

Sangwoo Ha

AI Research Engineer · Medical imaging · Computer vision · On-device AI

Six years in medical imaging and computer vision. I designed chest X-ray CAD models and carried them through clearance to a product, and built a cervical-cell detector that ships in a cleared instrument. I own the work from model design through label bootstrapping and compression to on-device deployment.

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- 01

miLab CER · Cervical cell detection
Noul · 2023–2026 · Ships in cleared product
- 02

DEEP:CHEST · Chest X-ray CAD
Deepnoid · 2020–2022 · MFDS clearance · npj Digital Medicine
- 03

Alphai PlantVision · Site CCTV
HumanICT · 2022–2023 · Real-time inference · PoC
- 04

Casualty location in disaster zones
UNIST M.S. research · 2017–2020
- 05

Open-source AI tools
Patina · Gajae Code App · ChatMux

Building and researching AI models inside products

- Design

Detection and segmentation models on data with too few labels.
- Compress

Shrink and quantize them to run on constrained hardware.
- Ship

Carry them through clinical trials, clearance, or field validation into a product.

Models

Detection · segmentation

Semi-supervised

Pseudo-labeling

Generative

YOLO family

TransUNet

DINOv3

Deployment

Quantization

TensorRT INT8

Jetson Nano · TX2

Linux

Tools

Python

PyTorch

TensorFlow

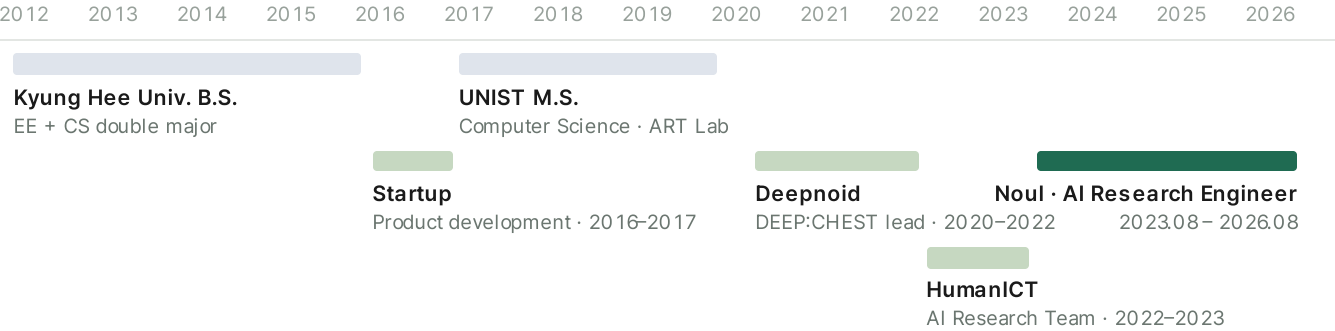
OpenCV

TypeScript

React

Tauri/Rust

Experience · Education



Noul · 2023-2026

miLab™ CER

Sole developer of the YOLO-based cell detector, compressed for Jetson. Ships in the cleared product.

Ships in cleared product

Deepnoid · 2020-2022

DEEP:CHEST DC-XR-03

Designed the read and localization models. Clinical trial and MFDS clearance (제허 21-841), then product.

Cleared · Shipped · Published

HumanICT · 2022-2023

Alphai PlantVision

Sole owner of the site-CCTV hazard detectors. Real time with TensorRT. PoC with Hyundai E&C.

PoC

miLab-CER AI model development

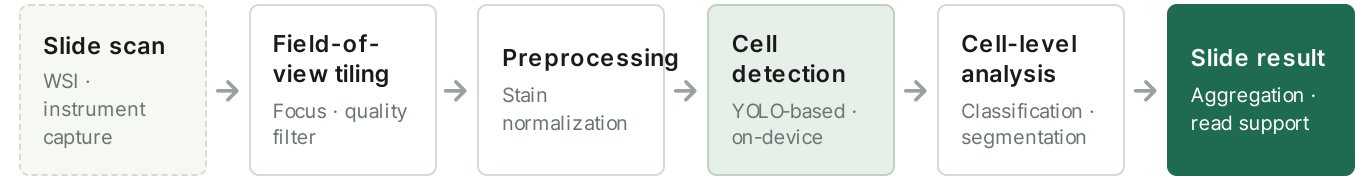
Outcome	Ships in cleared product miLab CER · MFDS 제허 23-940 · CE · MHRA
Role	Sole developer of the detector AI Research Engineer · pipeline · labels · compression
Target	Jetson Nano · TX2 Quantization · TensorRT

Problem Tens of thousands of cells per slide, abnormal ones rare. Staining varies by instrument, cell labels are expensive, and the board is small.

