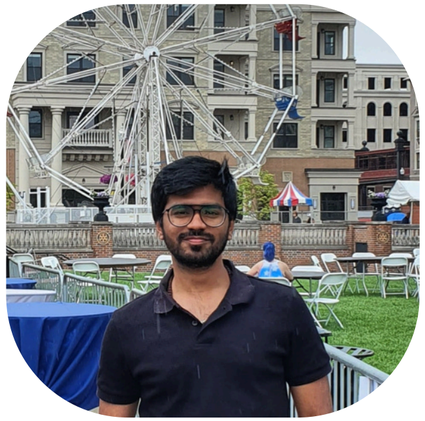

Cummins
AI Powered
Realtime PPE
Detection

Team

MEET THE TEAM
COVER UPS

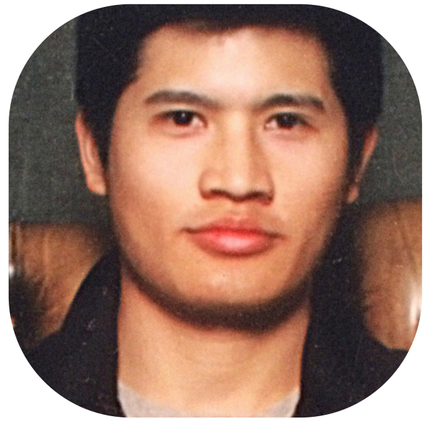
Riya

Srishti



Shanmukeshwar

Zion



Michael

The problem

- Cummins HSE goals
- Zero harm to employees
- Safety gear compliance enforcement
- Preventable safety incidents on-site
- Ease of access to safety training material. (Especially in times of emergency)
- Need for open communication, thorough inspection, and maintenance

The current situation at Cummins

Manually monitored which is time consuming

Can be automated

- Cummins uses Acumen AI for real-time monitoring of equipment performance for safety
- Cameras are located at the entrance and throughout the plants, but it’s all done manually
- Training videos provided on safety but not 100% foolproof

The impact of Visual AI

Factories utilizing AI technologies have seen a 30% reduction in safety incidents

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AI systems for maintenance and quality checks have led to a 20% improvement in overall manufacturing efficiency

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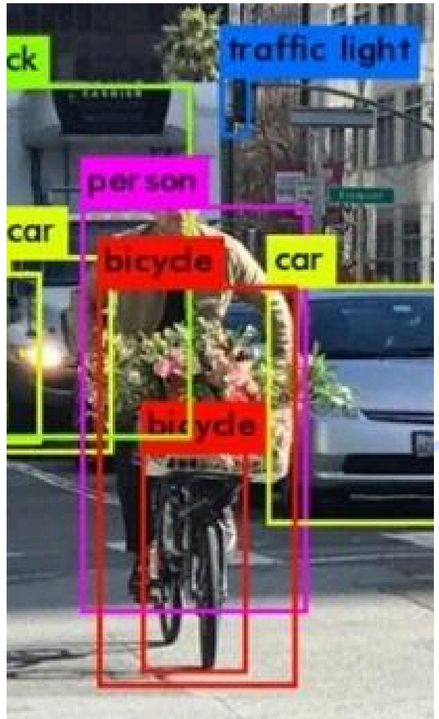
The AI in manufacturing market, valued at $3.2 billion in 2023, is projected to grow to $20.8 billion by 2028 (increased adoption)

Market Research

Companies that have successfully implemented Vision AI:

- **Tesla**
- **Waymo (Google)**



85%

reduction in injury-causing crash rates

57%

reduction in police-reported crash rates

OUR PROPOSAL

Prevent Workplace Injuries and Occupational Hazards with AI powered real-time PPE Detection

Back to Agenda

Our Milestones

Project timeline

Market research

Recent technology trends, safety metrics etc.

