

RIU CHERDCHUSAKULCHAI

752, Noble Ploenchit Condo, 1035 Phloen Chit Rd, Lumpini, Pathum Wan,

Bangkok, Thailand 10330

☎ (+66) 64-145-3659 ✉ rew.cherdchu@gmail.com 🌐 <http://linkedin.com/in/riu-cherdchusakulchai>

Passionate machine learning engineer with expertise in computer vision. Experienced in developing configurable ML pipelines, multi-camera tracking systems, re-identification methods, 6D object pose estimation, and RGBD contactless body measurement. Successfully designed innovative solutions for real-world AI applications and contributed to top-tier research, with multiple publications in the field. Eager to further explore and advance computer vision and robotics through graduate studies.

Education

Mechanical Engineering, Bachelor of Engineering

2018 – 2022

Chulalongkorn University, First Class honors, GPA: 3.60 / 4.00

Bangkok, Thailand

Experience

AI and Robotics Ventures Company

May 2022 – Present

Machine Learning Engineer

Bangkok, Thailand

ML Inference Pipeline for Visual Intelligence Product

- Designed a flexible, configuration-driven ML inference pipeline, optimized input/output data structures to enable seamless integration of multiple modules. This allowed for dynamically customized inference flows, supporting user-defined tasks like multi-camera tracking, face recognition, and license plate recognition.
- Developed multiple Kafka microservices for the ML inference pipeline, creating a reusable template for consistent use across services. Successfully deployed these microservices in both on-premises and cloud-based Kubernetes clusters, and optimized data transmission performance with Protobuf serialization.
- Implemented a vector database schema using Milvus to store tracklet data, and designed relational tables for efficient storage and retrieval of feature vectors from ReID, Face encoding, and Open-vocabulary models.

Multi-Target Multi-Camera Tracking System

- Integrated advanced modules for multi-camera tracking, including object detection, object tracking, re-identification, pose estimation, spatial estimation, and camera association.
- Developed an innovative online method for near real-time multi-camera tracking by introducing a global state of anchors from past tracking results and dynamically updating them based on new data in the current time window.
- Utilized graph neural networks to encode object relationships through topological embeddings and developed a self-supervised camera link model to learn inter-camera relationships without requiring labeled data.
- Introduced a spatial-temporal mechanism leveraging spatial and temporal data to create constraints, combined with anchor-feature hierarchical clustering, to improve camera association and boost the IDF1 and HOTA score.
- Achieved sixth place in the multi-camera people tracking competition at the CVPR Workshop on AI City Challenge 2024 and presented the associated paper at the workshop.

Person and Vehicle Re-Identification

- Experimented with various person re-identification architectures, including OSNet, ResNet-Ibn, TransREID, SOLIDER, and ClipREID, to balance performance and inference time for real-world applications.
- Collaborated with colleagues to develop a novel person re-identification method that integrated prompt learning, image feature learning, and prototypical contrastive learning, achieving high Rank-1 and mAP scores on benchmark datasets, including Market1501 and Occluded-Duke.
- Researched and experimented with architectures like BPBREid and PFDNet, using part average triplet loss and body part attention to address occlusion issues, resulting in improved mAP and Rank-1 accuracy in occluded datasets.

6D Object Pose Estimation for Remote Valve Operation

- Planned and Collected the valve dataset at the offshore platform, employing a variety of RGBD sensors and different types of valves to guarantee variability and high-quality data.
- Developed a robust pipeline for 6D dataset formatting, labeling, and post-processing using Open3D, syncing data from AWS S3, and optimizing the training workflow for precise pose estimation.
- Experimented and evaluated a wide variety of 6D object pose estimation architectures such as PoseCNN, DenseFusion, PVN3D, and FFB6D to optimize the most effective approach for custom datasets.

Real-time Multiple Analog Gauges Reader

- Experimented with different YOLOv5 architecture sizes for gauge detection and explored gauge reading methods, from computer vision to CNN- and transformer-based deep learning regression techniques.
- Conducted a thorough evaluation of the performance and practical applicability of each gauge detector-reader combination, leading to a robust solution in the field.

