

Project Title:

Real-Time Multi-Modal Threat Detection:
Integrating YOLOv11 and EfficientNetV2 using an Adaptive Front-end Framework

WEEK 1**Activities planned:**

Finalize problem statement, Begin background study on YOLO and EfficientNet, Initiate literature review

Activities executed:

Defined scope and limitations, Drafted initial problem statement, Reviewed foundational concepts of deep learning

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 2**Activities planned:**

Continue literature review, Create comparative survey table, Identify primary research gaps

Activities executed:

Studied object detection techniques, Tabulated existing model benchmarks, Drafted initial research gap list

Reason for delay if any: One member was absent due to illness

Corrective measures adopted: Redistributed tasks to ensure progress

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WEEK 3**Activities planned:**

Finalize abstract, Deep dive into YOLOv11 architecture, System block diagram draft

Activities executed:

Submitted abstract for review, Understood YOLOv11 C2PSA module, Created first system architecture sketch

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 4

Activities planned:

Explore EfficientNetV2, Finalize literature review, Identify tools and frameworks

Activities executed:

Reviewed EfficientNetV2's scalability and efficiency, Finalized 12+ research papers, Selected PyTorch and TensorFlow

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 5

Activities planned:

Start UML diagrams, Explore GDXray dataset, Build Gantt chart

Activities executed:

Prepared Use Case & Activity diagrams, Analyzed X-ray dataset properties, Completed Gantt chart

Reason for delay if any: Delay in literature compilation

Corrective measures adopted: Extended session hours

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WEEK 6

Activities planned:

Model architecture draft, Dataset preparation, Setup initial codebase

Activities executed:

Drafted modular pipeline, Downloaded + preprocessed initial dataset (images & X-rays), Initialized GitHub repo

Reason for delay if any: Internet downtime at college

Corrective measures adopted: Switched to offline documentation work

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WEEK 7

Activities planned:

Begin preprocessing pipeline, Data augmentation testing, System architecture finalization

Activities executed:

Integrated Albumentations for X-ray augmentations, Applied mosaic & random cropping for CCTV data, Finalized system pipeline diagram

Reason for delay if any: Albumentations conflict with OpenCV

Corrective measures adopted: Used fallback transforms with PIL

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WEEK 8

Activities planned:

Start YOLOv11 training, Generate synthetic data using GANs

Activities executed:

Ran first training with pre trained YOLOv11m weights, Created 1,500+ synthetic samples via GANs

Reason for delay if any: GPU overheating during training

Corrective measures adopted: Installed additional cooling pad

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WEEK 9

Activities planned:

Integrate EfficientNetV2 pipeline, Start training on GDXray

Activities executed:

Loaded EfficientNetV2-M with pretrained weights, Achieved 93.4% initial accuracy

Reason for delay if any: GDXray image corruption in some batches

Corrective measures adopted: Re-downloaded and filtered corrupt files

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WEEK 10

Activities planned:

Implement training visualizations, Add TensorBoard

Activities executed:

Added metrics logging, Displayed mAP, Precision, Recall curves

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 11

Activities planned:

Start model evaluation and error analysis

Activities executed:

Detected class imbalance errors, Improved F1-score via class-weight tuning

Reason for delay if any: Overfitting during fine-tuning

Corrective measures adopted: Used dropout + reduced learning rate

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WEEK 12

Activities planned:

Refactor codebase, Implement DFD Level 0–2

Activities executed:

Completed functional breakdown, Created detailed DFDs with all modules

Reason for delay if any: Initial confusion in system boundaries

Corrective measures adopted: Clarified with guide's help

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WEEK 13

Activities planned:

Backend setup using Flask, Alert system prototype

Activities executed:

Set up Flask server, Integrated basic alert (email/popup) module

Reason for delay if any: SMTP rate limit

Corrective measures adopted: Used alternate API for alerts

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WEEK 14

Activities planned:

Frontend dashboard UI mockup, Integrate live camera feed

Activities executed:

Created responsive dashboard with Angular, Added CCTV feed simulation

Reason for delay if any: Angular component routing bug

Corrective measures adopted: Fixed through manual service injection

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WEEK 15

Activities planned:

Continue model tuning, Deploy EfficientNet on cloud test

Activities executed:

Tuned hyperparameters, Deployed EfficientNetV2 inference on AWS

Reason for delay if any: Delay in cloud access approval

Corrective measures adopted: Used Google Colab temporarily

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WEEK 16

Activities planned:

Threat escalation logic, Decision fusion system

Activities executed:

Built decision-making module to combine YOLO + EfficientNet scores

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 17

Activities planned:

