

# PPE-WATCHER Frontend Functional Manual

University of Canberra – Master of Information Technology and Systems

System: PPE-WATCHER (AI-based PPE Monitoring Web Application)

Version: v1.0

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Date: October 7, 2025

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## 1. Introduction

The PPE-WATCHER web application provides a unified interface for monitoring, managing, and analyzing PPE compliance across industrial environments. It connects real-time edge device detections (via YOLOv8 models) with a central dashboard, allowing administrators to view alerts, track trends, and configure notification preferences.

The frontend is built with React and Material UI (MUI), focusing on usability, responsive design, and efficient data presentation.

It communicates with the Fastify backend through RESTful APIs and provides visualization and control panels for administrative users.

## 2. System Overview

The system architecture integrates three main layers:

Edge Devices: YOLOv8-based AI detectors deployed on Jetson or Raspberry Pi devices.

Backend Server: Fastify with Prisma ORM, handling APIs, database operations, and event broadcasting.

Frontend Web Interface: React + MUI single-page application for visualization and configuration.

Key functions include:

- Real-time violation detection and alerting
- Data visualization and analytics
- Notification management via email/SMS
- User-controlled configuration and system status monitoring

## 3. Interface Layout

The PPE-WATCHER frontend implements a two-level navigation structure that separates global and local navigation, ensuring a clean and intuitive user experience.

The layout consists of four primary sections:

- **Top Bar:**  
Displays the system title and real-time alert indicator (green or blinking red).  
A Theme Switcher (🌙 / ☀️ icon) allows users to toggle between Light Mode and Dark Mode.  
The design reserves space for displaying logged-in user information, which can be enabled in future multi-user versions

- **Main Navigation Bar (MainNav):**

The horizontal navigation bar below the Top Bar provides access to the top-level system modules —

Dashboard, History, and Settings.

Selecting a module updates the main content area accordingly and loads related secondary options in the Side Navigation panel (if applicable).

- **Side Navigation (SideNav):**

The vertical navigation panel on the left provides secondary navigation within the currently active module.

For example:

Dashboard → Overview, Alerts

History → Violations, Trends, Notifications, Bookmarks

Settings → AlertSetting, Contacts, SenderConfig, Security

This design separates global (MainNav) and local (SideNav) navigation for improved clarity.

- **Main Content Area:**

Displays the detailed content of the selected subpage, including charts, tables, and configuration panels.