Approach Designed the slide → field-of-view → cell pipeline and a YOLO-based detector with the architecture heavily modified for the product and device.

Result The compressed model ships in the miLab CER instrument.

From slide to cell — analysis pipeline



The highlighted stage (cell detection) is the model I built and shipped; the rest is the pipeline designed around it.



miLab™ CER — the instrument the detector ships in, with the read result. Image: Noul official product material.

Hardening it into a product

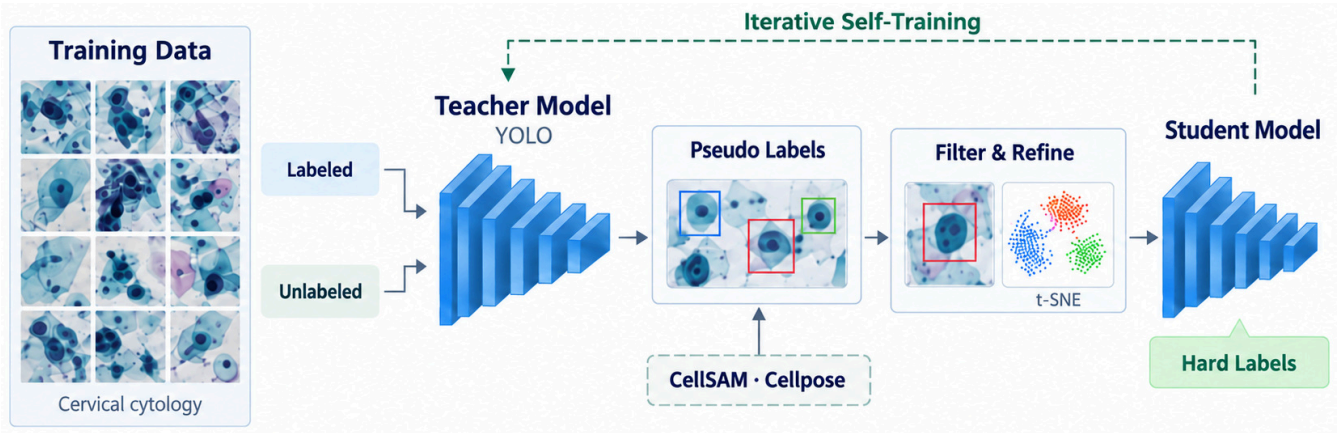
Labels	Pseudo-labeling · teacher–student CellSAM · Cellpose assist · manual review · t-SNE check
Compression	Quantization · TensorRT Validated on Jetson Nano · TX2, then shipped
Research	Generative · DINOv3 · MedGemma Research / design stage Diffusion · DiT · StyleGAN samples, foundation model, LLM read-report design

- Why?**

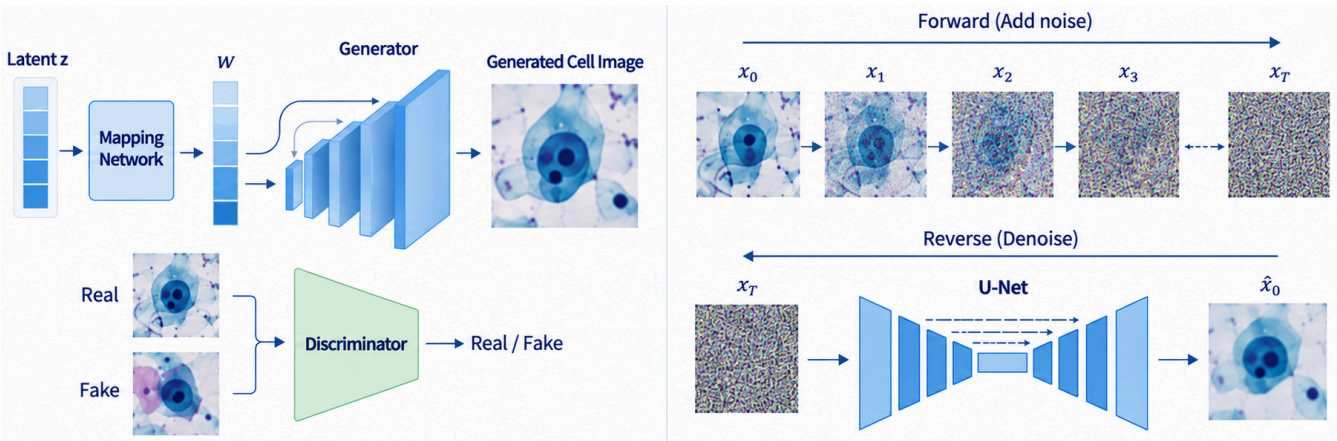
Rare classes cannot be labeled by hand at scale, and a trained model does not simply run on the instrument's board.
- How?**

