

Monitoring and predictive detection of anomalies on conveyor belts by image analysis



✓ Why is this project beneficial? ?



Reduced production downtime through early anomaly detection, preventing critical failures.



Saves time and resources by replacing manual inspections with 24/7 automated monitoring.



Maintenance optimization through a predictive rather than reactive approach, extending the lifespan of belts and equipment.

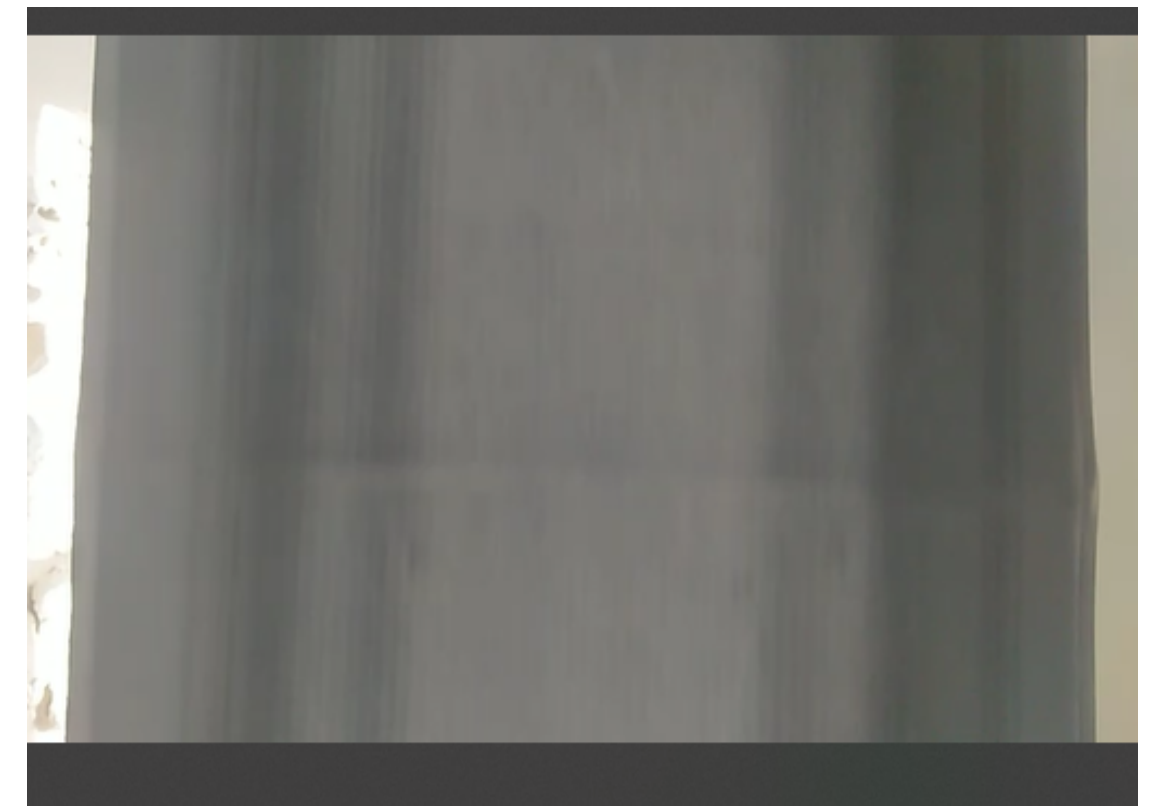
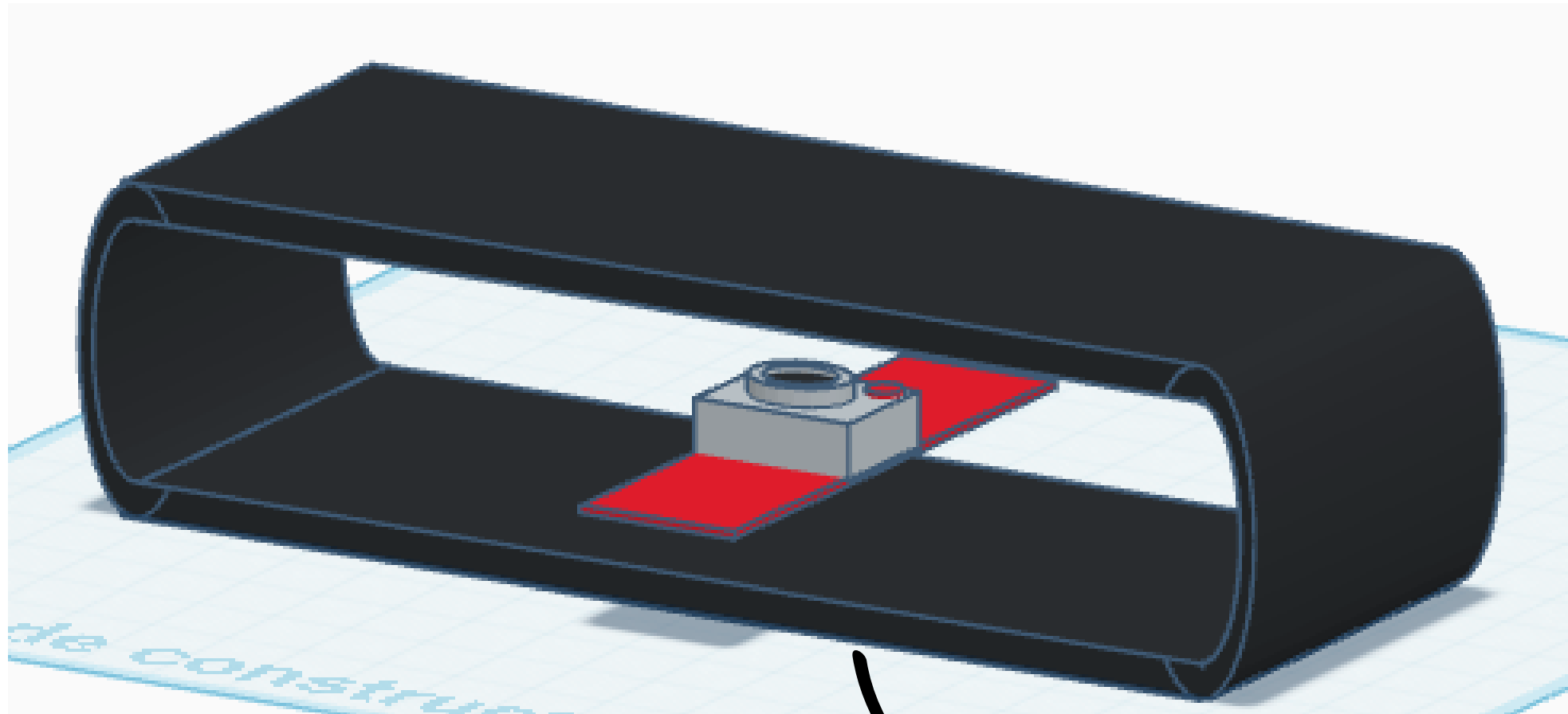