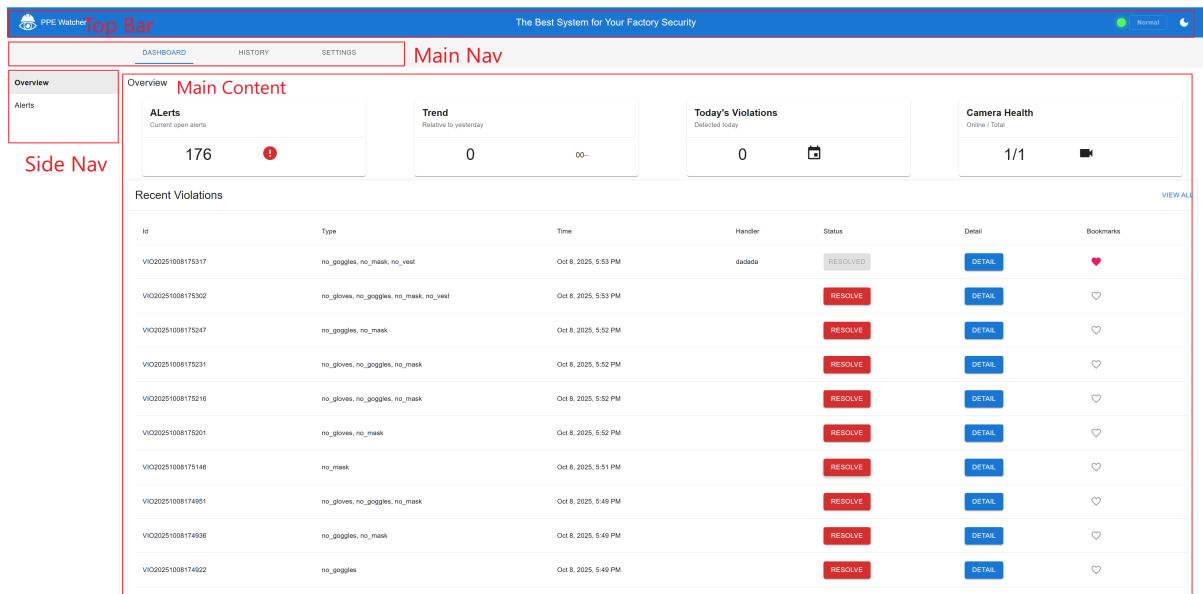


Figure 3.1 Interface Structure Overview

## 4. Dashboard Module

The Dashboard provides an at-a-glance view of the system's operational performance and recent PPE detections.

## 4.1 Overview

This page provides a real-time summary of system status and recent detection results. At the top, KPI Cards display key metrics including:

- Alerts – total number of currently open alerts
- Trend – change compared to the previous day
- Today's Violations – total violations detected today
- Camera Health – number of active vs. total edge devices

Below the KPI Cards, the Recent Violations Table lists the latest 10 detected PPE violations, showing details such as ID, violation type, timestamp, handler, status, and bookmark indicator.

This allows administrators to quickly review the most recent unsafe events directly from the dashboard without navigating to the History module.

Overview

KPI Cards

**ALerts**

Current open alerts

176

1

**Trend**

Relative to yesterday

0

00--

**Today's Violations**

Detected today

0

📅

**Camera Health**

Online / Total

1/1

🖥️

Recent Violations		Latest Violations				
ID	Type	Time	Handler	Status	Detail	Bookmarks
VIO20251008175317	no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM	dadada	RESOLVED	DETAIL	❤️
VIO20251008175302	no_gloves, no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM		RESOLVE	DETAIL	♡
VIO20251008175247	no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175231	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175216	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175201	no_gloves, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175146	no_mask	Oct 8, 2025, 5:51 PM		RESOLVE	DETAIL	♡
VIO20251008174951	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174936	no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174922	no_goggles	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡

VIEW ALL

Figure 4.1 Dashboard KPI Cards and Recent Violations Table

## 4.2 Alert

The Alerts page displays all current PPE violations that have not yet been resolved. At the top, KPI Cards summarize the total number of violations by status:

- Open – total number of unresolved violations (red indicator)
- Resolved – total number of resolved cases (green indicator)
- Total – overall count of all recorded violations

Below the KPI Cards, the Unresolved Violations Table lists each open case with its: Violation ID, type, timestamp, handler, and status

1. Detail button for viewing captured image evidence
2. Bookmark icon to mark high-priority or frequently reviewed events
3. Users can resolve a violation directly by clicking the Resolve button, which updates the record status and dashboard count in real time.

This design provides a quick way to monitor and manage active safety issues.

Alerts

KPI Cards for total amount of Vioalctions

Open176

Resolved160

Total336

Only Violations not resolved						
Id	Type	Time	Handler	Status	Detail	Bookmarks
VIO20251008175302	no_gloves, no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM		RESOLVE	DETAIL	♡
VIO20251008175247	no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175231	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175216	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175201	no_gloves, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175146	no_mask	Oct 8, 2025, 5:51 PM		RESOLVE	DETAIL	♡
VIO20251008174951	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174936	no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174922	no_goggles	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174908	no_gloves, no_goggles, no_helmet, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174852	no_goggles, no_helmet, no_mask	Oct 8, 2025, 5:48 PM		RESOLVE	DETAIL	♡
VIO20251008174837	no_mask	Oct 8, 2025, 5:48 PM		RESOLVE	DETAIL	♡

Figure 4.2 Dashboard Alerts – KPI Summary and Unresolved Violations Table

## 5. History Module

The History module stores all past violations and notification logs for data review and analysis.