Proposed labels from a teacher are reviewed before a student retrain; slimming, quantization, and TensorRT conversion were each checked for accuracy loss.

Label bootstrapping loop



Generative models for rare classes



StyleGAN (left) and diffusion (right). Solo research aimed at generating training samples for rare classes.

Developing the DEEP:CHEST chest X-ray AI model

Outcome **DC-XR-03 cleared and shipped**
MFDS 제허 21-841 · passed clinical trial

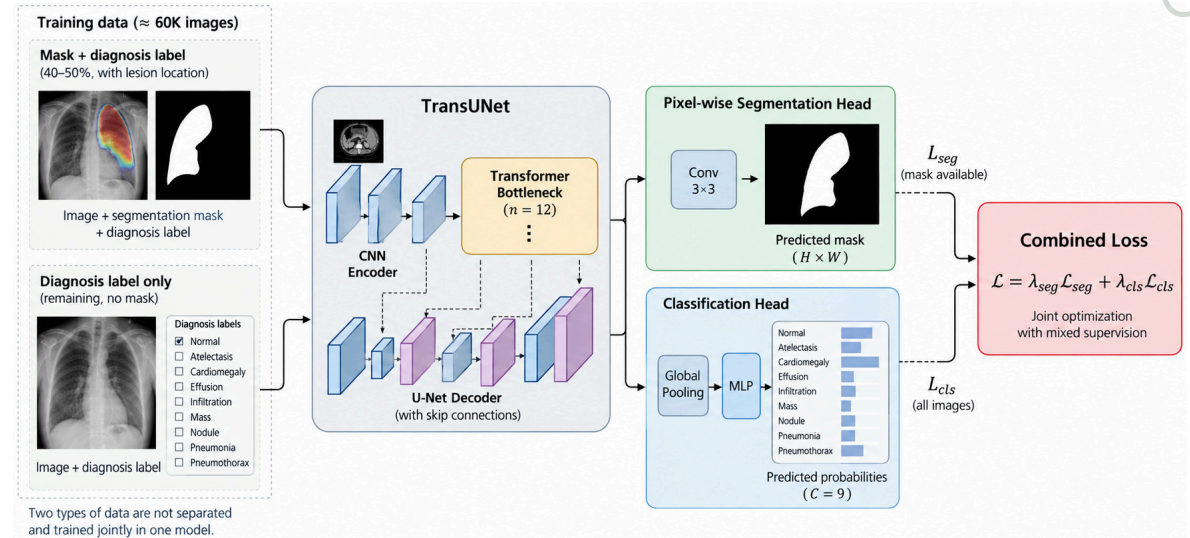
Role **DEEP:CHEST lead**
Team of 3 incl. me · architecture and loss design