AI Model building

Data accumulation, development of AI model using YOLOV9

User Interface development

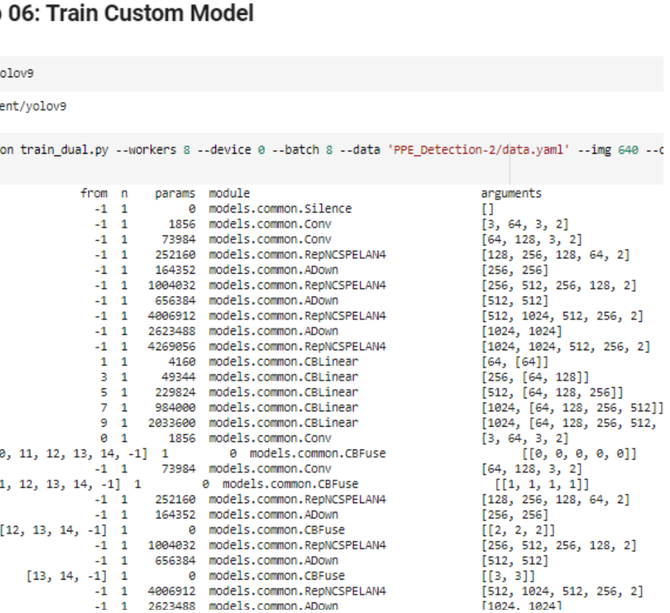
Designing and developing UI mockups

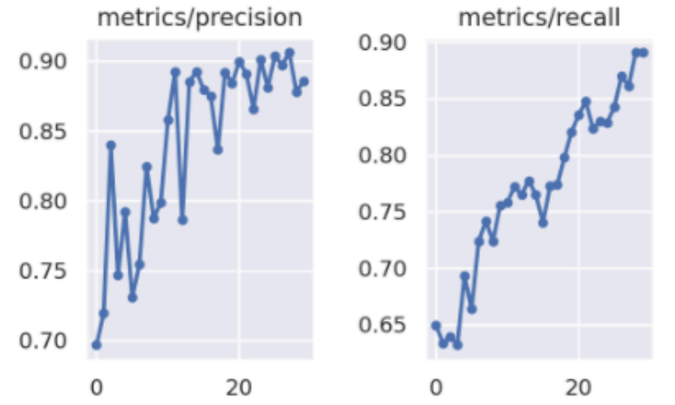
BI Dashboard Development

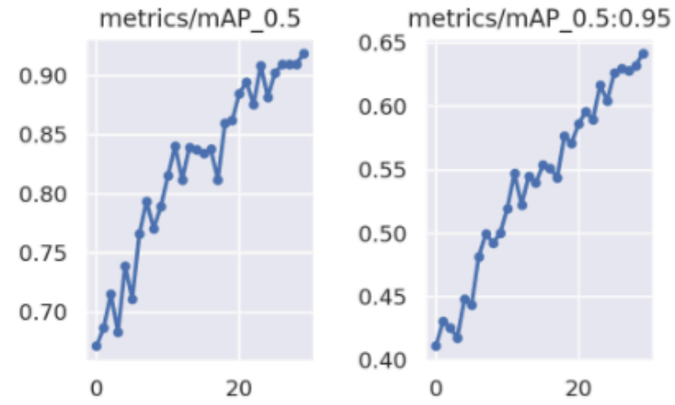
Creation of analytics dashboard on PowerBI using data from model