Users can browse, filter, and visualize violation data to monitor long-term PPE compliance trends.

## 5.1 Violations

This page displays all violations in the system, including both resolved and unresolved cases.

A Filter Bar allows users to search by date range, violation type, or keyword.

The Violation List contains details such as violation ID, type, timestamp, handler, status, and bookmark.

Users can open the Detail view to inspect captured snapshots or click Resolve to close an open record.

Pagination controls at the bottom make browsing through large datasets smooth and efficient.

Search Violations

Filter Bar

Search Criteria

From

To

Search

X

SEARCH

List

Total Violations List

Id	Type	Time	Handler	Status	Detail	Bookmarks
VIO20251008175317	no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM	dadada	RESOLVED	DETAIL	♥
VIO20251008175302	no_gloves, no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM		RESOLVE	DETAIL	♡
VIO20251008175247	no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175231	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175216	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175201	no_gloves, no_mask	Oct 8, 2025, 5:52 PM		RESOLVE	DETAIL	♡
VIO20251008175146	no_mask	Oct 8, 2025, 5:51 PM		RESOLVE	DETAIL	♡
VIO20251008174951	no_gloves, no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174936	no_goggles, no_mask	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡
VIO20251008174922	no_goggles	Oct 8, 2025, 5:49 PM		RESOLVE	DETAIL	♡

Figure 5.1 Violation History Page – Filter Bar and Violation List

## 5.2 Trends

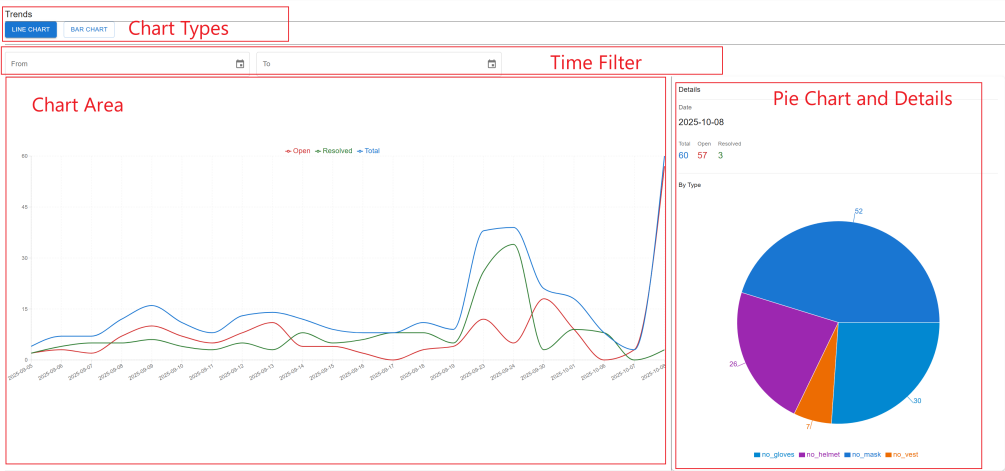
The Trends page visualizes aggregated violation data using Line Chart and Bar Chart modes.

Users can switch chart types via the Chart Type Toolbar and apply a Time Filter to display data for custom date ranges.

The Chart Area shows the frequency of detected PPE violations (Open, Resolved, and Total),

while the right panel provides a Pie Chart summarizing violations by PPE type (e.g., helmet, mask, gloves, vest).

This helps identify recurring non-compliance patterns and assess safety performance over time.



### 5.3 Notifications

This page lists all system-generated notifications (Email and SMS). A Filter Bar lets users search notifications by date, keyword, or status. The Notification List includes message ID, content, timestamp, related violation ID, and current status. Each record can be managed using the Handle button, which allows users to update the notification status (for example, from unhandled to handled) and add a note describing the action taken. Notifications help track alert delivery, response status, and communication reliability between system and administrators.

