Le Van The

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Seoul, South Korea, 05600

SUMMARY

My work centers on developing and applying AI methodologies to solve challenges in Image Processing and Computer Vision. In parallel, I independently develop LLM-based projects, exploring integration with VLMs.

EDUCATION

• **Sejong University (SJU)** _Sept 2020 - Oct 2025_
Ph.D, Department of Intelligent Mechatronics Engineering Seoul, South Korea
  ◦ GPA: 4.45/4.5
  ◦ Dissertation: "Deep learning based specular highlight detection and removal"

• **HCM City University of Technology, Vietnam National University (HCMUT – VNU HCM)** _Sept 2016 – Oct 2019_
Bachelor of Mechatronics Engineering, PFIEV Program (equivalent to European Master 1) HCM City, Vietnam
  ◦ GPA: 8.33/10
  ◦ Top 5 highest GPA of major
  ◦ Thesis: "A study on design and control of the shrimp peeling machine".

EXPERIENCE

• **Intelligent Visual Computing Lab []** _Sept 2020 - Present_
Lab Leader / Researcher Seoul, South Korea
  ◦ Conduct research in deep learning for Image Processing and Computer Vision, including image restoration, specular detection and removal, quality classification, object detection, neural rendering, and medical imaging.
  ◦ Explore Natural Language Processing applications such as text generation and video captioning.
  ◦ Manage research projects, including proposal writing, task allocation, and project implementation.
  ◦ Lead lab operations, including member recruitment, technical training, and task supervision.

• **PIAspace Co., Ltd []** _Jun 2024 - Aug 2024_
AI Research Intern Seoul,South Korea
  ◦ Conducted data preprocessing and augmentation for abnormal behavior detection using generative AI, enhancing dataset diversity and model robustness.
  ◦ Developed and implemented fall detection and face identity decoding systems, optimizing real-time inference accuracy for intelligent surveillance applications.

• **Samsung Electronics HCMC CE Complex (SEHC)** _Sep 2019 - Aug 2020_
System Innovation Engineer HCM City, Vietnam
  ◦ System control (database, KPI).
  ◦ Propose and deploy projects to resolve the issues related to both system control and production.
  ◦ Outstanding Projects: AGV system for automatic PCB delivery; Smart self-balancing two-wheeled AGVs for material transport; IoT-based monitoring of equipment status.

AI PROJECTS
CI=COMPUTER VISION AND IMAGE PROCESSING, LM=LARGE LANGUAGE MODEL

• **[CI.1] Doctoral Dissertation: Deep Learning Based Specular Highlight Detection and Removal** _Sept 2020 - Jul 2025_
Tech Stack: Image Segmentation, Image Restoration, Quaternion Transformers, Variational Autoencoder, CNN
  ◦ Developed VAUnet, a variational attention U-network for accurate detection of complex specular highlights.
  ◦ Designed QformerSHR, a Quaternion transformer-based network with depth-wise separable Quaternion convolutions, for efficient and precise specular highlight removal.
  ◦ Integrated VAUnet and QformerSHR into a two-stage SHDRN framework, combining detection and removal.
  ◦ Proposed hybrid training strategies to improve learning stability and overall performance.

• **[CI.2] DF-SDD: Distributed Feature-based Surface Defect Detection** _Mar 2025_
Tech Stack: PyTorch, Python, Distributed Convolution, Spatial Attention Gate
  ◦ Developed DF-SDD, a lightweight surface defect detection network using Distributed Convolution (DConv) and Distributed Depthwise Convolution (DDWConv) to efficiently capture local and long-range features.
  ◦ Designed DFEB block and integrated Spatial Attention Gate (SAG) for multi-level feature fusion across scales.
  ◦ Achieved state-of-the-art results with only 0.85M parameters and 6.2 GFLOPs, enabling real-time deployment, and demonstrated accurate detection of small and large defects.

- **[CI.3] Lightweight 3D CNN for Brain MRI Super-Resolution** *Jan 2024*
  Tech Stack: PyTorch, Python, 3D Convolutional Neural Networks, Medical Image Processing 📄
  - Designed a lightweight 3D CNN for volumetric brain MRI super-resolution, balancing high reconstruction quality with low computational complexity.
  - Incorporated extraction, compression, and reconstruction stages with skip connections to retain fine spatial and anatomical features.
  - Utilized $1 \times 1 \times 1$ convolutions for efficient feature compression, achieving high PSNR/SSIM and producing clinically reliable outputs.

- **[LM.1] AI Interview: Automated Candidate Screening and Assessment** *2025*
  Tech Stack: Python, FastAPI, Svelte, TailwindCSS, OpenAI API, Google TTS/STT ▶
  - Developed a fully automated AI interview platform using LLMs and voice AI to replace initial human interviews.
  - Implemented JD-based question generation, intelligent answer analysis, and automated scoring to ensure consistent and unbiased evaluation.
  - Built a web-based UI for real-time interviewing, candidate management, and session logging.
  - Integrated Google TTS/STT APIs and backend LLM modules for natural two-way voice interviews.