Improved safety by reducing human intervention in high-risk areas.



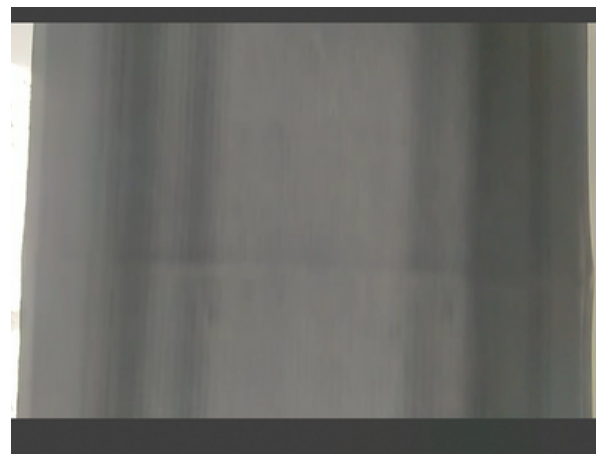
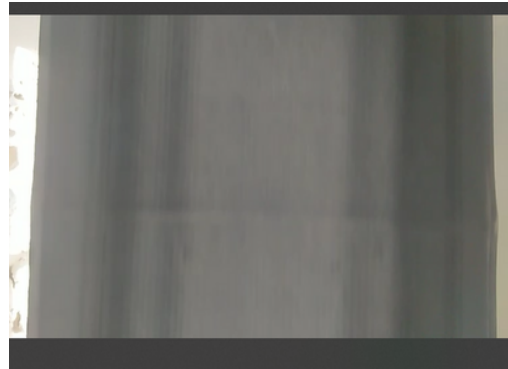
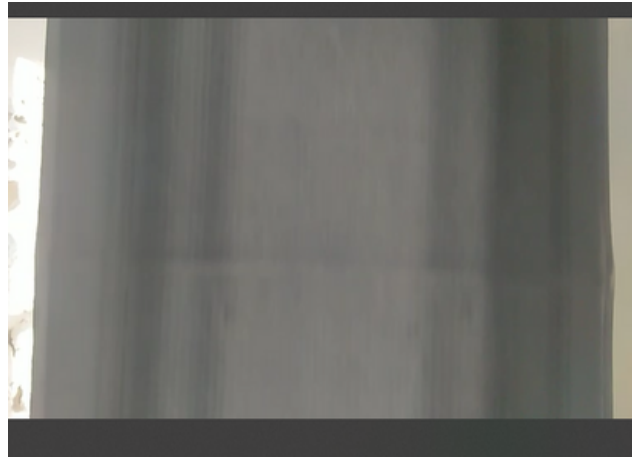
Continuous data analysis enables refinement of long-term maintenance strategies.