Notifications

ToolBar							
Filter Bar							
From		To		Search			SEARCH

Notification List							
Id	Message	Time	ViolationID	Type	Handler	Kind	Status
NTF20251008175619	Violation resolved by dadada	Oct 8, 2025, 5:56 PM	VIO20251008175317	resolved	dadada	no_goggles, no_mask, no_vest	unhandled
Note: No note yet							
NTF20251008175317	New violation detected	Oct 8, 2025, 5:53 PM	VIO20251008175317	violation	-	no_goggles, no_mask, no_vest	unhandled
Note: No note yet							
NTF20251008175303	New violation detected	Oct 8, 2025, 5:53 PM	VIO20251008175302	violation	-	no_gloves, no_goggles, no_mask, no_vest	unhandled
Note: No note yet							
NTF20251008175247	New violation detected	Oct 8, 2025, 5:52 PM	VIO20251008175247	violation	-	no_goggles, no_mask	unhandled
Note: No note yet							
NTF20251008175231	New violation detected	Oct 8, 2025, 5:52 PM	VIO20251008175231	violation	-	no_gloves, no_goggles, no_mask	unhandled
Note: No note yet							
NTF20251008175216	New violation detected	Oct 8, 2025, 5:52 PM	VIO20251008175216	violation	-	no_gloves, no_goggles, no_mask	unhandled
Note: No note yet							

Figure 5.3 Notification History – Filter Bar and Notification List

## 5.4 Bookmarks

The Bookmarks page allows users to view and manage saved violation records. A Filter Bar provides quick searching by date or keyword. The Bookmark List displays violation ID, type, handler, and resolution status. Users can open details or remove bookmarks directly from this view. A Pagination Control at the bottom allows navigation across multiple saved pages.

Bookmarks

ToolBar

Filter Bar

From

To

Search

SEARCH

Bookmarks List

Id	Type	Time	Handler	Status	Detail	Bookmarks
VIO20251008179317	no_goggles, no_mask, no_vest	Oct 8, 2025, 5:53 PM	dadada	resolved	<a>DETAIL</a>	
VIO20251001214053		Oct 1, 2025, 9:40 PM	dadada	resolved	<a>DETAIL</a>	
VIO055	no_vest	Sep 12, 2025, 10:08 AM	system	open	<a>DETAIL</a>	
VIO20251001170741	no_helmet, no_mask	Oct 1, 2025, 5:07 PM		open	<a>DETAIL</a>	
VIO20250930201938	no_helmet, no_mask	Sep 30, 2025, 8:19 PM		open	<a>DETAIL</a>	
VIO184		Sep 24, 2025, 5:08 PM	system	resolved	<a>DETAIL</a>	
VIO217		Sep 24, 2025, 5:08 PM	dadada	resolved	<a>DETAIL</a>	
VIO212		Sep 24, 2025, 5:08 PM	system	resolved	<a>DETAIL</a>	

Rows per page: 15

1-8 of 8

<

>

pagination

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Figure 5.4 Bookmark List – Filter Bar and Pagination

## 6. Settings Module

The Settings module manages alert rules, contact lists, sender credentials, and account security. All changes are saved to the backend database and take effect immediately.

### 6.1 Alert Setting

This section allows users to configure PPE detection types (e.g., helmet, mask, gloves) and notification channels (Email or SMS). Users can enable one or multiple detection categories and delivery methods simultaneously.

A Save button applies the configuration instantly. A note area below the form provides usage guidance, such as ensuring at least one alert type and channel are selected.



## Alert & Notifications Settings

PPE Type

☒ Helmet

☒ Mask

☒ Vest

☒ Gloves

☒ Goggles

☒ Boots

Notifications Type

☒ EMAIL

☒ SMS

SAVE

NOTE:

1. Select at least one PPE type for proper violation detection.
2. Select at least one notification method (Email or SMS) to ensure alerts are delivered.
3. Saved settings take effect immediately and apply only to future alerts.

Figure 6.1 Alert & Notification Settings Page

## 6.2 Contacts

The Contacts page manages alert recipients.

