the events.

System Requirement

Configuration Requirement			
Resolution	LPR Recognition (640*480)		
Frame/Second	10 fps		
Hardware Requirement			
Server Machine	Processor: Intel ® Core i7-9700B CPU@ 3.50 GHz (4 cores) Memory: Min. 8GB Disk Storage: Min. 240 GB	Support 4 cameras	
Client Machine	Processor: Intel ® Core i5-7260U CPU@ 2.20 GHz (2 cores)	Support Mi-LPR client Entry/Exit	
Network Bandwidth	2M bps per camera		
Software Requirement			
Operating System	Windows 7/Windows Server 2012 or above		
.Net Framework	Microsoft .NET 4.5 and above		
Database	Microsoft SQL Server Express 2012 / Optional in case the need of watchlist		

Future Plan

Continued research and development are ongoing to meet new demands in surveillance requirements. Some of the directions that the Mi-LPR platform may explore include:

- To further enhance detection accuracy using advanced AI techniques, in anticipation of more complex license plate
- To explore similar systems from foreign countries
- To incorporate other vehicle properties as second and third authentication factors for vehicle identification
- To adapt the platform for usage with dynamic camera on mobility platforms in an active environment
- To explore suitable edge device for software or firmware integration.





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MILPR MIMOS License Plate Recognition



INTELLECTUAL PROPERTY

No	Patent Number	Title
1	20140001586	System and method to determine false detection for vehicle license plate recognition
2	20140001624	System and method to enhance plate detection for vehicle license plate recognition
3	20140001625	System and Method to Determine Malaysian Taxi Plate for Car Plate Recognition System
4	20150001726	System and method to enhance the accuracy of vehicle license plate detection using rule-based Tophat technique
5	20150001729	System and Method to Determine Malaysian cursive Plate for Car Plate Recognition System
6	20150002002	System and Method to enhance edge-based plate detection by multi masking technique
7	20150002104	System and method to binarize license plate via local processing framework using histogram analysis
8	20140001587	System and method to isolate vehicle plate characters by converging iterative binarization
9	20140001623	System and method to isolate vehicle plate characters by background estimation binarization
10	20150001722	System and method to fuse multiple binarized plates
11	20150001008	System and method to detect license plate in subsequent frames using first frame plate matching
12	20150001806	2System and method to eliminate anomalies within detected region of license plate
13	20170002006	System and method to enhance plate detection for vehicle license plate recognition (LPR) in different environment
14	20190002093	Apparatus Of Determining Image Patch as Malaysia Standard License Plate or Noise
15	20190002092	System and method to propose fast vehicle detection
16	20200002135	System and Method for Identifying Text Regions in Dynamic Images



PUBLICATIONS

- Chai Yan Hum, Hamam Mokayed, Liang Meng, Hon Woon, and Lai Wee, "Elimination of Signal- resembled Anomalies in Detected Plate", The 3rd IIAE International conference on Intelligent Systems and Image Processing 2015
- Hooi Sin Ng, Yong Haur Tay, Kim Meng Liang, Hamam Mokayed, and Hock Woon Hon, "Detection and Recognition of Malaysian Special License Plate Based on SIFT Features". The 10th Asian Control Conference 2015 (ASCC 2015).
- Hamam Mokayed, Kim Meng Liang, Hock Woon Hon, and Hooi Sin Ng, "Car Plate Detection Engine Based on Conventional Edge Detection Technique". The international conference on Computer Graphics, Multimedia, and image processing (CGMIP 2014).
- Hooi Sin Ng, Yong Haur Tay, Kim Meng Liang, Hamam Mokayed, and Hock Woon Hon, Car plate detection engine based on conventional edge detection technique, The International Conference on Computer Graphics, Multimedia and Image Processing, 2014 [October 2014]



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