

Scope for Construction Site Time-Lapse Monitoring System

Introduction

As part of Sand Arabia's commitment to enhancing site monitoring and ensuring timely project completion, we are planning the implementation of a Construction Site Time-Lapse Monitoring System. This system will utilize strategically placed cameras to capture images from multiple locations and angles across the construction site. The images will be analyzed and processed to provide real-time insights into daily progress, enabling better decision-making and more efficient project management.

Benefits to Sand Arabia

- **Enhanced Project Oversight:** The system will provide real-time insights into daily progress across all construction sites, enabling better decision-making and quicker identification of potential issues.
- **Improved Communication:** With automated notifications and easy video sharing, stakeholders can stay informed and collaborate more effectively, reducing the risk of miscommunication and delays.
- **Resource Optimization:** By automating monitoring processes and providing detailed reports, the system will help optimize resource allocation and reduce the need for manual site visits.
- **Security and Accountability:** The secure login and role-based access controls ensure that sensitive project data is protected, while the detailed activity logs provide accountability for all actions taken within the system.

System Features and Functionalities

Administration Panel

1. Login

- **Secure Access:** The Admin Panel will offer a secure login system with robust authentication methods, including two-factor authentication (2FA), ensuring that only authorized personnel can access the system.
- **Role-Based Access:** The system will allow different levels of access for different roles within the company, ensuring that users only access the features and data relevant to their responsibilities.
- **Session Management:** The system will maintain secure sessions, with automatic logout features to prevent unauthorized access.

2. Client Management

- **Project Site Management:** Admins can create and manage profiles for each construction site, including assigning cameras, setting up monitoring schedules, and designating site managers.
- **Multiple Project Management:** The system will support managing multiple construction projects simultaneously under a site, allowing admins to easily switch between projects, manage different timelines, and allocate resources efficiently.
- **User Management:** The system will allow the creation and management of user accounts for site managers, engineers, and other stakeholders, with customizable access levels.

3. Camera Management

- **Camera Profile:** Each camera can be named based on its location and angle, ensuring easy identification and reference. For example, cameras can be named “North-West Corner - Ground Level” or “Crane View - Tower 1.”
- **Picture Taking Frequency Settings:**
 - **Configurable Intervals:** Admins can set the frequency at which each camera captures images, ranging from real-time to hourly or daily intervals, based on the project's monitoring needs. These intervals can be configured role based.
 - **Event-Triggered Captures:** The system can be configured to capture images based on specific triggers, such as significant movement or the completion of a certain construction phase.
- **SDK Integration:** The system will integrate with the camera's SDKs to ensure compatibility and to leverage advanced features like zoom, pan, and tilt. This integration ensures that all cameras work seamlessly within the monitoring system.
- **Multiple Camera Viewing via Split Screen:** The system will allow the simultaneous viewing of multiple camera feeds on a split screen, enabling a comprehensive overview of the construction site from various angles.
- **Camera Offline Notifications:** The system will automatically notify admins if any camera goes offline, ensuring prompt action can be taken to resolve the issue.

4. Notification Management

- **Real-Time Alerts:** The system will send real-time notifications to relevant stakeholders when certain events occur, such as when a camera captures images that meet specific criteria or when cameras go offline.

- **Scheduled Notifications:** Daily or weekly progress summaries can be automatically generated and sent to stakeholders, keeping everyone informed of the project's status.
- **Multiple Channels:** Notifications can be sent via email, SMS, or push notifications to ensure that stakeholders receive critical information in a timely manner.
- **Storage Capacity Alerts:** The system will notify admins when image data storage capacity is nearing its limit, allowing for timely management and optimization of storage resources.

5. Image Processing

- **Image Capturing Interval:** Admin can define the intervals at which images are captured, allowing for flexible monitoring schedules that can be tailored to the specific needs of each project.
- **Time Lapse Video Generation:** The system will support the generation of time-lapse videos from the captured images, providing a dynamic and condensed view of the construction progress over a specified period.
- **Image Comparison:** The system will allow users to compare images captured at different times, highlighting differences and changes in the construction site, which can be crucial for tracking progress and identifying issues.
- **Image Markup:** Users will be able to annotate and markup images, adding notes or highlighting specific areas, making it easier to communicate observations and instructions. Also images can be water marked with company logo.
- **Image Sharing:** The system will facilitate easy sharing of images with stakeholders, either via secure links or through integration with other collaboration tools, ensuring that everyone stays informed and up-to-date.
- **Public Access (Non-Restricted Link):** For projects requiring broader visibility, the system can generate non-restricted public links, allowing access to images or videos without requiring a login, while still maintaining control over the content shared.

6. Video Generation

- **Date Range Setting:** Admins can set limits on the date range for which videos can be generated, ensuring that the system's storage and processing resources are used efficiently.
- **Video Expiry Time:** Generated videos will have a defined retention period, after which they will be automatically deleted or archived to save storage space. Admins can customize these settings based on project needs.

- **Project Timeline Video:** The system will allow the creation of comprehensive project timeline videos, compiling footage from the start to the current stage of the project, providing a visual narrative of the construction progress.
- **Share Video:** The system will allow videos to be easily shared with stakeholders via secure links or email, with permissions to ensure only authorized users can view or download the content.

Client Panel

1. Login

- **User Authentication:** The Client Panel will have a secure login system to ensure that only authorized personnel can access site data and video footage.
- **Access Logs:** Clients can view their login history, including timestamps and IP addresses, providing an additional layer of security and transparency.

2. Forgot Password

- **Password Recovery:** Clients who forget their passwords can reset them via a secure process, which may include answering security questions or receiving a verification code via email or SMS.
- **Password Change Notifications:** Once a password is reset, the system will send a confirmation notification to the user, ensuring that unauthorized password changes are immediately flagged.

3. Generate Video

- **Date Range Settings:** Clients can select specific date ranges for which they want to generate a video, ensuring they have the visual documentation they need for any given period.
- **Specific Camera Selection:** The system allows clients to choose which cameras to include in the video generation process, giving them control over which site areas are covered in the footage.
- **All Camera Selection:** For comprehensive site monitoring, clients can opt to generate videos that include footage from all available cameras, providing a complete overview of the site's progress.
- **Time Lapse Video Generation:** Clients can generate time-lapse videos that compress days, weeks, or even months of footage into a short, concise video, providing a quick overview of the project's progress over time.

Mobile Applications

- **Mobile Application (Android & iOS):** A dedicated mobile application with limited features will be developed for both Android and iOS platforms, allowing users to access the system's features on the go. The app will offer real-time notifications, image viewing, video generation request, and report access, ensuring that stakeholders can monitor progress and manage projects from anywhere.

Server Storage Calculations .

For Onsite Deployment there must be calculations for number of cameras as per their image quality and time requirements .