Bonus: Use Case Proposal –**FIRECHECK**

**TEAM NAME: ALGOMATES**

**APPLICATION NAME: FIRECHECK**

**VIDEO + GITHUB REPOLINK:**[**firecheck\_algomates\_githublink**](https://github.com/Geetanshvats/firecheck_algomates.git)

# 1. Real-World Problem Addressed

In critical environments such as space stations, laboratories, and industrial facilities, the presence and accessibility of safety equipment like fire extinguishers, oxygen tanks, and toolboxes is vital for survival and emergency response.  
  
However, in many real-world scenarios:  
- Audits are manual, time-consuming, and prone to human error.  
- Equipment may be misplaced, obstructed, or non-functional.  
- Frequent physical inspections in restricted or hazardous zones (e.g., space modules) are difficult.

# 2. Our Application: FireCheck

We built a lightweight web-based application that uses our trained YOLOv8 model to automatically detect safety equipment from an image or video feed. It works on desktop or can be accessed from a mobile browser, making it suitable for on-site audits.

* Features:
* Upload or capture an image from any device (camera feed or surveillance still)
* Model detects presence and locations of: Fire Extinguishers, Oxygen Tanks, Toolboxes
* Displays prediction result visually
* Lists all detected items
* Works in low-light and occlusion-prone synthetic environments thanks to Falcon-trained data
* Devices Supported:
* Desktop browser (Windows/Linux/Mac)
* Mobile browsers (Chrome, Safari, Edge)
* Optionally deployable as a Progressive Web App (PWA)

| Component | Tool / Framework |
| --- | --- |
| 🔍 Object Detection | [YOLOv8](https://github.com/ultralytics/ultralytics) (custom-trained) |
| 🌐 Web Framework | Python Flask (backend), HTML5/CSS3 (frontend) |
| 📱 Compatibility | Desktop & mobile browsers (Chrome, Safari, Edge) |
| 🎨 UI Styling | Responsive layout, external CSS |
| 🧪 Data Simulation | Falcon (synthetic environment generator) |
| 📦 Deployment | Local or web-hosted (e.g. Render, Railway) |

# 3. Demo Deliverables

✓ Attached app source code in submission

✓ Video demo of app in use (showing image upload → detection result)

# 4. Falcon Integration – Keeping the Model Up-to-Date

In real-world conditions, object appearances and scenarios can evolve:

|  |  |
| --- | --- |
| Scenario | Falcon-based Solution |
| Fire extinguisher model/design changes | Use Falcon to simulate new versions and retrain the model with synthetic images |
| New object introduced (e.g., fire blanket) | Add new class in Falcon simulation, regenerate labeled dataset, fine-tune model |
| Lighting, camera angle, or occlusion problems | Use Falcon's digital twin to simulate new camera placements and lighting settings |
| Environmental changes (e.g., cluttered station module) | Modify the Falcon environment accordingly and export more varied training data |

* Continuous Model Maintenance Strategy:

1. 1. Periodically use Falcon to simulate new safety scenarios
2. 2. Export synthetic data with YOLO-compatible labels
3. 3. Fine-tune or retrain the model using updated dataset
4. 4. Replace best.pt in the application backend
5. 5. App behavior updates instantly, with zero change to UI

# 5. Outcome & Potential

This approach enables automated, scalable, and up-to-date fire safety audits in high-risk or remote environments — from spacecraft to chemical labs. It’s a step toward intelligent safety systems that can reduce human workload and increase reliability.

Regards

Team:Algomates

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