AI MODEL DEVELOPMENT

Our DL Model





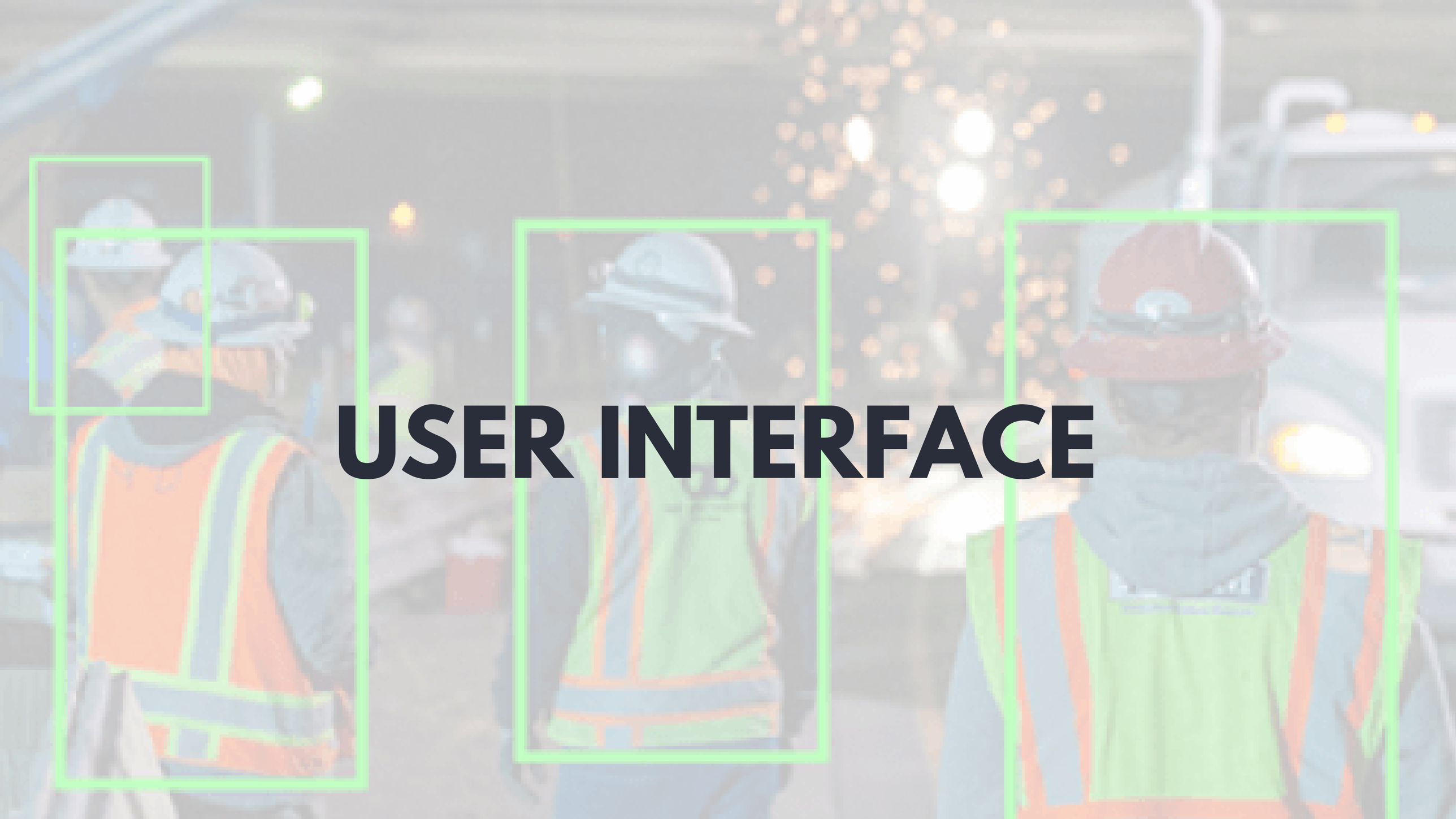


We finetuned and trained a YOLOv9 model on a custom PPE detection dataset by cloning the YOLOv9 repository, and downloading pre-trained weights. Using the Roboflow API, we obtained a PPE dataset with labeled images.

We configured the model and trained it for 30 epochs with advanced data augmentation. The model, has around 55 million parameters and 160 layers.