✓ System operation :



📷 an industriel caméra that takes 30 photos per second.

✓ System operation :

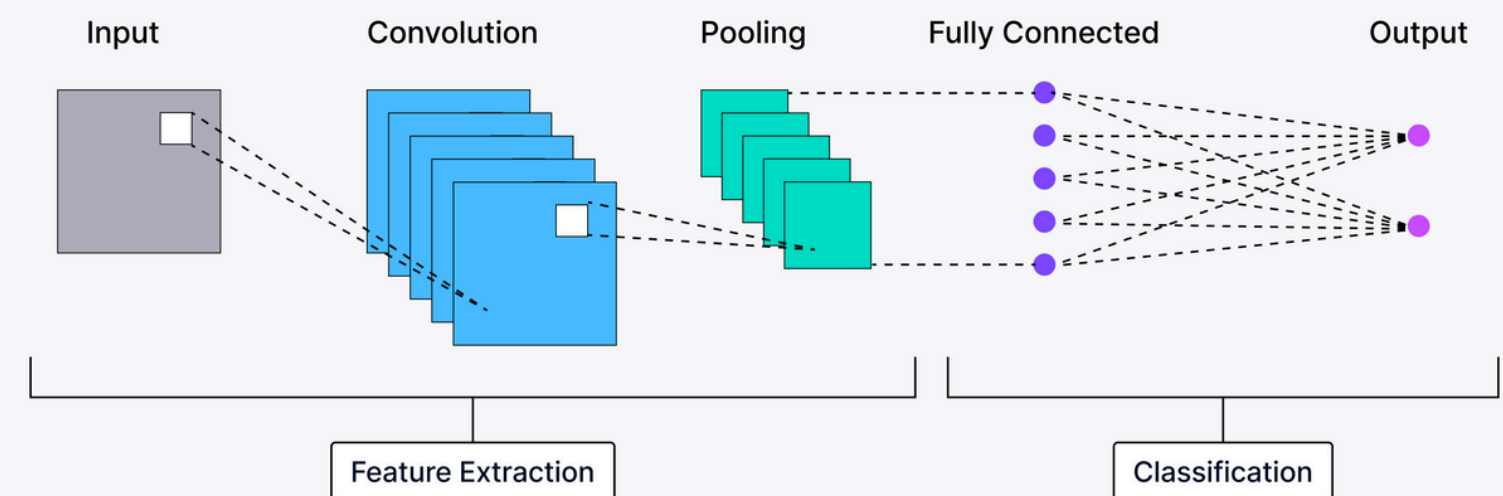


The photos are sent to the system for analysis via a CNN model.