The Contacts List displays contact name, email, and phone number.

Users can add, edit, or delete contacts directly using the icons in the Action column. Notes at the bottom describe valid email/phone requirements and alert delivery rules.

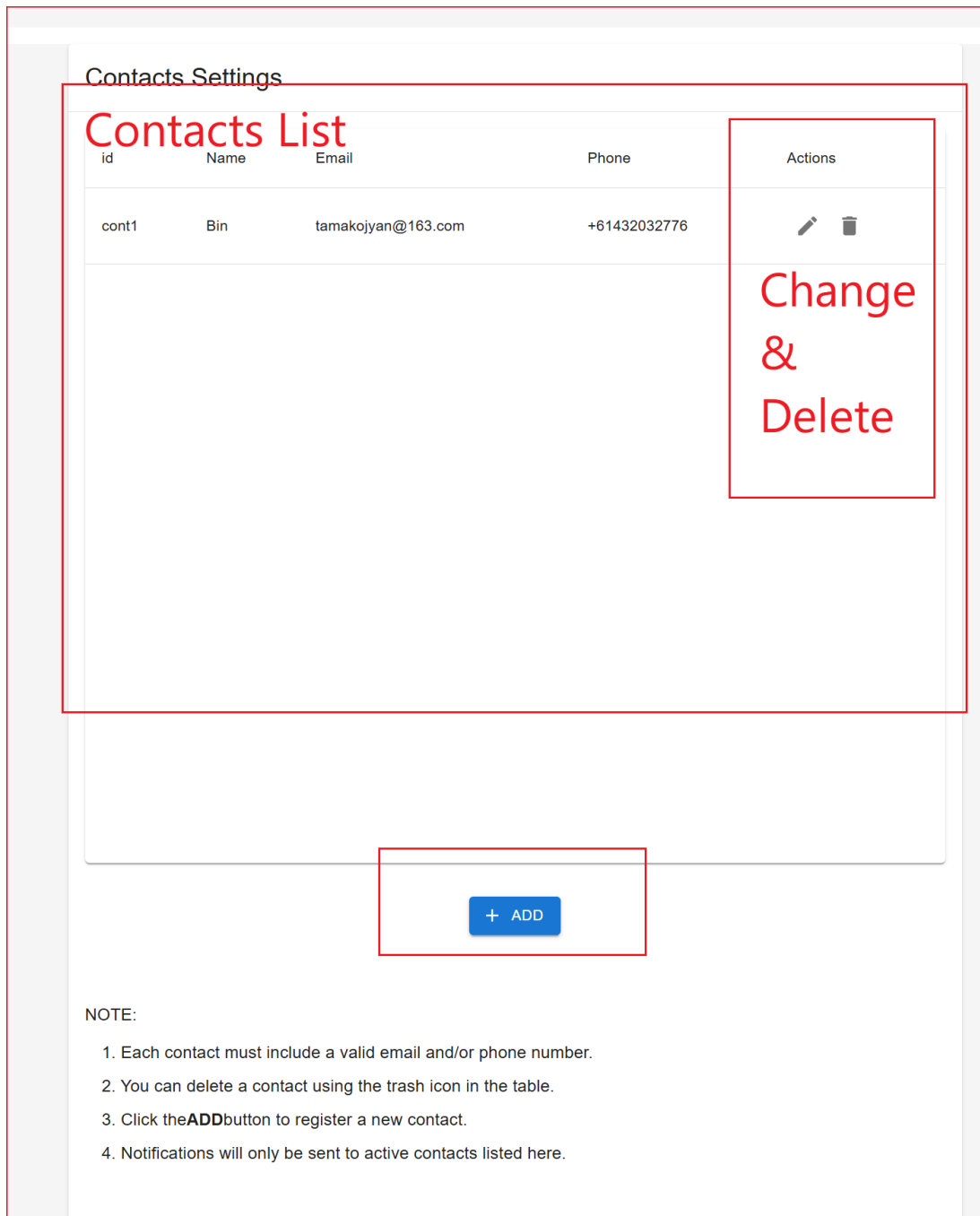


Figure 6.2 Contacts Management Interface

### 6.3 Sender Configuration

The Sender Config page defines both Email (SMTP) and SMS (Twilio) sender credentials. Administrators must fill in fields for SMTP host, port, user, password, and sender email, as well as Twilio account SID, token, and sender phone number.