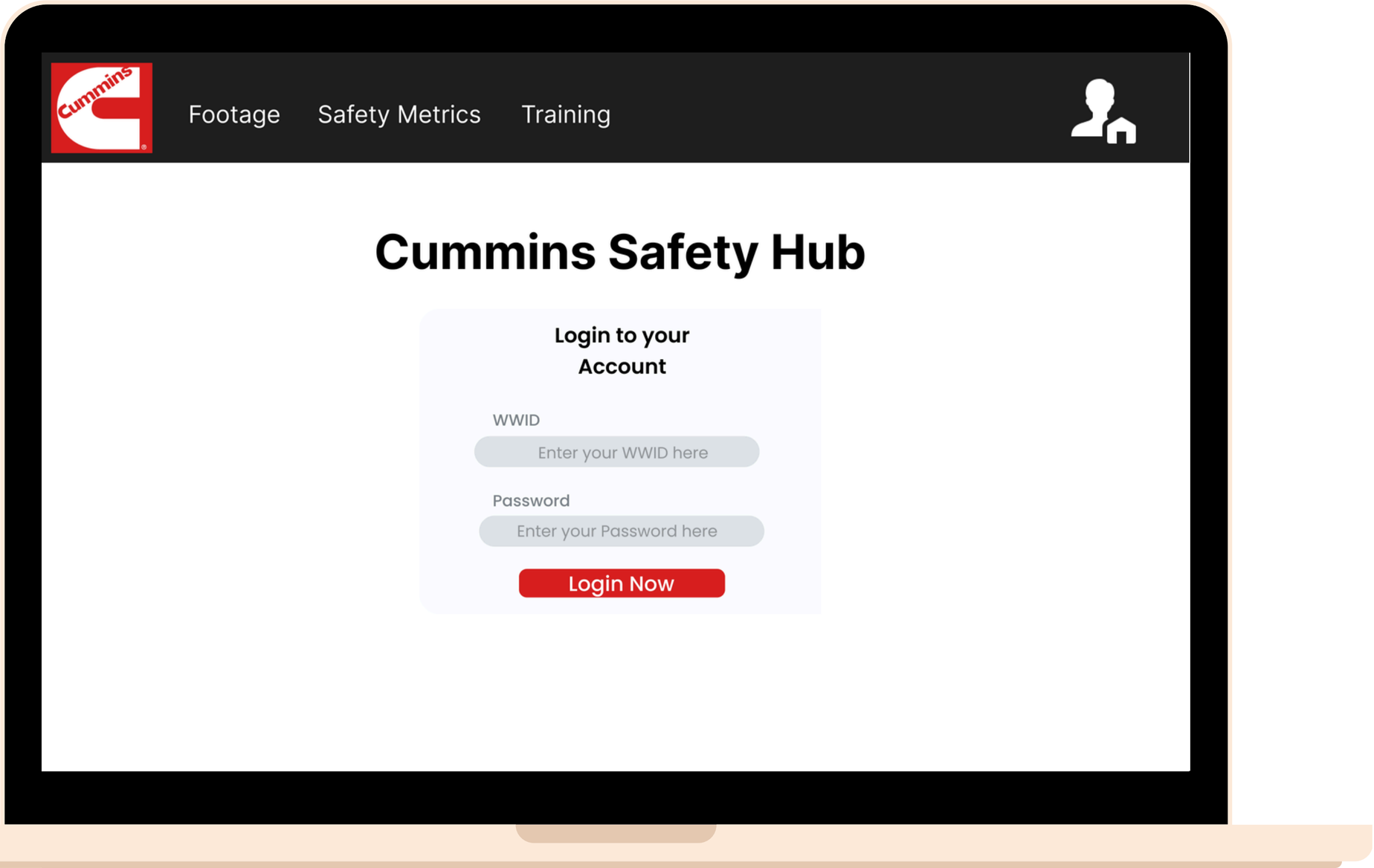
After training, we evaluated the model on a validation dataset using a confidence threshold of 0.001 and an IoU threshold of 0.7. The model showed strong performance with a training accuracy of 98% and testing accuracy of 95%, indicating high detection accuracy and well-defined metrics.

It accurately detected helmets, vests, gloves, and steel toed shoes in images and videos, demonstrating its potential for real-time safety monitoring.