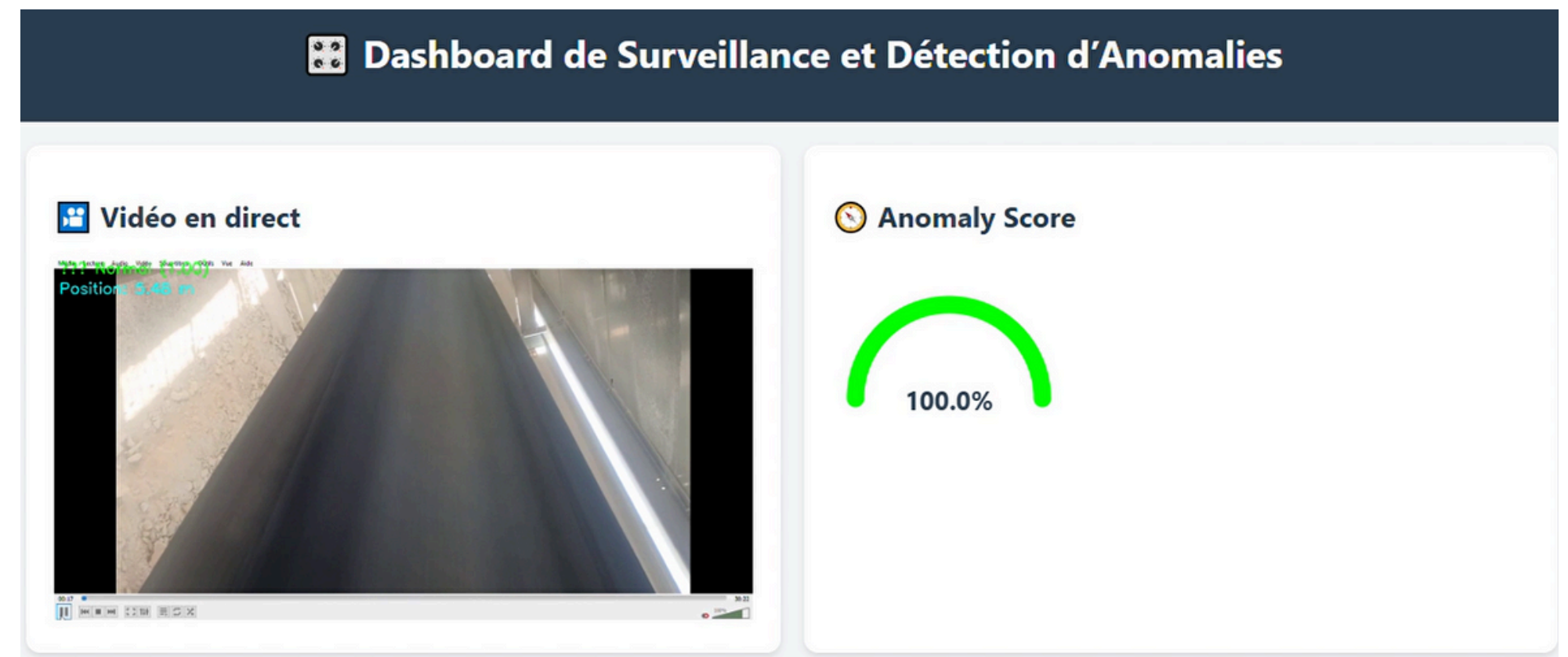
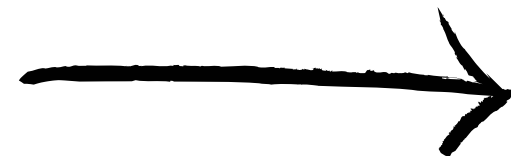
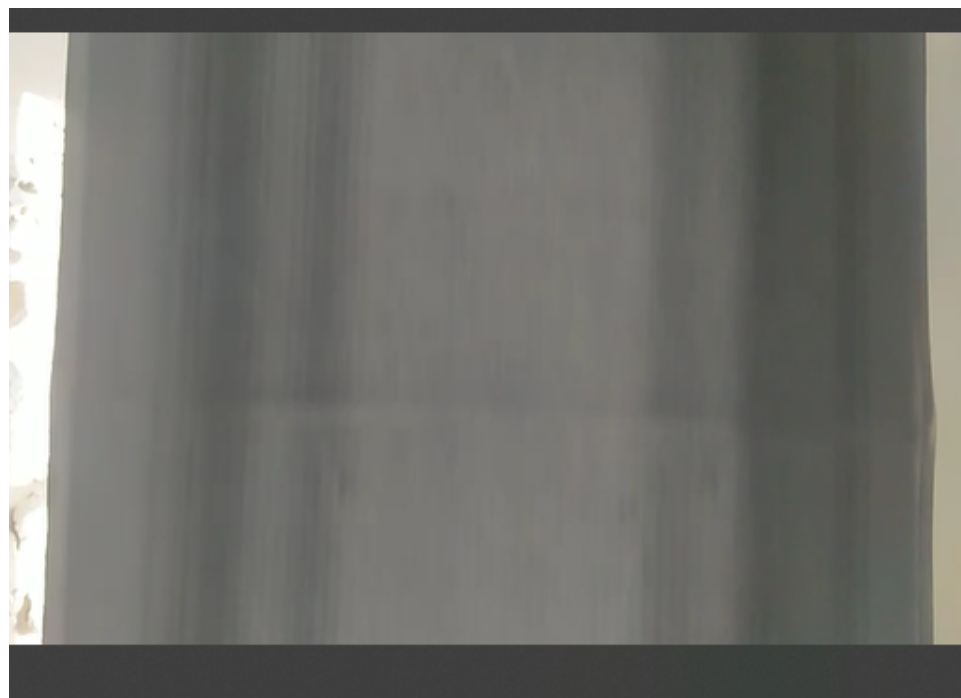
```
app.py > ...
144 @app.route('/')
145 def index():
146     snapshots = sorted(os.listdir(SNAPSHOT_DIR), reverse=True)
147     anomalies = []
148     if os.path.exists(LOG_PATH):
149         with open(LOG_PATH, 'r') as f:
150             reader = csv.DictReader(f)
151             anomalies = list(reader)
152     return render_template('index.html', snapshots=snapshots, anomalies=anomalies, belt_speed=belt_speed)
153
154 @app.route('/video_feed')
155 def video_feed():
156     return Response(generate_frames(),
157                     mimetype='multipart/x-mixed-replace; boundary=frame')
158
159 @app.route('/snapshot/<filename>')
160 def snapshot_image(filename):
161     return send_from_directory(SNAPSHOT_DIR, filename)
162
163 @app.route('/download_logs')
164 def download_logs():
165     return send_from_directory('logs', 'anomalies.csv', as_attachment=True)
```

