VISUAL ANALYTICS SOLUTIONS

Ensure Quality and Security with Image Processing Technology

Quality Use Cases (Trust.AI)

CONTENTS

1 Introduction

About BLP Industry.AI

Industry.AI is an Enterprise AI and Industrial IoT company driving digital transformation across industries. It provides an end-to-end solution, from installing IoT devices for customers through to providing insights using big data analytics to drive productivity. The company provides an AI platform ("Orion") that houses a wide array of proprietary algorithms to drive this digital transformation. These AI-based products include asset health and predictive maintenance, inventory management, supply chain optimization, asset tracking, performance monitoring, and energy efficiency. In addition, the platform provides visual analytics-based solutions to detect safety breaches, surveillance, and manufacturing defects.

Visual Analytics

Visual Analytics is soon going to be the new standard for security, safety, video surveillance and many more real-time needs. The recent developments in the field have proven the fact that industry-ready solutions are real and have been automating many manual activities. Industry.AI has developed the Trust.AI platform in such a way that this addresses most of the relevant use cases as demanded by industrial clients.

PRI is looking forward to leveraging the power of analytics on the video and image feeds captured in various cameras in order to enhance the safety measures prevailing at the workplace. BLP Industry.AI is given the project to automate the use cases using visual analytics-based solutions thus reducing the manual dependencies and interference. This in turn reduces the cost of operations, reduces the human error possibilities, and gives an edge in the business.

With the Trust.AI solution in place, all the feeds can be screened by the models deployed in the platform and alerts and notifications will be identified, raised, and logged by the Solution itself.

Trust.AI Solution

Trust.AI is a platform developed and designed to address critical business use cases for industry segments. There are billions of cameras and sensors worldwide, capturing an abundance of data that can be used to generate business insights, unlock process efficiencies and improve revenue streams. Whether it's at a traffic intersection to reduce vehicle congestion, health and safety monitoring at hospitals, surveying retail aisles for better customer satisfaction, sports analytics, or at a manufacturing facility to detect component defects- every application demands reliable, real-time Intelligent Video Analytics (IVA).

Trust.AI takes the streaming data as input from cameras and uses AI and computer vision to generate insights from pixels for a better understanding of the environment. Trust.AI is the

foundation layer for the majority of the visual analytics-based solutions like monitoring employees without masks or safety shoes and detecting fire and smoke at an earlier stage to avoid hazards and accidents.

Trust.AI is highly flexible and uses many customized solutions for Videos and Images including those that are available in open source. We use state of art object detection models such as YOLO.