Each section includes an Update button to save changes separately.  
Settings are securely stored in the backend configuration file and environment variables.

**Note: Parameter names and formats may differ depending on the email/SMS service**

SenderConfig Settings

Email (SMTP)

Host

smtp.sendgrid.net

example: smtp.sendgrid.net

Port

587

example: 465 (SSL) or 587 (TLS)

User

apikey

example: apikey (for SendGrid SMTP user)

Password

.....

example: API key or SMTP password

Sender Email

tamakojyan@gmail.com

example: noreply@yourdomain.com

UPDATE EMAIL

SMS

Provider

twilio

example: twilio

SID

AC2ca78019b44611954048e2d1d13e2ffc

example: ACXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Token

21f4a97ceadd2dff80a87eec0033cbb

example: your\_auth\_token

From Number

+13376284844

example: +15005550006 (Twilio phone number)

UPDATE SMS

provider.

Figure 6.3 Sender Configuration Page (SMTP & SMS)

10

## 6.4 Security

The Security page manages user authentication and password settings.

The current version supports one administrative account managed directly in the database.

Users can change passwords through the Change Password form.

Additional information such as Last Login and Last Password Change timestamps are displayed.

Notes at the bottom provide password requirements and reset instructions.

### Security Settings

#### Change Password

Current Password

New Password

Confirm Password

UPDATE PASSWORD

Last Login  
9/26/2025, 2:50:59 PM

Last Password Change  
9/23/2025, 3:16:08 PM



NOTE:

1. Password must be at least 8 characters and include upper/lower case and a number.
2. You'll be signed out on other devices after updating the password.
3. If your account is managed by SSO/IT, please contact your administrator to reset your password.

Figure 6.4 Security Settings Page

## 7. Notification and Alert Indicators

A visual alert indicator in the top bar shows real-time system status:

-  Blinking Red – Active or unresolved alerts
-  Green – All systems normal

### Appendix – Button Function Summary

Button	Page / Module	Function Description
<b>Resolve</b>	Alerts, Violations	Marks a violation as resolved and updates KPI counters in real time.
<b>Detail</b>	Alerts, Violations, Bookmarks	Opens detailed violation view, showing captured image evidence and metadata.
<b>Bookmark / Unbookmark</b>	Alerts, Violations, Bookmarks	Adds or removes a violation from the user's bookmark list for quick access.
<b>Handle</b>	Notifications	Updates notification status (e.g., from <i>unhandled</i> → <i>handled</i> ) and allows adding notes for record keeping.
<b>Search</b>	Violations, Notifications, Bookmarks	Executes search queries based on filters such as date range, keyword, or violation type.
<b>Save</b>	Settings → Alerts & Notifications	Saves alert configuration including PPE detection types and notification channels.
<b>Add (+)</b>	Settings → Contacts	Adds a new contact record for alert notification delivery.
<b>Edit (✎)</b>	Settings → Contacts	Edits an existing contact's name, email, or phone number.
<b>Delete (🗑)</b>	Settings → Contacts	Removes a contact from the notification recipient list.
<b>Update Email / SMS</b>	Settings → Sender Config	Updates SMTP and Twilio configuration used for email and SMS delivery.
<b>Update Password</b>	Settings → Security	Changes administrator password and updates the last-login timestamp.

Button	Page / Module	Function Description
<b>Theme Toggle</b> 🌞 / 🌙	Top Bar	Switches between light and dark UI modes.
<b>Logout</b> (🔒)	Top Bar / Security	Logs out the current user and returns to the login interface.