Data **~60,000 chest X-rays**
40–50% with masks · rest reading labels only

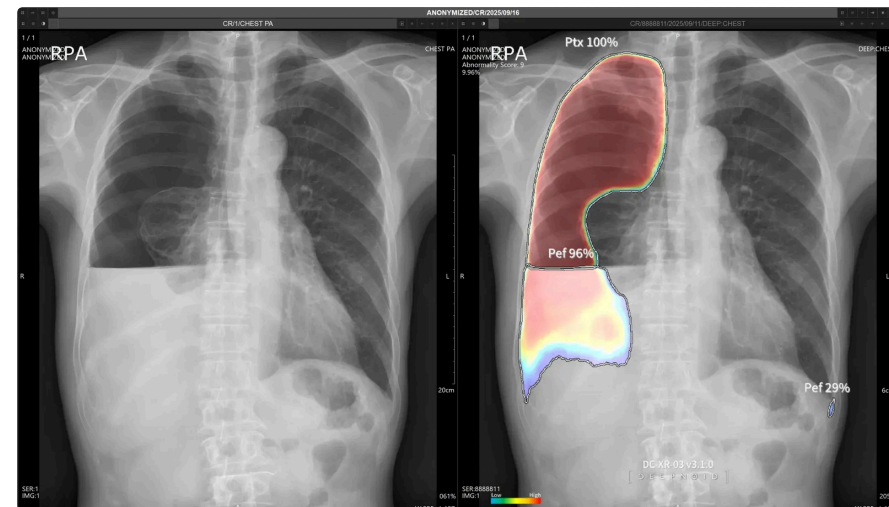
Problem A CAD product must show where, not just whether. Lesion masks existed for only half the data; the rest carried a reading label alone.

Approach TransUNet-based semi-supervised learning: masked samples get pixel and classification loss, label-only samples get classification loss alone.

Result The pneumothorax and consolidation read-and-localize models passed the clinical trial and clearance and shipped as DC-XR-03.



Semi-supervised design — pixel labels and reading labels trained in one model. Figure: my own diagram.



Clearance and publication

Paper	npj Digital Medicine 5, 107 (2022) Co-first author · clinical validation study
Product	DC-XR-03 → DC-XR-04 Pneumothorax · consolidation → multi-finding read and localization
Lead	Team of three Model design · clinical trial · clearance · product

Paper	I designed and developed the detection and localization models in the paper and continued the follow-up research.
Extension	DC-XR-04 handles multiple findings — lung cancer, atelectasis, heart failure, nodules, pleural effusion — in one model.
Lesson	What the trial measures and what the clearance file contains have to be designed together with the model.

ARTICLE OPEN



Localization-adjusted diagnostic performance and assistance effect of a computer-aided detection system for pneumothorax and consolidation

Sun Yeop Lee^{1,11}, Sangwoo Ha^{1,11}, Min Gyeong Jeon¹, Hao Li¹, Hyunju Choi¹, Hwa Pyung Kim¹, Ye Ra Choi^{2,3}, Hoseok I^{4,5}, Yeon Joo Jeong⁶, Yoon Ha Park⁷, Hyemin Ahn⁸, Sang Hyup Hong⁸, Hyun Jung Koo⁸, Choong Wook Lee⁸, Min Jae Kim⁹, Yeon Joo Kim¹⁰, Kyung Won Kim⁸ and Jong Mun Choi^{1,8}

While many deep-learning-based computer-aided detection systems (CAD) have been developed and commercialized for abnormality detection in chest radiographs (CXR), their ability to localize a target abnormality is rarely reported. Localization accuracy is important in terms of model interpretability, which is crucial in clinical settings. Moreover, diagnostic performances are

npj Digital Medicine · 2022 — co-first author. Image: first page of the publisher's original.

What the study did

A clinical study of a CAD system for pneumothorax and consolidation on chest X-rays, evaluating diagnostic performance adjusted for whether the lesion was correctly localized, and the effect of AI assistance on physicians' reads.

My part

I designed and developed the detection and localization models in the paper and continued the follow-up research. Co-first authorship is stated in the publisher's author-contribution section.

DOI 10.1038/s41746-022-00658-x · PMID 35908091 · Published 30 Jul 2022

Developing a worker-hazard detection model on CCTV video

Outcome **PoC** Not installed on site
With the Hyundai E&C team, toward site deployment

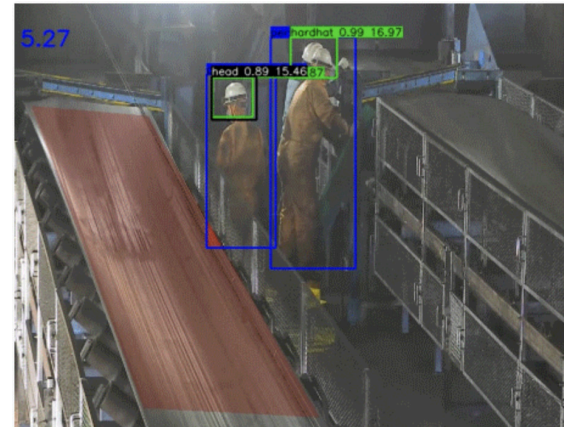
Role **Sole owner of the AI models**
Fire · smoke · missing helmet · construction vehicle · vehicle