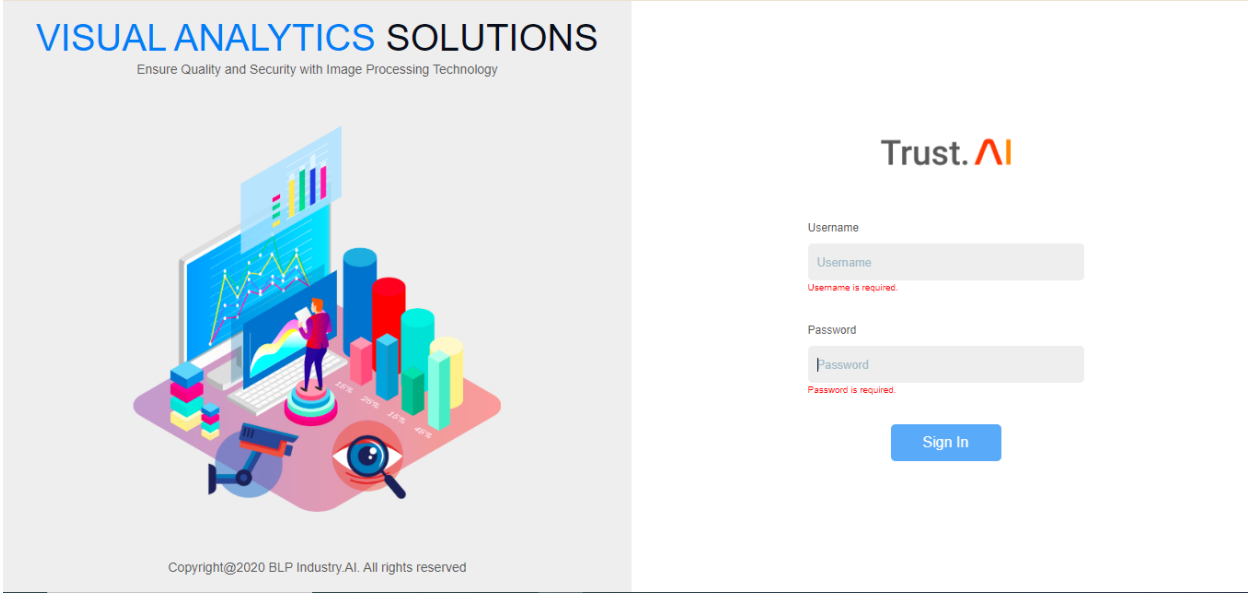
2 Logins and Access

The users can log in to our Web application using the following
URL: https://stl-trustai-platform.web.app/login
User-credential- user id
Password- password

Users have 2 types of access.

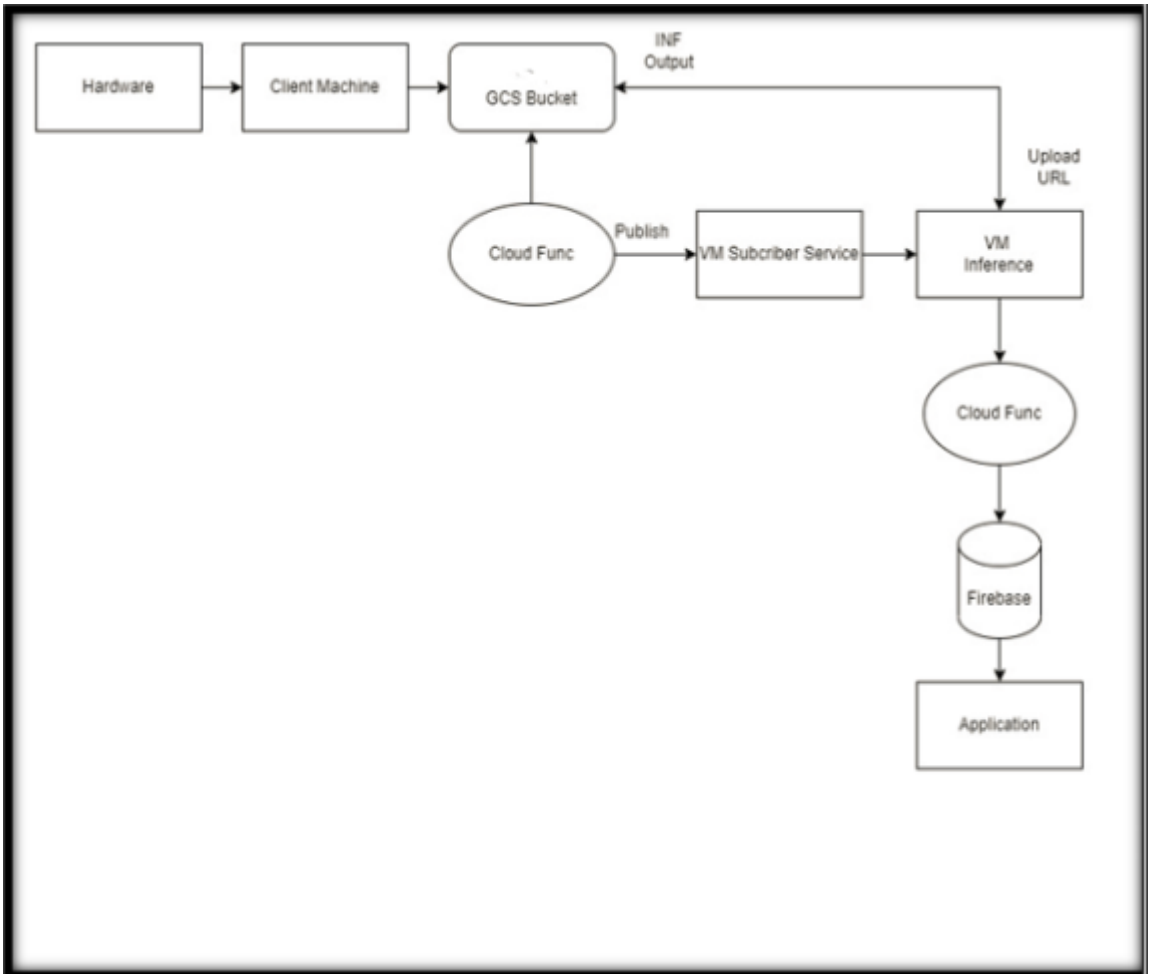
1. **Super admin access** – This user has access to all the plants and can view the alerts and reports of each plant