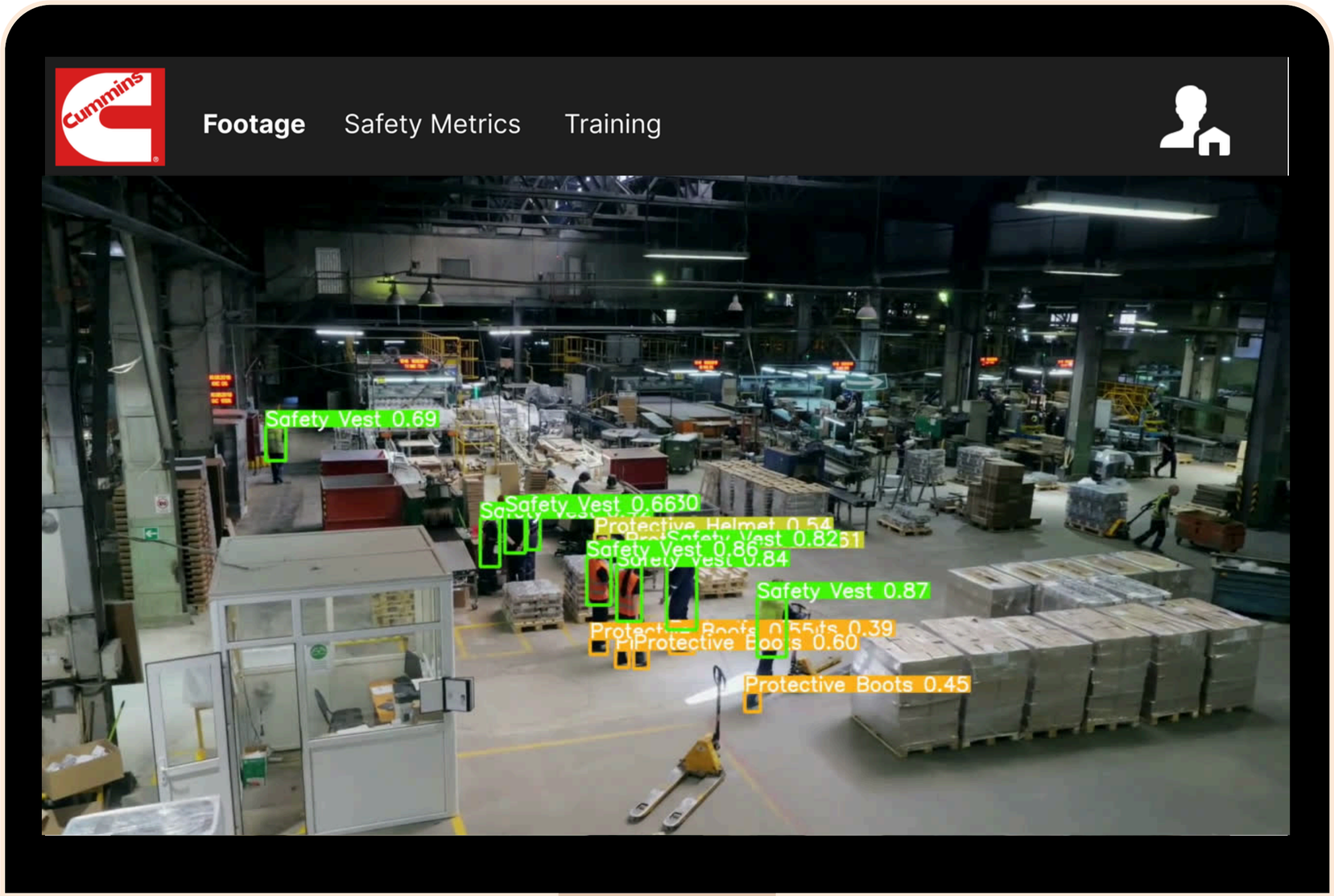


USER INTERFACE

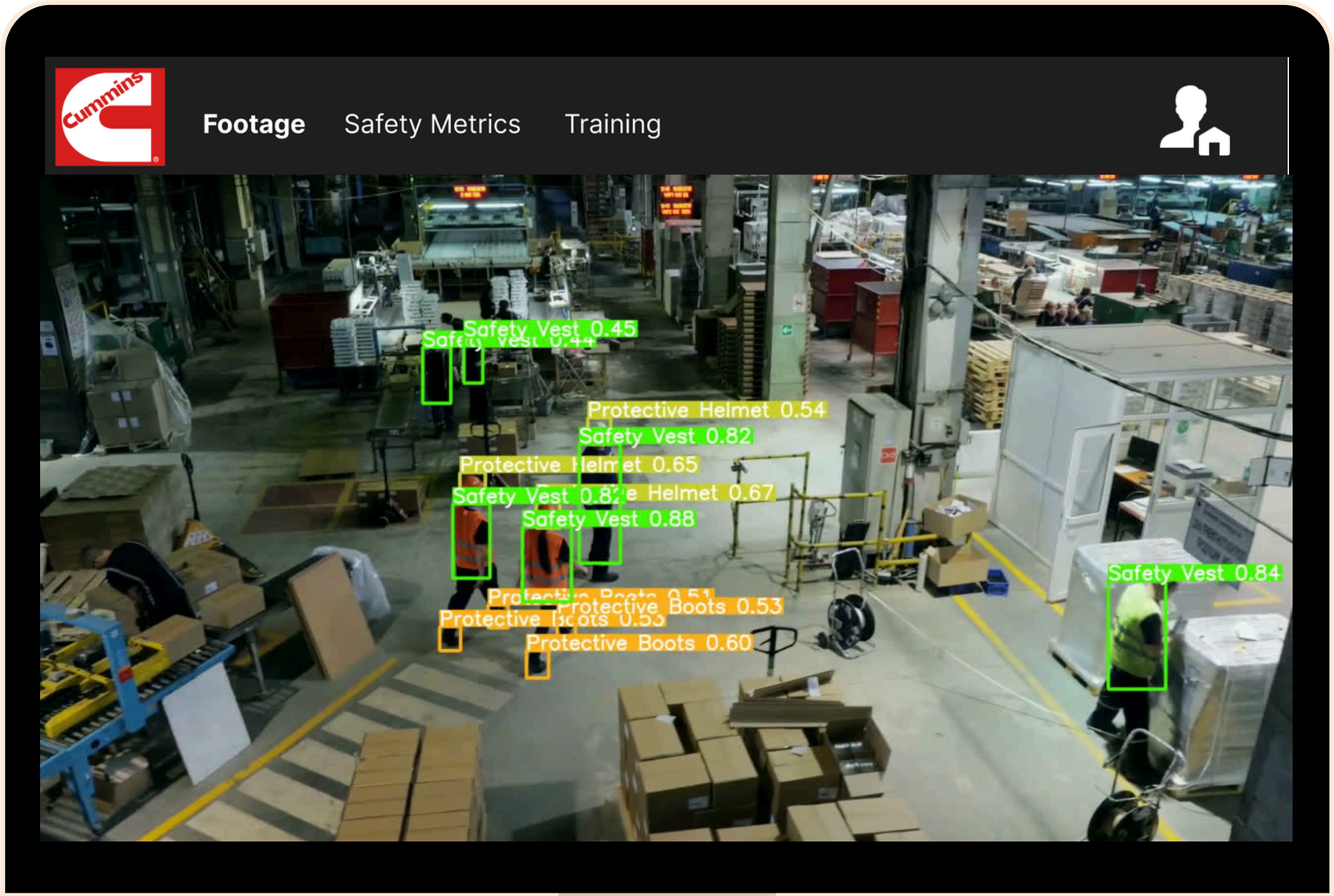
How it looks


Footage
Safety Metrics
Training
Cummins Safety Hub
Login to your Account
WWID
Enter your WWID here
Password
Enter your Password here
Login Now

How it looks


Footage
Safety Metrics
Training
Safety Vest 0.69
Safety Vest 0.87
Protective Boots 0.45