Deployment **TensorRT INT8**
Model compression · multi-stream real-time inference

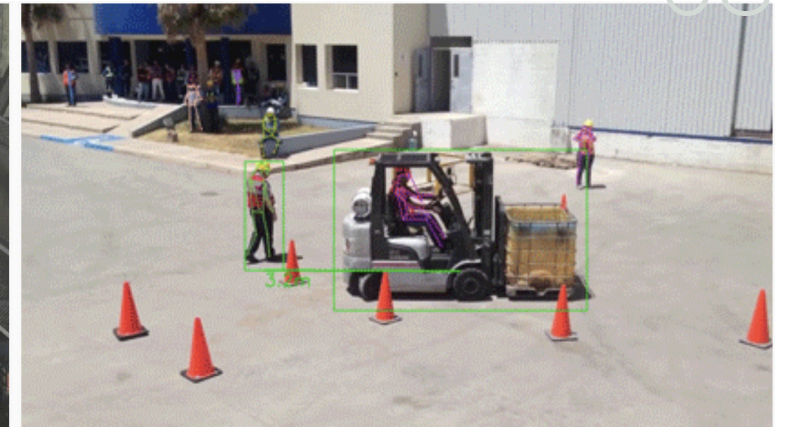
Problem Many cameras, few GPUs. One model had to catch diffuse smoke and small helmets while cutting hardware cost.

Approach Compressed a five-class detector to TensorRT INT8 and fed pixel differences between frames into post-processing to drop static false positives.

Result Real-time inference on the site's CCTV hardware and a PoC with Hyundai E&C. Speed and cost figures were internal and are not shown.



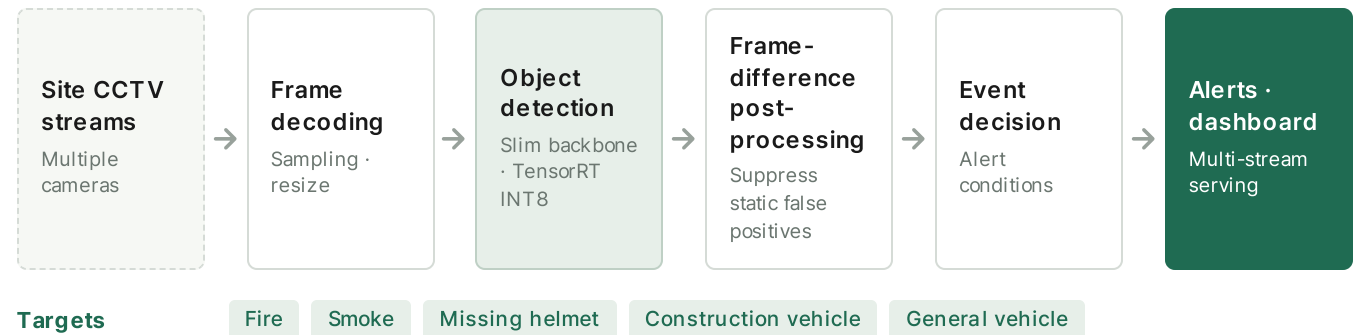
경고 지역 접근, 안전모 미착용



작업자 안전사고 감지

Alphai PlantVision detection view — missing helmet and restricted-zone entry (left), worker safety incident (right). Image: HumanICT product material.

From camera to alert



A slim backbone and TensorRT INT8 cut the GPU resources needed per camera; post-processing compared consecutive frames to drop detections with no motion.

