



## Technical Visit to TT Vision Holdings Bhd.

By

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On Friday, 3<sup>rd</sup> October 2025, the Electronic Engineering Technical Division (eETD) of The Institution of Engineers, Malaysia (IEM) successfully organised a technical visit to TT Vision Holdings Bhd. (TT Vision), a leader in providing Automated Vision Inspection (AVI) Systems. The company is located in Taman Perindustrian Batu Kawan, Penang. 13 participants registered from various engineering backgrounds, with the objective of enhancing their understanding of cutting-edge Automated Vision Inspection (AVI) systems, precision testing, and high-speed automation technologies crucial for Industry 4.0 implementation in the semiconductor and manufacturing sectors.

The visit began with a warm welcome from the TT Vision team, led by Dr. Teo Teow Wee, Technical Marketing Manager, setting a positive and engaging tone for the session. The group was then taken through an informative and visually immersive technical presentation delivered by Mr. Vasu Velayuthan, Chief Strategic Officer. The briefing provided deep insight into the company's core expertise in designing and developing advanced Automated Vision Inspection (AVI) systems. Participants learned how TT Vision leverages artificial intelligence, deep learning, and high-resolution imaging to deliver high-precision quality assurance across sophisticated manufacturing environments. Particular emphasis was placed on the company's ability to perform non-contact, high-speed inspection for semiconductor packaging, printed circuit boards, and electronic component assembly applications.

The presentation highlighted three main pillars of their inspection technology. First, high-speed cameras and optical systems equipped with specialised lenses and lighting are used to detect extremely small defects. Second, sophisticated image-processing algorithms, supported

by proprietary software and AI models, evaluate product quality by identifying defects, measuring critical dimensions, and verifying component placement accuracy. Third, precision motion-control systems and automated part-handling mechanisms ensure that products are positioned and inspected at very high speed with exceptional accuracy. Together, these capabilities enable TT Vision to support zero-defect manufacturing by reducing human error, increasing production efficiency, and ensuring strict compliance with global industry standards.

A key focus of the briefing was on TT Vision's use of deep learning and AI to strengthen inspection capabilities. The speaker explained that traditional rule-based systems can face limitations when dealing with variations in product features or unknown defect types. To address this, TT Vision trains deep learning models using large image datasets, allowing the system to recognise subtle and complex defects that previously required experienced human operators. This shift from fixed inspection rules to intelligent, adaptive models leads to higher accuracy, improved detection rates, and fewer false rejections, ultimately improving product yield.



Welcoming by Dr Teo Teow Wee, Technical Marketing Manager

The session also touched on the high-performance computing infrastructure required to process large volumes of visual data in real time. With components moving at rapid speeds during inspection, TT Vision must balance mechanical speed with the intensive computation needed for image analysis. The team described how they use powerful computing platforms and optimised parallel-processing techniques to manage real-time inspection workloads efficiently. This combination of mechanical engineering, software intelligence, and computing performance showcased the multidisciplinary expertise that drives TT Vision's leadership in automated inspection technology.



Sharing on TT Vision Background by Mr. Vasu Velayuthan, Chief Strategic Officer.

### **Facility Tour and Robotic Showcase**

Following the presentation, participants were taken on a guided tour of TT Vision's production and testing facilities, where they observed live demonstrations of the Automated Vision Inspection (AVI) systems in operation. The tour offered an up-close look at the seamless integration of precision robotics, advanced optics, and intelligent software. Among the highlights was the semiconductor wafer and integrated-circuit inspection line, where high-resolution cameras scanned chips for microscopic defects that cannot be detected by the human eye.

The Automated Optical Inspection (AOI) platform for printed circuit boards was also showcased, demonstrating rapid verification of solder paste application, component placement, and polarity on high-density PCBs. In addition, participants viewed precision handling systems featuring collaborative robotic arms and custom-engineered handlers designed to position delicate components for inspection and subsequently sort them according to quality classification.

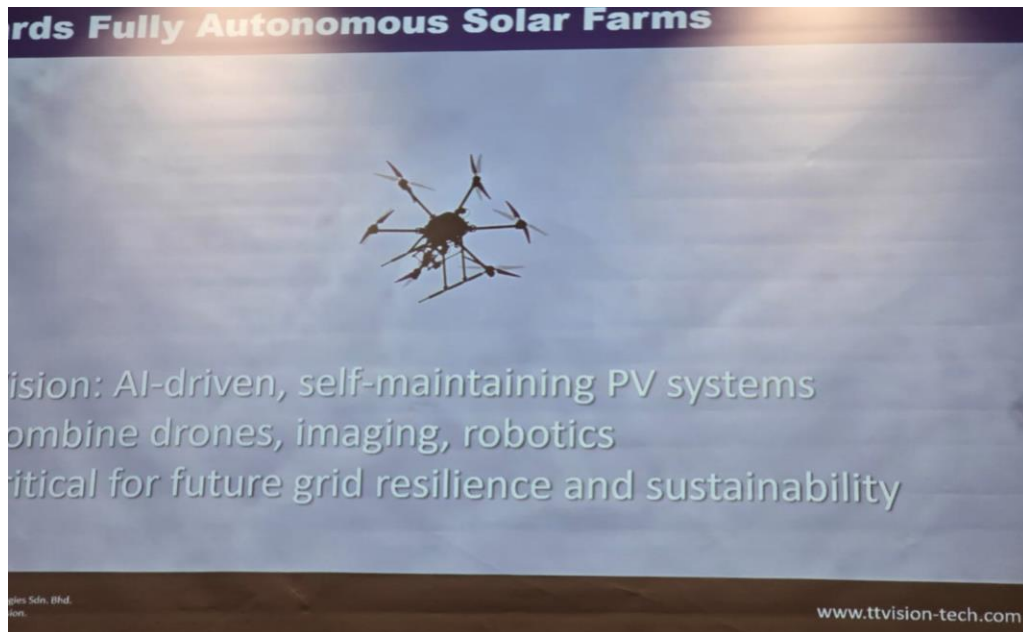
These systems exhibited high-speed, highly accurate pick-and-place capabilities, underscoring TT Vision's expertise in combining mechanical precision with artificial intelligence-driven decision-making. Throughout the tour, TT Vision engineers engaged actively with participants, offering detailed technical explanations and addressing questions, thereby illustrating how their solutions enhance process accuracy, production efficiency, and data-driven quality control across the manufacturing workflow.



Briefing on Automated Optical Inspection (AOI) platform



Demonstration of Vision Technology by Mr Loo Soon Kau, Chief Engineering Officer



Sharing on Autonomous Solar Monitoring Project (ASMP) by Dr Teo Teow Wee

Finally, the team presented their innovative work on the Autonomous Solar Monitoring Project (ASMP). This system utilises their core expertise in high-resolution vision and motion control to automate the inspection and maintenance of large-scale solar farms.

The ASMP involves autonomous vehicles or drones equipped with specialised cameras (thermal and visual) that systematically scan thousands of solar panels. The vision system uses AI to detect and classify panel defects such as hotspots, cell cracks, and debris accumulation in real-time, providing immediate data for maintenance teams and significantly improving the efficiency and energy yield of the entire solar power system.



Group photo of the participants

The technical visit to TT Vision Holdings Bhd. proved to be highly insightful and beneficial for all attendees. It provided a first-hand view of advanced Automated Vision Inspection (AVI) systems, precision engineering, and the practical deployment of Industry 4.0 principles within the high-tech manufacturing sector in Malaysia. The experience significantly enriched participants' technical knowledge and reinforced IEM's mission to promote professional development through active engagement with industry leaders in innovation.