The Architecture of Convolutional Neural Networks



✓ System operation :

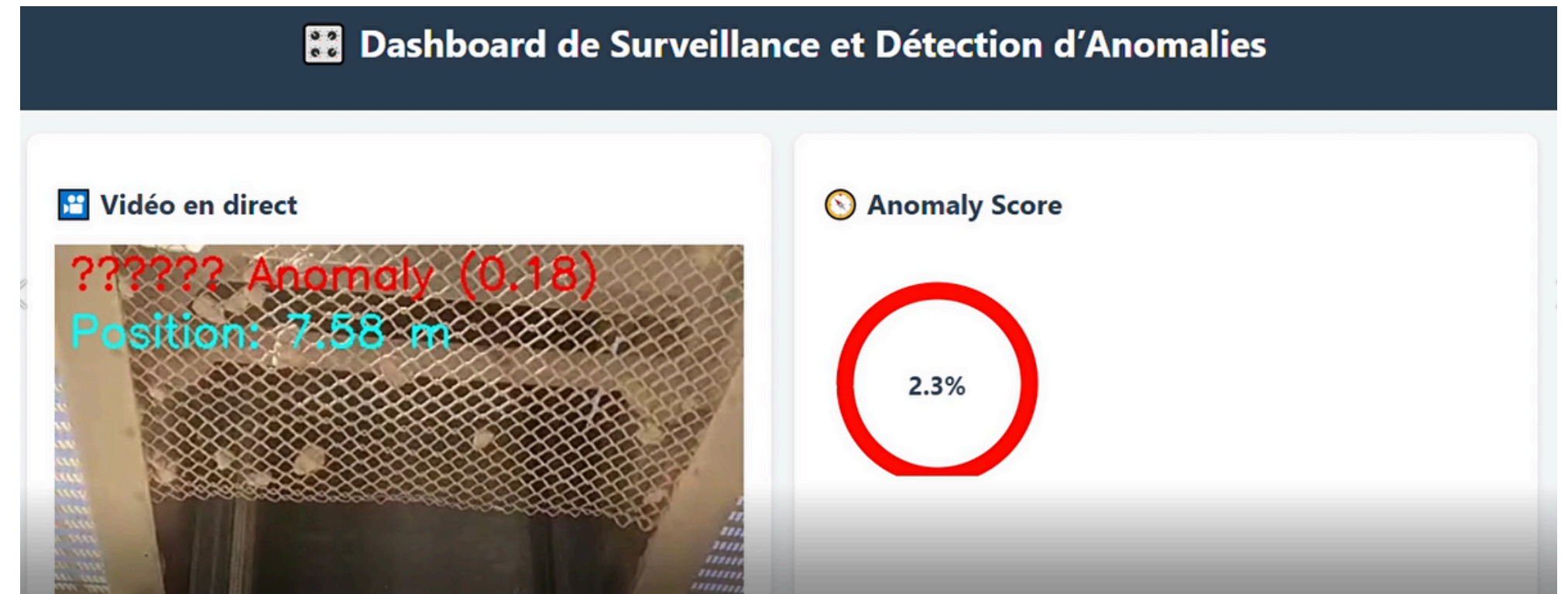
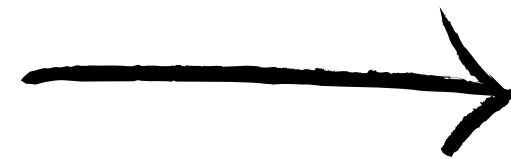
If the photo appears to be normal