Predicting injured-person locations inside RCRS simulation

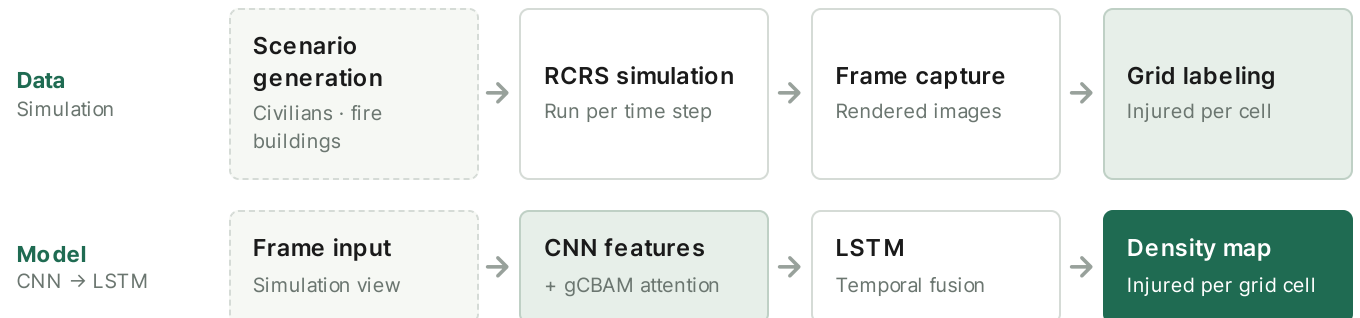
Research	Casualty location in disaster zones RoboCup Rescue Simulation · advisor Tsz-chiu Au
Methods	CNN · LSTM · gCBAM Extended attention module to focus on important regions
Code	RCRS_ML_Model · RCRS_Scenario_Generator github.com/devswha · devswha.github.io/swha

Problem	In a disaster the injured are hard to locate, and real data cannot be collected.
Approach	Generated scenarios in bulk with a simulator and predicted casualty density per grid cell from the rendered view.
What carried over	Designing labels when none exist — the starting point for later using generative models and pseudo-labeling in medical imaging.



RoboCup Rescue Simulation — a disaster-city scenario and what is observed in it: collapsed or burning buildings, rescue teams, injured civilians. Image: a scenario view I generated.

Data generation and model



Two stages: generate data with the simulator, then predict casualty density from the rendered view.

Open-source tool development

My tools	Patina · Gajae Code App · ChatMux Design, development, maintenance · github.com/devswha
Stack	TypeScript · React · Tauri/Rust Node.js · Python · GitHub Actions
What it gave me	Verifying LLM output, tracing failures Used directly when designing the MedGemma/LLM report structure at Noul

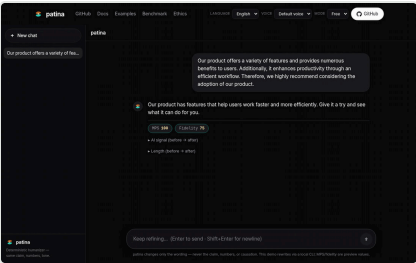
What the three tools have in common

Verifying output	Checking what an LLM wrote against rules and metrics. Patina compares before and after a rewrite with style diagnostics and a meaning-preservation score.
Sessions and permissions	Letting a person see and approve what an agent does. Gajae Code App puts session state, permission approvals, and diff review on one screen.
Running many sessions	Overseeing several agents at once. ChatMux gathers tmux sessions into one web and mobile (PWA) view.

Release	MIT license	GitHub Actions tests and releases
	CLI · web · VS Code · Obsidian	
	Desktop (Tauri) · self-hosted	Mobile PWA



Patina
Open source · maintainer

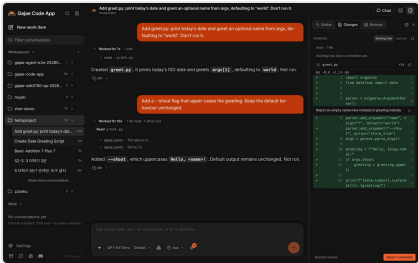


Multilingual writing tool that fixes awkward phrasing in AI-written text while preserving meaning: rule-based diagnostics, LLM rewriting, meaning-preservation checks. CLI · web · VS Code · Obsidian.

github.com/devswha/patina



Gajae Code App
React · Tauri/Rust

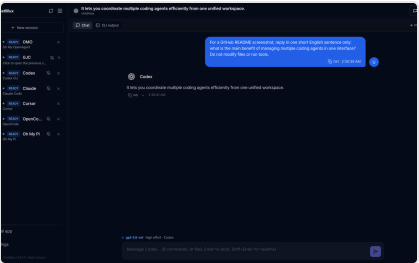


Web and desktop app that runs a coding-agent SDK in a separate worker and connects session state, permission approvals, and code review. Extends an existing open-source UI.