Security response module, Operator panel integration

Activities executed:

Developed threat escalation flowchart, Linked alert dashboard to operator login

Reason for delay if any: Delay in user auth setup

Corrective measures adopted: Used token-based temp solution

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WEEK 18

Activities planned:

Model robustness testing under noise, stress test pipeline

Activities executed:

Injected synthetic noise, validated model under varying lighting & occlusion

Reason for delay if any: RAM limitation

Corrective measures adopted: Batched inference for memory savings

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WEEK 19

Activities planned:

Write IEEE paper draft, Begin documentation

Activities executed:

Completed abstract + methodology sections, Started integrating system screenshots

Reason for delay if any: Formatting conflict

Corrective measures adopted: Used Overleaf template

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WEEK 20

Activities planned:

Final testing of complete system

Activities executed:

Ran real-time simulations on 4 camera feeds, Captured performance logs

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 21

Activities planned:

Analyze test cases, Validate model predictions with real-time footage

Activities executed:

Developed test suite with 12 test cases, Validated YOLOv11 across night and indoor scenes

Reason for delay if any: Misclassification in low-light scenarios

Corrective measures adopted: Fine-tuned with augmented dark images

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WEEK 22**Activities planned:**

Begin final model training with updated datasets

Activities executed:

Trained YOLOv11-m with synthetic + real data, Improved mAP to 0.96

Reason for delay if any: CUDA memory errors

Corrective measures adopted: Optimized batch size and image resolution

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WEEK 23**Activities planned:**

Backend integration with final models, Alert system expansion

Activities executed:

Connected backend with inference engine, Added SMS alert via Twilio

Reason for delay if any: Twilio rate limits

Corrective measures adopted: Configured verified sandbox

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WEEK 24**Activities planned:**

Graphical result analysis, UI polish

Activities executed:

Plotted mAP, Precision-Recall curves, Cleaned up web dashboard UI

Reason for delay if any: Chart.js version conflict

Corrective measures adopted: Rewrote graphs using Plotly

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WEEK 25

Activities planned:

Screenshot documentation, Risk assessment logic

Activities executed:

Captured threat detection UI screenshots, Added zone-based risk assessment logic

Reason for delay if any: Zone mapping errors

Corrective measures adopted: Manual zone annotation

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WEEK 26

Activities planned:

Test GUI controls, Implement confidence threshold slider

Activities executed:

Added adjustable confidence slider in frontend, Logged performance metrics

Reason for delay if any: UI state not updating

Corrective measures adopted: Used Angular Reactive Forms

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WEEK 27

Activities planned:

Real-time integration and camera switch testing

Activities executed:

Successfully tested USB, IP, and RTSP camera feeds

Reason for delay if any: Delay in configuring IP feed

Corrective measures adopted: Updated FFmpeg config

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WEEK 28

Activities planned:

Generate reports, Create export features

Activities executed:

Built report generation tool (CSV & PDF), Logged time-stamped alerts

Reason for delay if any: PDF generation failed due to font errors

Corrective measures adopted: Embedded Google Fonts locally

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WEEK 29

Activities planned:

Final system testing, Begin review

Activities executed:

Conducted complete end-to-end system test, Logged performance report

Reason for delay if any: Slight delay in camera warm-up sync

Corrective measures adopted: Introduced buffer for feed stability

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WEEK 30

Activities planned:

Start final documentation

Activities executed:

Began writing implementation and results section, Inserted sample output

Reason for delay if any: None

Corrective measures adopted: N/A

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WEEK 31

Activities planned:

Create presentation, Summary slide for demo

Activities executed:

Designed final PPT with architecture, result graphs, and conclusions

Reason for delay if any: Delay in screenshot stitching

Corrective measures adopted: Used snipping tool + PowerPoint export

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WEEK 32

Activities planned:

Conduct internal review, Refine UI and backend logic

Activities executed:

Bug fixes on alert timestamps, Improved system responsiveness

Reason for delay if any: None

Corrective measures adopted: N/A

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WEEK 33

Activities planned:

Wrap up all code and submit for freeze

Activities executed:

Frozen backend and frontend repo, Tagged final release

Reason for delay if any: N/A

Corrective measures adopted: N/A

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WEEK 34

Activities planned:

Dry run for presentation and oral viva

Activities executed:

Practiced team pitch, Adjusted slide timings and demo order

Reason for delay if any: Coordination issue in voice-over

Corrective measures adopted: Reassigned speaker roles

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WEEK 35

Activities planned:

Final submission and presentation

Activities executed:

Submitted report, presented to panel, received positive feedback

Reason for delay if any: None

Corrective measures adopted: N/A

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