- **[LM.2] CV Screening: Automated Candidate Evaluation System** *2025*
  Tech Stack: Python, FastAPI, Svelte, TailwindCSS, Ollama, LlamaIndex, OllamaOCR ▶
  - Developed an automated CV screening platform leveraging LLMs and VLMs to extract, standardize, and score candidate data from diverse CV formats.
  - Implemented candidate scoring and ranking based on education, skills, experience, and roles, with clear score descriptors for transparency.
  - Built a web interface for uploading CVs and job descriptions, managing data, and viewing evaluation results.
  - Expected to significantly reduce manual HR workload, improve fairness, and scale recruitment for large applicant volumes.

- **[LM.3] Multimodal RAG: Retrieval-Augmented Generation for Complex Documents** *2025*
  Tech Stack: Python, FastAPI, Svelte, TailwindCSS, LangChain, Ollama, MultiVectorRetriever ▶
  - Developed a multimodal RAG system combining LLMs and VLMs to extract, summarize, and answer queries on complex documents with text, tables, and images.
  - Used VLMs to filter irrelevant images and generate meaningful captions for figures, charts, and diagrams.
  - Implemented MultiVectorRetriever for efficient retrieval across text, table, and image embeddings.
  - Built an interactive web interface for PDF upload and chat-based querying.

PUBLICATIONS

1. **T. V. Le**, et al., "Surface Defect Detection Using Distributed Features", *Engineering Applications of Artificial Intelligence*, 2025.

2. **T. V. Le**, J. Y. Lee, "QformerID: Quaternion Transformer Based Image Denoising", *IEEE Multimedia*, 2025.

3. A. Telili, W. Hamidouche, I. Farhat, H. Amirpour, C. Timmerer, I. Khadraoui, J. Lu, **T. V. Le**, J. Baek, J. Y. Lee, Y. Wei, X. Sun, Y. Gao, J. Huang, Y. Zhong, "360-degree Video Super Resolution and Quality Enhancement Challenge: Methods and Results", *Signal Processing: Image Communication*, 2025.

4. **T. V. Le**, J. Y. Lee, "Specular Highlight Removal Using Quaternion Transformer", *Computer Vision and Image Understanding*, vol. 249, Dec. 2024.

5. Y. Choi, **T. V. Le**, G. Bang, J. Lee, J. Y. Lee, "Efficient Immersive Video Coding Using Specular Detection for High Rendering Quality", *Multimedia Tools and Applications*, 2024.

6. **T. V. Le**, J. Y. Lee, "Quality Enhancement Based Video Captioning in Video Communication Systems", *IEEE Access*, 2024.

7. Y. B. Kim, **T. V. Le**, J. Y. Lee, "Lightweight Brain MR Image Super-Resolution Using 3D Convolution", *Multimedia Tools and Applications*, Jan. 2024.

8. J. Y. Lee, Y. Choi, **T. V. Le**, K. Choi, "Efficient Feature Coding Based on Performance Analysis of Versatile Video Coding (VVC) in Video Coding for Machines (VCM)", *Multimedia Tools and Applications*, Nov. 2023.

9. **T. V. Le**, Y. Choi, J. Y. Lee, "Specular Detection and Rendering for Immersive Multimedia", *IEEE Multimedia*, Apr.–Jun. 2023.

10. J. Y. Lee, **T. V. Le**, Y. Choi, K. Choi, "Low-Complexity Two-Step Lossless Depth Coding Using Coarse Lossy Coding", *Multimedia Tools and Applications*, Apr. 2022.

11. K. Choi, **T. V. Le**, Y. Choi, J. Y. Lee, "Low-Complexity Intra Coding in Versatile Video Coding", *IEEE Trans. Consumer Electronics*, May 2022.

Skills

- **Machine Learning & AI Tools:** PyTorch, TensorFlow, Scikit-learn, Keras, LangChain, Ollama, Ultralytics
- **Research Skills:** Deep Learning, Computer Vision, LLM, Image Processing, Technical Leadership
- **Specialized Areas:** Image Restoration, Object Detection, Medical Imaging, Neural Rendering
- **Programming & Development Tools:** Python, C++, MATLAB, SQL/NoSQL, JavaScript, Git, Docker, Linux, FastAPI, Svelte, React
- **Languages:** Vietnamese (Native), English (IELTS 6.5), and French (DELF B1)

Honors and Awards

• **Second Prize Winner, 360-Degree Video Super Resolution and Quality Enhancement Challenge - Track 2**   *2024*
IEEE International Conference on Image Processing (ICIP) 2024   [🌐]
◦ Awarded second prize for outstanding performance in video super-resolution and quality enhancement challenge.

• **Study Encouragement Scholarship**   *2014 – 2019*
HCMUT, Vietnam
◦ Granted scholarship for excellent academic performance and active participation in social activities.
◦ Received 7 scholarships over 10 semesters in the PFIEV program.

• **Excellent Student Awards**   *2016, 2018*
HCMUT, Vietnam
◦ Recognized for consistent high academic achievement, research contributions, and extracurricular excellence.

References

1. **Jin Young Lee**
Associate Professor, Department of Artificial Intelligence and Robotics, Sejong University
Email: jinyounglee@sejong.ac.kr
Relationship: Doctoral Dissertation Advisor / Research Supervisor

2. **Jae Kyu Suhr**
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Relationship: Chair, Doctoral Dissertation Committee