github.com/devswha/gajae-code-app

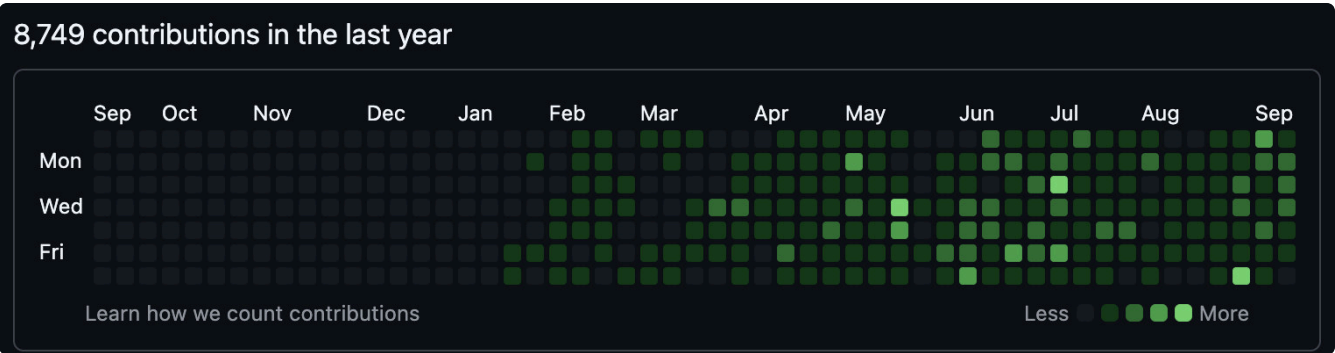


ChatMux
tmux · WebSocket



Web interface that gathers the conversations and terminals of multiple coding agents running in tmux into one place.

github.com/devswha/chatmux



github.com/devswha — contribution graph for the past year. Image: GitHub profile.

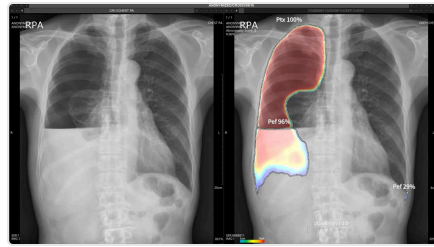
From research to product to open source — a **problem solver** who works with AI.



miLab™ CER

Sole developer of the cervical cell detector · Jetson compression

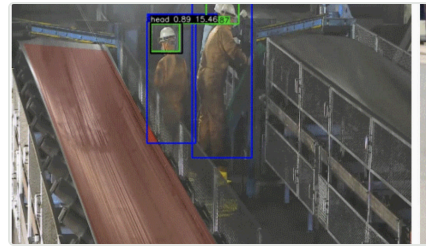
In a cleared product



DEEP:CHEST

Semi-supervised chest X-ray model · team lead · co-first author

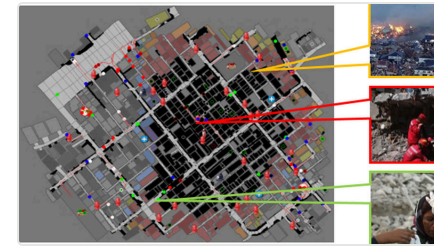
Cleared · published



Alpha PlantVision

Solo CCTV hazard detector · TensorRT INT8

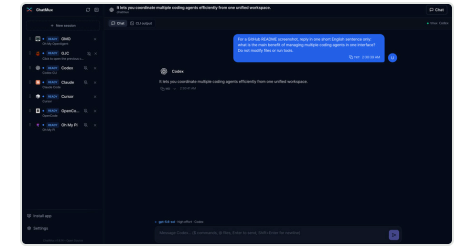
PoC



RCRS casualty prediction

Labels designed from simulation · UNIST M.S.

M.S. research



Open-source tools

Patina · Gajae Code App · ChatMux, built and maintained

Open source

How I work

- 01** Detection and segmentation models for medical imaging with scarce labels — filled in with semi-supervised learning, pseudo-labeling, and generative models.
- 02** Models that run on the device, with Jetson and TensorRT. Accuracy and on-device performance designed together.
- 03** Followed through to clinical trials, clearance, and field validation. Models of mine ship in two cleared products.

Contact

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The links open directly. Happy to share project details or walk through code on request.



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Web portfolio · CV
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GitHub
github.com/devswha



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linkedin.com/in/sangwoo-ha-4130b8298