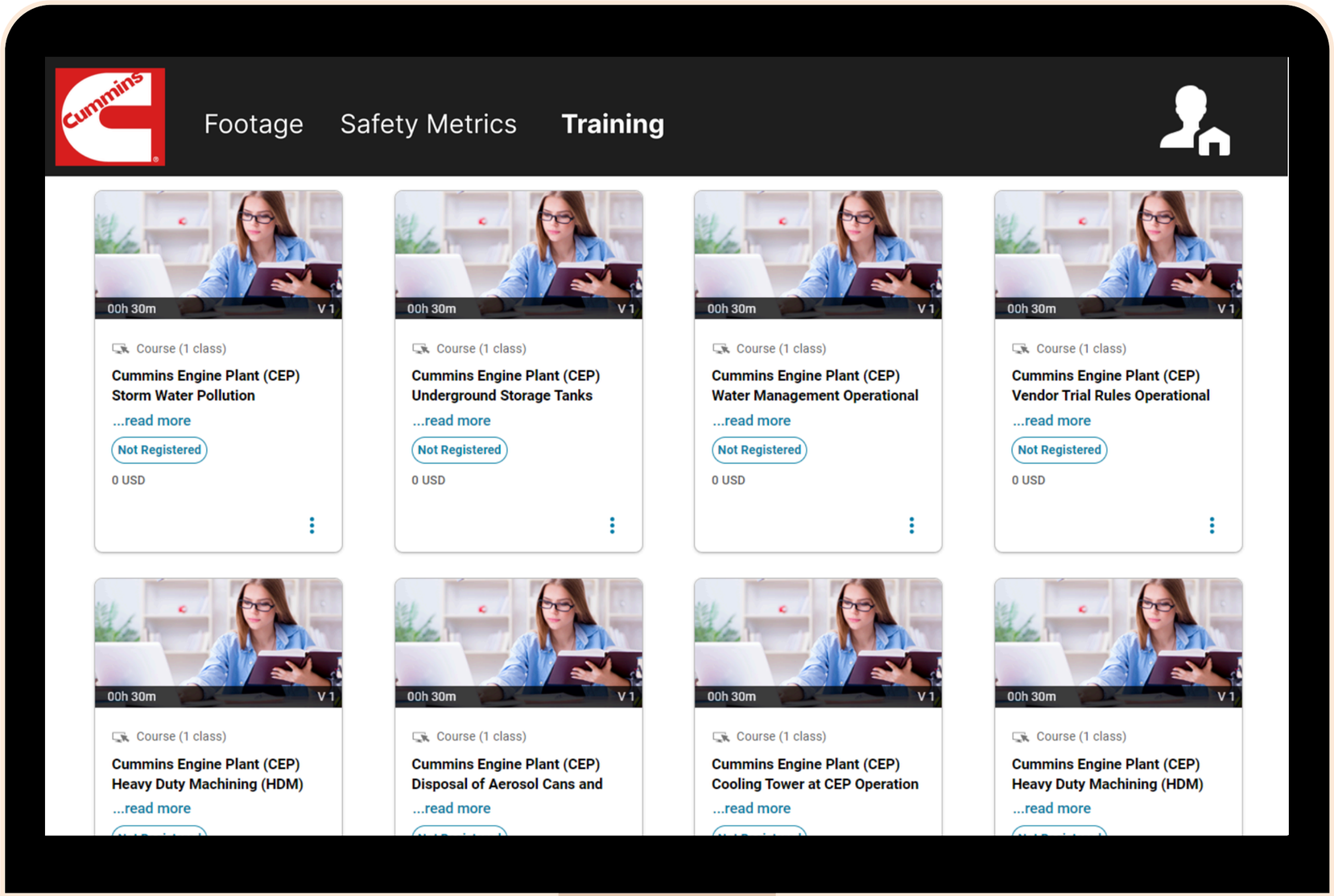
How it looks


Footage
Safety Metrics
Training
Safety Vest 0.45
Protective Helmet 0.54
Safety Vest 0.82
Protective Helmet 0.65
Safety Vest 0.88
Safety Vest 0.84
Protective Boots 0.53
Protective Boots 0.60