2. **Plant level access** – This user has a login that is plant-specific and can view alerts or generate reports only of that particular plant



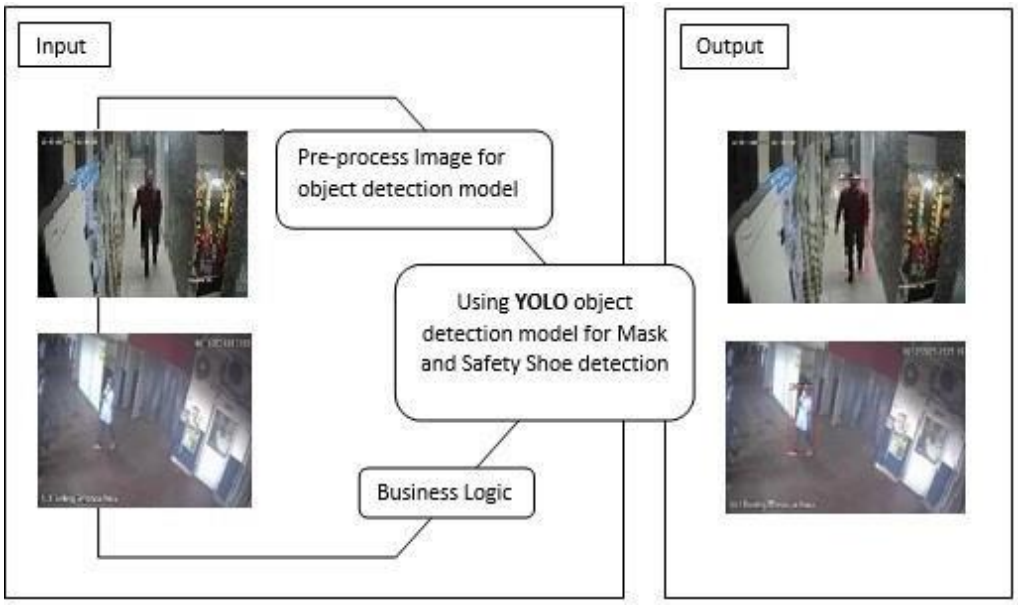
3 Solution Design & Approach

The design flow of capturing violations and alerting is as shown in the below figure.



- Live feed from the camera/NVR is streamed continuously to our inference engine in the AI Server

- All the feeds are screened by the models deployed in the inference engine and in case of any violations, that particular frame will be captured and uploaded to GCS bucket


Input
Pre-process Image for object detection model
Using YOLO object detection model for Mask and Safety Shoe detection
Business Logic
Output

- The concerned individuals are notified immediately through the mail which comprises of a URL to the alert image
- The alert images are also uploaded to Fire store, through which the alerts can then be visualized in the Trust.AI Pro Web application that raises a notification whenever a new alert is generated

Architecture approach

Security: The ability to protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies.

Reliability: The ability of a system to recover from infrastructure or service failures, dynamically acquire computing resources to meet demand, and mitigate disruptions such as misconfigurations or transient network issues.

Performance Efficiency: The ability to use computing resources efficiently to meet system requirements, and to maintain that efficiency as demand changes and technologies evolve.

Cost Optimization: The ability to avoid or eliminate unneeded costs or suboptimal resources.

Operational Excellence: The ability to run and monitor systems to deliver business value and to continually improve supporting processes and procedures.