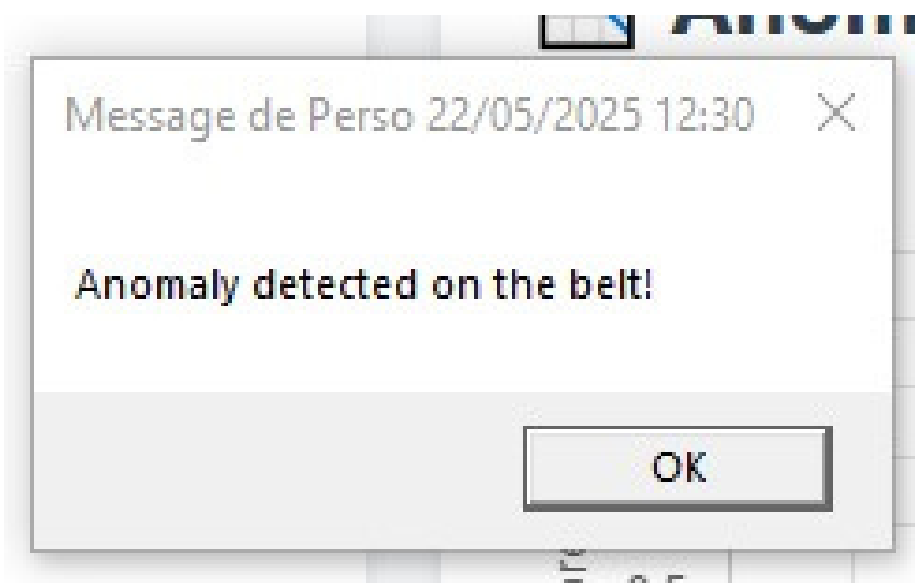
The dashboard displays the results .

✓ System operation :

If the photo appears to have an anomaly



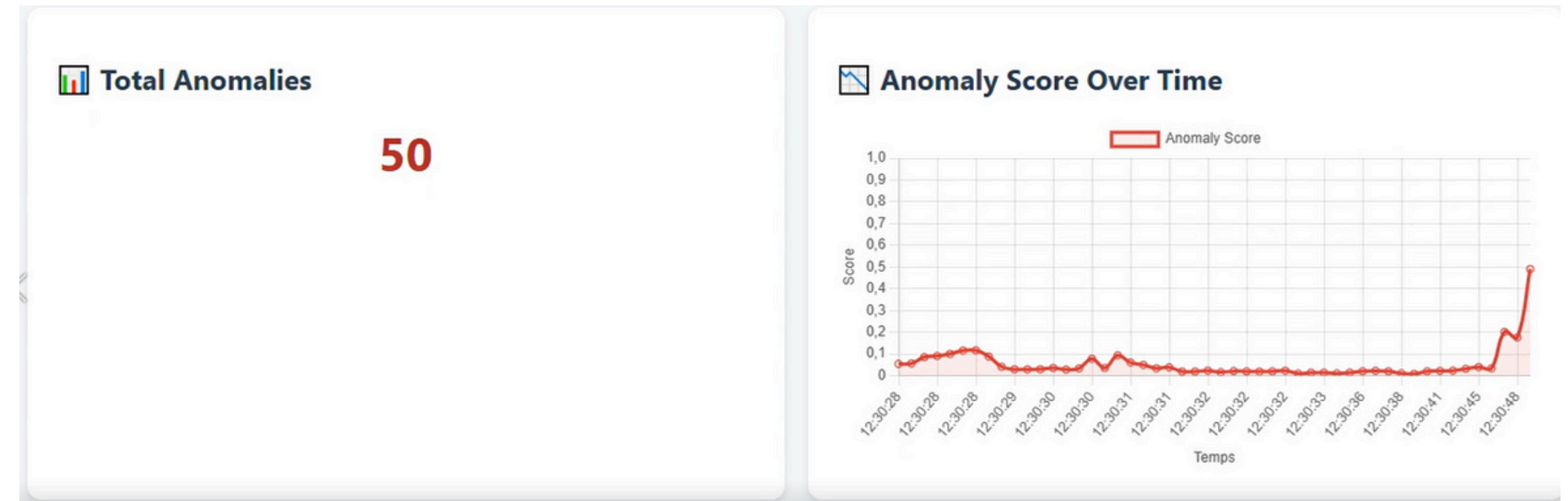
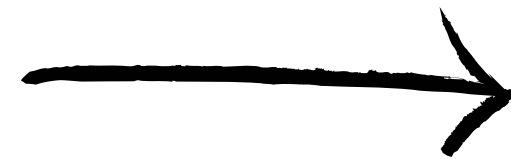
The dashboard displays the results .