How it looks

Camera_ID	Location	Shift	Year	Month	PPE_Defaulted
Cam_03	95L Assembly line	8	2024	July	Safety Glasses
Cam_09	30L Assembly line	7	2024	July	Steel Toe Shoes
Cam_02	Receiving	6	2024	February	Vest
Cam_04	7.5L Assembly line	6	2024	July	Vest
Cam_04	95L Assembly line	6	2024	January	Safety Glasses
Cam_05	Testing	6	2024	July	Vest
Cam_06	Other	6	2024	April	Vest
Cam_07	Testing	6	2024	July	Vest
Cam_08	95L Assembly line	6	2024	July	Steel Toe Shoes
Cam_08	Receiving	6	2024	September	Vest
Cam_09	Receiving	6	2024	February	Gloves
Cam_10	Receiving	6	2024	December	Safety Glasses

How it looks


Footage
Safety Metrics
Training
00h 30m
V 1
Course (1 class)
Cummins Engine Plant (CEP) Storm Water Pollution
...read more
Not Registered
0 USD
Course (1 class)
Cummins Engine Plant (CEP) Underground Storage Tanks
...read more
Not Registered
0 USD
Course (1 class)
Cummins Engine Plant (CEP) Water Management Operational
...read more
Not Registered
0 USD
Course (1 class)
Cummins Engine Plant (CEP) Vendor Trial Rules Operational
...read more
Not Registered
0 USD
Course (1 class)
Cummins Engine Plant (CEP) Heavy Duty Machining (HDM)
...read more
Course (1 class)
Cummins Engine Plant (CEP) Disposal of Aerosol Cans and
...read more
Course (1 class)
Cummins Engine Plant (CEP) Cooling Tower at CEP Operation
...read more
Course (1 class)
Cummins Engine Plant (CEP) Heavy Duty Machining (HDM)
...read more

IMPLEMENTATION AT CUMMINS

- **Streamlined Implementation and Real-Time EHS Monitoring for Enhanced Workplace Safety**
- **Use your existing cameras: Integrate with existing camera infrastructure on assembly lines providing a cost-effective approach**
- **Web platform hosted on Cummins server ensures easy access to video feeds, providing comprehensive safety audit reports and employee training videos.**

YOLO vs Azure AI

	YOLOV9	Azure Vision AI
Cost	Free and open-source	Subscription-based, potentially higher cost
Integration	Requires manual setup and configuration	Seamless integration with other Azure services
Data Privacy	Data remains within company control	Data managed by Azure
Learning Curve	Steeper learning curve	User-friendly, extensive documentation and tutorials
Support	Community support	Professional support from Microsoft
Maintenance	Self-maintained	Maintained by Microsoft with regular updates
Scalability	Scalable but requires manual management	Highly scalable with built-in Azure infrastructure
Performance	High accuracy with proper training	High accuracy, benefits from Microsoft's resources

Sprints	Action	Duration
Project Planning and Requirement Analysis	Define project scope and objectives, Gather detailed requirements, Conduct feasibility study and risk analysis	2 weeks
System Design and Initial Setup	Design system architecture, data flow and storage solutions, Create UI/UX design, technical specifications, setup of development environments	3 weeks
YOLOv9 Model Development and Camera Integration	Setup and configure YOLOv9, Integrate it with existing cameras, Train, fine-tune, Validate and test the model, Install and configure cameras on-site	4 weeks
Dashboard Development and Security Integration	Develop backend to handle data from cameras and model, Design and develop the user interface for the dashboard, implement functionality to view footage, ensure real-time updates and responsiveness, Implement security measures for data and system access	4 weeks
Power BI Dashboard	ETL data pipeline for Power BI, create data models, audit reports and visualization, develop a page for training videos, Integrate hosting and streaming solutions	3 weeks
Integration, Testing, Deployment, and Security	Integrate all modules, conduct system testing and bug fixing, security and performance testing, validate against requirements, Deploy the system, final testing, Go-live	5 weeks

Thank you!

Anand B Lohia
Andriy Abbott
Phillip R McElreath
Becky Baker-Schoen


Q&A