Contactless Body Measurement using RGBD Camera

- Utilized human skeleton tracking and segmentation models to extract essential information from RGBD images, including joint positions, body posture, and depth-based measurements.
- Developed a human reconstruction algorithm using pose graph optimization, combined with point cloud processing, to create accurate and reliable 3D human models.
- Developed iterative algorithms to accurately identify and measure key human body parts (height, waist, hip) based on standard anatomical definitions, using least-squares fitting and ellipse shrinkage to minimize errors from curved surfaces.

Surveillance Robot with Object Detection System

- Developed C++ and Python code for communication between microprocessors, Raspberry Pi, and dashboard interface.
- Deployed YOLOv3 object detection model to robot vision and implemented feature to notify users of detected objects.
- Programmed an autonomous robot patrol system with obstacle avoidance, using an algorithm that leverages information gained from sensors such as cameras and ultrasonic sensors.

Publication

R. Cherdchusakulchai et al., "Online multi-camera people tracking with spatial-temporal mechanism and anchor-feature hierarchical clustering," in Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, June 2024, pp. 7198–7207. (First author)

V. Trairattanapa et al., "PTITReID: Progressive Three-Stage Iterative Learning for Person Re-identification," Computer Vision and Image Understanding (CVIU), 2024, under review. (Co-author, 3rd position)

R. Cherdchusakulchai et al., "Contactless Body Measurement System Using Single Fixed-Point RGBD Camera Based on Pose Graph Reconstruction," IEEE Access 12 (2024): 84363-84373. (First author)

V. Trairattanapa et al., "Real-time Multiple Analog Gauges Reader for an Autonomous Robot Application," 2022 17th International Joint Symposium on Artificial Intelligence and Natural Language Processing (ISAI-NLP), Chiang Mai, Thailand, 2022, pp. 1-6. (Co-author, 4th position)

Skills & Proficiencies

Fields: Computer Vision, Deep Learning, Point Cloud, 3D Vision, Graph Neural Network, Reinforcement Learning

Programming Languages: Python, C++, MATLAB, Shell script, SQL

Library/Framework: OpenCV, Open3D, Pytorch, Tensorflow, ROS2, Isaac Sim, Gymnasium, Pytorch Geometric, Hugging Face, Pillow, Keras, Transformers, Numpy, Pandas, Scikit-learn, SciPy, Matplotlib

Developer Tools: Git, DVC, Docker, Docker Compose, FastAPI, Kafka, MQTT, AWS CLI, Crontab, Power BI, VSCode

Courses & Certifications

Deep Learning Specialization (DeepLearning.AI, Coursera)

First Principles of Computer Vision Specialization (Columbia University, Coursera)

Additional Experience

Reinforcement Learning: An Introduction**June 2024 - Oct 2024**

- Studied key concepts such as Markov Decision Processes (MDPs), Generalized Policy Iteration (GPI), strategies for the exploration-exploitation trade-off, temporal difference learning (TD), and $TD(\lambda)$.
- Explored foundation algorithms for solving control problems, including SARSA, Q-learning, Watkins's $Q(\lambda)$, and model-based methods such as Dyna-Q and trajectory sampling.
- Studied deep RL techniques, including DQN and policy-based methods like Proximal Policy Optimization (PPO), gaining insights into using neural networks for approximating value functions and policies in high-dimensional state spaces.

Stable Diffusion with LoRA**Oct 2023**

- Completed a comprehensive tutorial course on Stable Diffusion, acquiring skills in Text-to-Image and Image-to-Image generation, and mastering parameter setup such as Sampling Method, Denoising Scale and CFG Scale.
- Gained proficiency in advanced image generation techniques such as Mask Inpainting, ControlNet, and Prompt Editing, enhancing my ability to manipulate and refine generated images according to specific requirements.
- Trained the LoRA model using a personalized dataset, achieving face generation of targeted faces within images.

Google Foobar Challenge**Sep 2023 - Oct 2023**

- Received a direct invitation to participate in the Google's renowned coding challenge
- Progressed to Level 4 problem by demonstrating strong problem-solving skills and algorithmic knowledge.