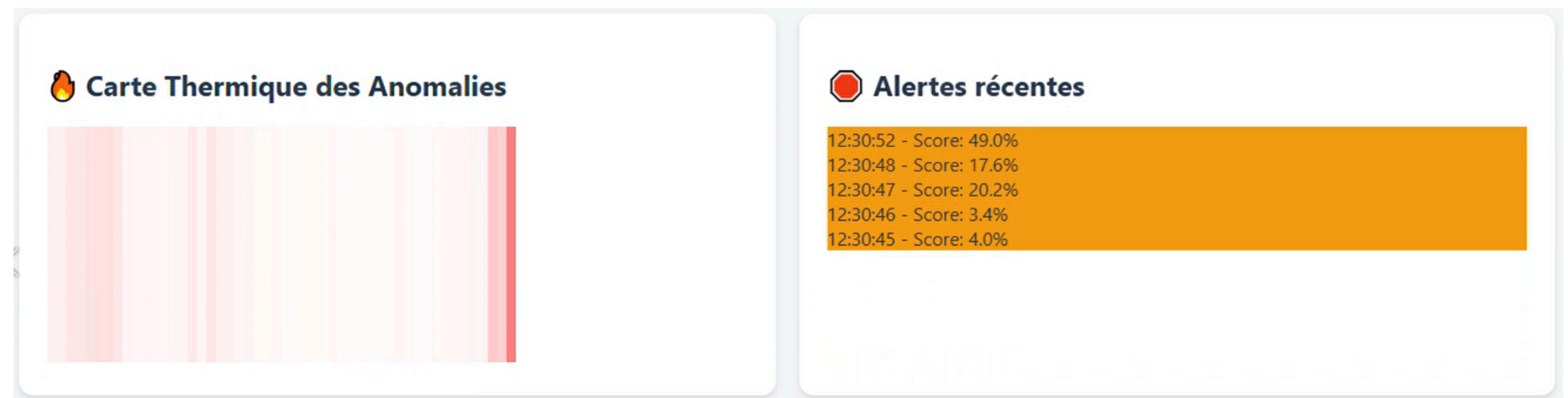
sends an alert .

✓ System operation :

If the photo appears to have an anomaly



keeps track of the anomalies and their scores over time.



Displays a heatmap of the anomalies and the 5 most recent ones.

✓ **System operation :**

If the photo appears to have an anomaly



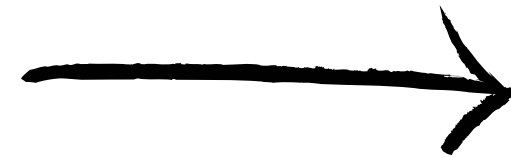
📷 **Snapshots et journal**

🕒 Horodatage	🔍 Prédiction	📷 Snapshot	📍 Position	🕒 Vitesse
2025-05-22 12:30:25	0.0016030485		0.12 m	3.50 m/s
2025-05-22 12:30:25	0.002112791		0.24 m	3.50 m/s

Records the anomalies in a log along with their time of occurrence, prediction score, position on the belt, and the belt speed.

