Implementation of Vehicle Safety Management System in Ghoraburhani Sagasahi Iron Ore Mines (AMNS INDIA)

Danveer

Introduction:

The main purpose of developing a Vehicle Safety Management System mobile application for Heavy Earth Moving Machinery (HEMM) in mines is to enhance safety, streamline monitoring and reporting processes, and mitigate potential risks associated with these large and powerful machines. It can generate real-time alerts when any parameter exceeds safe limits, helping operators and supervisors respond swiftly to potential dangers. The app sends notifications to operators, maintenance teams, and supervisors when scheduled maintenance or safety inspections are due, reducing the risk of equipment failure. The app generates automated safety reports, reducing paperwork and the risk of errors. Supervisors, safety officers, and managers can access safety data and alerts remotely, providing them with better oversight of HEMM operations.

Approaches, Target Set, Measured & Achieved:

Developing a fully automated and digital platform for ensuring safety checking and generating reports in PDF and Excel formats is a significant step in improving safety compliance, reducing paperwork, and enhancing efficiency. Here's how the system aligns with your objectives:

a. Automated Safety Checking: The system provides a digital checklist that inspectors must complete during safety checks. It includes built-in validation checks to ensure that all required safety fitments and braking system checks are performed as per DGMS guidelines.

b. Report Generation: After the safety check, the system automatically generates reports in both PDF and Excel formats, including all relevant data and photographs. This significantly reduces the time and effort required for manual report creation.

c. Report Sharing: The system automates the distribution of generated reports to the concerned persons, ensuring that they receive the information within the stipulated time. Email alerts can be sent to relevant parties with the attached reports.

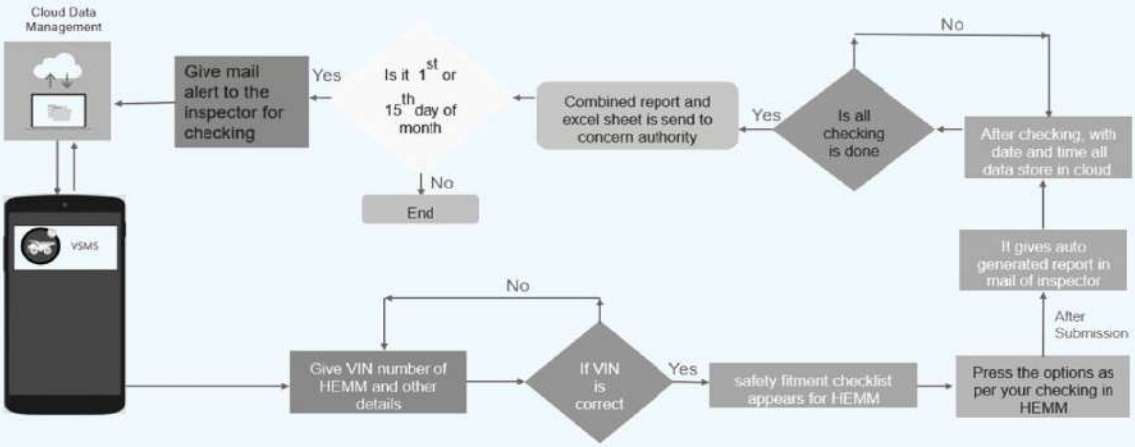
d. Data Storage: All safety check reports, and historical data are stored in a secure digital platform that is accessible from anywhere and at any time. This allows for easy retrieval of past records, simplifying compliance monitoring and audits.

Mechanical Maintenance

Arcelor Mittal Nippon Steel India Pvt. Ltd Sagasahi Iron Ore Mines

e. Scheduled Safety Checks: The system sends automated email alerts to the inspector two days before the scheduled safety check, ensuring they are prepared and aware of their responsibilities.

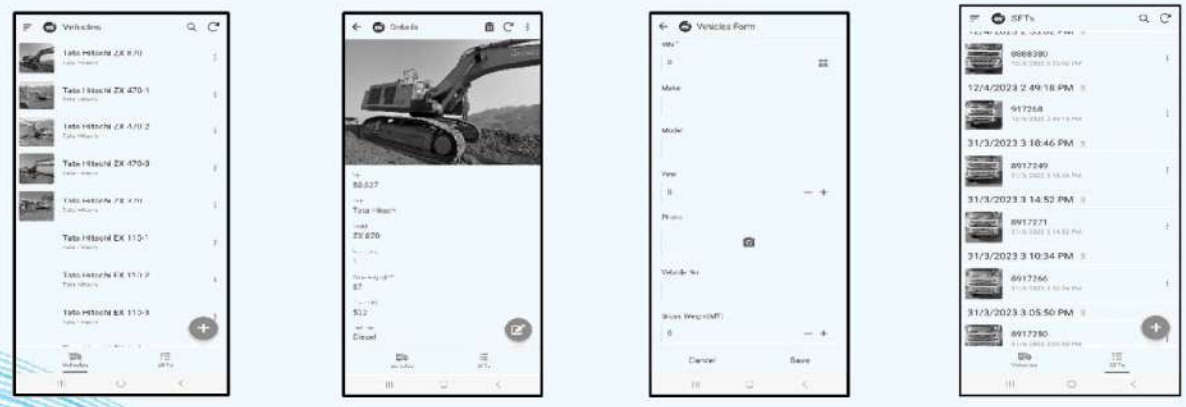
Process Flow Diagram:



Software Building:

Kotlin is an expressive and concise programming language that reduces common code errors and easily integrates into VSMS apps. To build this app, we started with Kotlin to take advantage of its best-in-class features. When building new Android development tools and content, such as Jetpack libraries, samples, documentation, and training content, we will design them with Kotlin users in mind while continuing to provide support for using APIs from the Java programming language.

VSMS Interface:



Results:

A thorough examination of current practices and concerns. To address the difficulties, we chose to use automation and digitalization. As per our requirements, we approached many outside providers to automate and digitize the process. A feasibility analysis was performed between the costing and the requirement. To tackle the difficulties within 30 days, it was decided to create a mobile application called VSMS by ourselves using programming. We ensured 100% statutory compliance by performing safety tests every two weeks.

Conclusion:

- We ensured 100 % statutory compliance by doing the safety checks in each fortnightly.
- Fully digitalized and automated platform by which we capture & share the reports of safety fitment checks automatically.
- Auto-alerting to inspector to do safety check well before schedule time so that chance of lapses is minimized.
- We get the detail history report of each equipment as & when required.
- Safety checking time reduced to 3 minutes per HEMM from 8 minutes per HEMM, thus save time and paperwork due to avoiding of manual and paper-based system.

References:

- R. Coppola *et al.*
  Characterizing the transition to kotlin of android apps: a study on f-droid, play store, and github Proceedings of the 3rd ACM SIGSOFT International Workshop on App Market Analytics (2019)
- L.M.T. Victor L. de Oliveira
  On the adoption of kotlin on android development: a triangulation study 27th IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER 2020)
  (2020)
- R. Coelho *et al.*
  Exception handling bug hazards in android Empir. Softw. Eng. (2017)
- S. Hellbrück
  A Data Mining Approach to Compare Java with Kotlin (2019)
- B. Góis Mateus *et al.*
  An empirical study on quality of android applications written in kotlin language Empir. Softw. Eng. (2019)
- E. Gamma *et al.*
  Design Patterns: Elements of Reusable Object-Oriented Software (1994)
- VV.AA.
  Kotlin Language Documentation, v 1.3 Technical Report (2018)