✓ System operation :

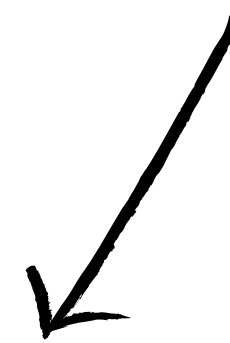
If the photo appears to have an anomaly



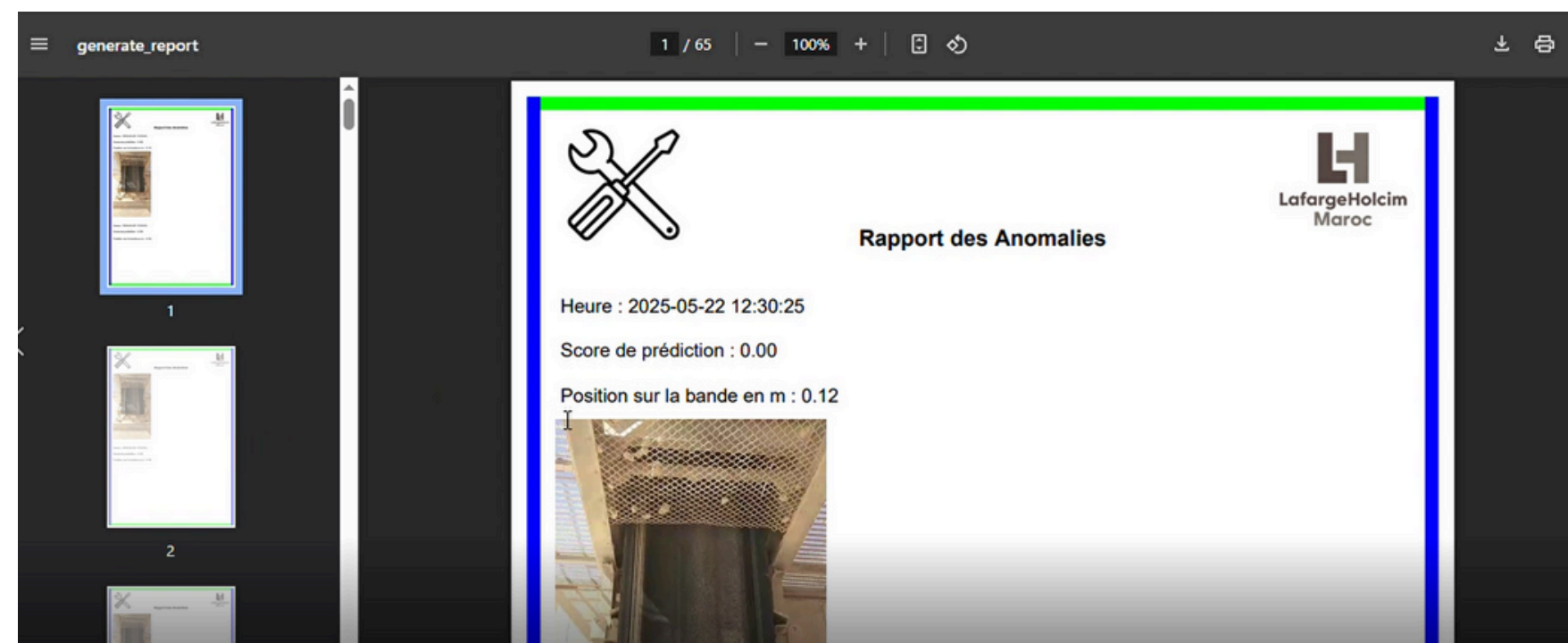
Rapports

 Générer un rapport PDF

 Télécharger le journal CSV



The log can be downloaded in two formats: a PDF report or a CSV table.



A	B	C	D	E	F	G
2025-05-19 11:36:42,0.0139756985,snapshots/2025-05-19_11-36-42.jpg,5.68,3.50						
2025-05-19 11:36:42,0.014014606,snapshots/2025-05-19_11-36-42.jpg,5.80,3.50						
2025-05-19 11:36:43,0.010316302,snapshots/2025-05-19_11-36-43.jpg,5.92,3.50						
2025-05-19 11:36:43,0.014220052,snapshots/2025-05-19_11-36-43.jpg,6.04,3.50						
2025-05-19 11:36:43,0.020394908,snapshots/2025-05-19_11-36-43.jpg,6.16,3.50						
2025-05-19 11:36:43,0.022437425,snapshots/2025-05-19_11-36-43.jpg,6.27,3.50						
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2025-05-19 11:36:44,0.008039799,snapshots/2025-05-19_11-36-44.jpg,6.63,3.50						
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