Defects type we need to identify:

- Layer out
- Cross Binding
- Bad Binding Bobbin
- Bad Binding Machine
- Coat Bubbles
- Uneven coating
- Finger impression on fiber surface
- Loose Binding
- Hard Binding
- Side Gap
- Damaged Fiber

- Dent machine
- Color loss on top
- Color loss on whole length
- Speckles
- Scratch on the top
- No Bottom End
- Short Bottom end
- Dust Bobbin
- Bobbin NOK
- Whitish
- Yellowish
- Sticky Coating
- Lumps
- Multiple end
- Dent Manual

Dashboard and Reporting:

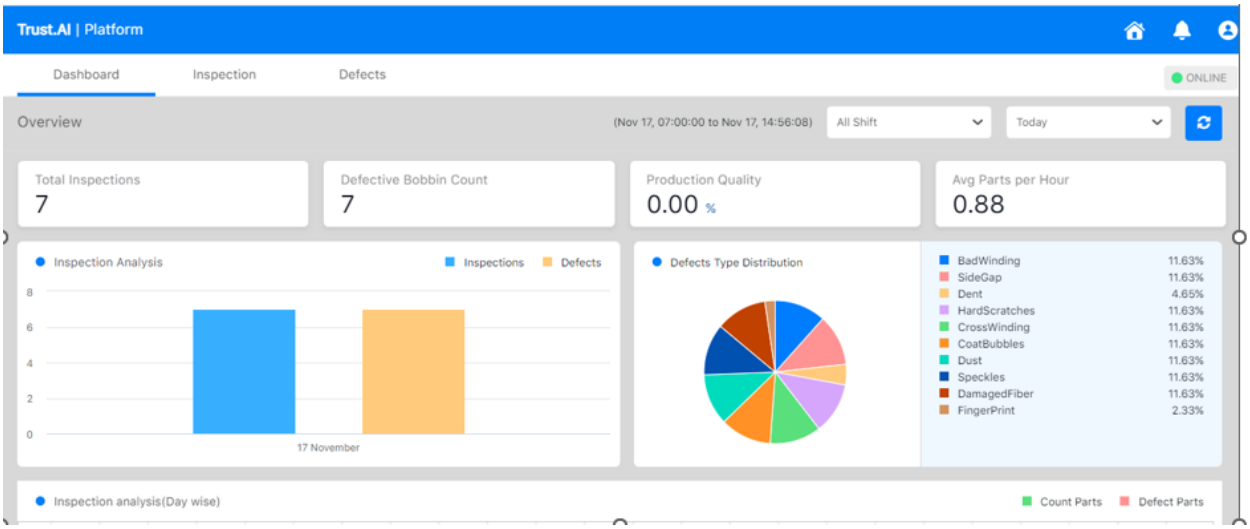
Following is the Dashboard, which gives an overview of the number of cameras, the cameras with active feed, trends for day-wise and camera-wise alerts and metrics for the day. The trends are displayed based on your filter selection, i.e., the user can select the required Shifts, and Today, yesterday, last 7 days, This Month and last month as per customer requirement.

Apart from that we have 4 different KPI:

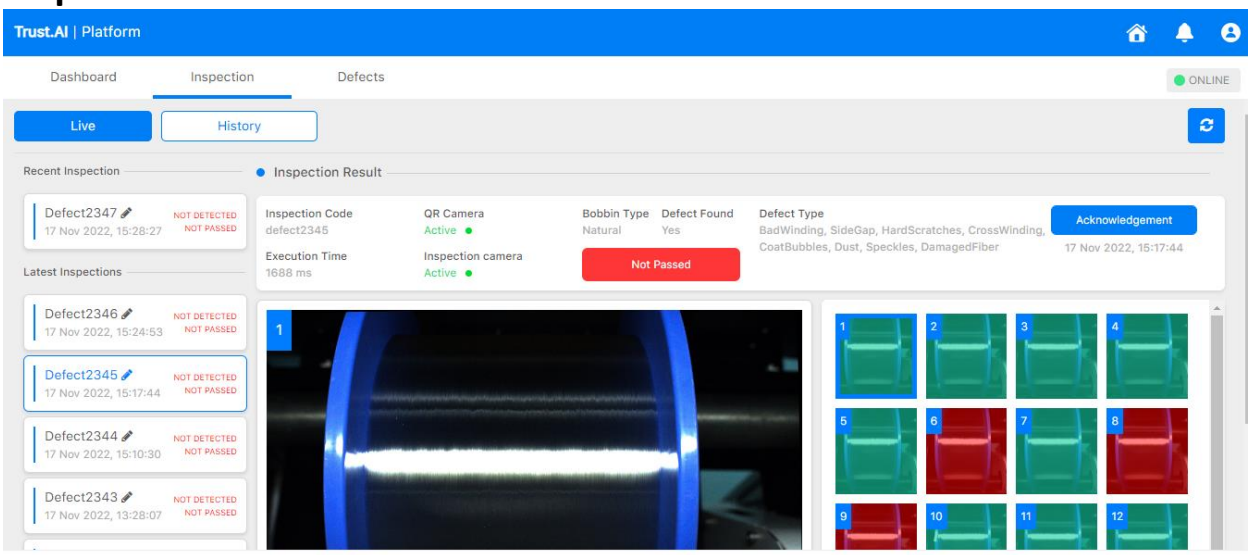
- Total inspection
- Defective Bobbin Count
- Production Quality
- Avg parts per Hour

Here we are showing Inspection analysis in Graph which is giving clear idea about how much inspection happened during time interval and how much defective bobbin identified by our Model.

Defects Type Distribution: Here we are showing the distribution of defects in pie chart in percentage. Each type of defect listed in with different color coding.



Inspection:



In this page we have two types of data:

- ❖ Live
- ❖ History

In live page images and barcode details of the bobbing will display we trigger will be run that is called inspection as well. In this page we can see inspection code, Execution time, Camera status (Active or inactive) Bobbin type, defect found or not, Defects type and respective frames.

As per current model in each execution it should display 18-21 frames.

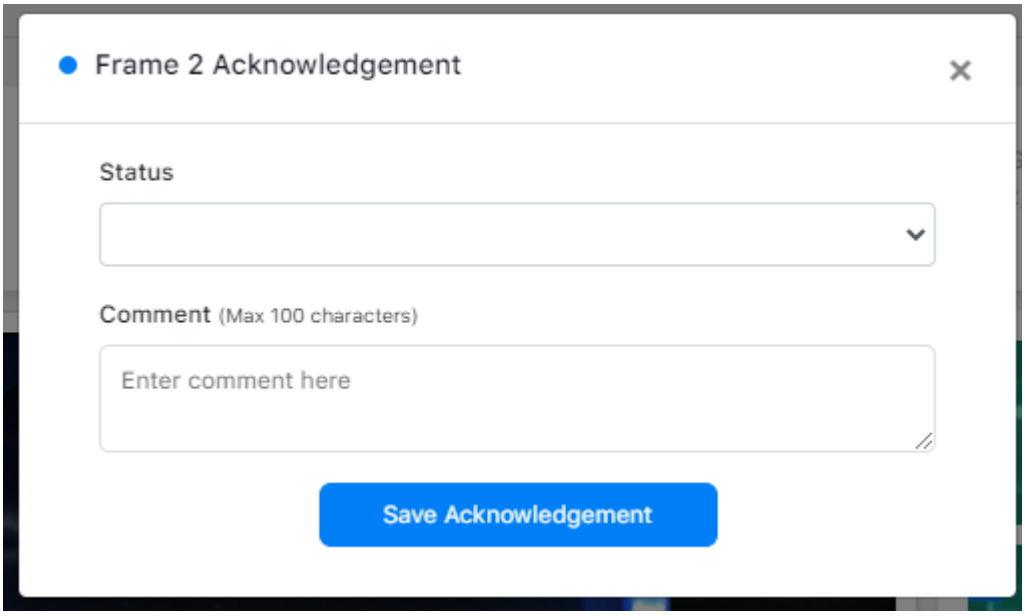
While validating we have to match the GCP backet data with application data and it should match 100%

Acknowledgement functionality: With this functionality operator can acknowledge the the defects found by model is correct or not:

Steps to acknowledgement:

4. Click on Acknowledgement button
5. Select the Status (Acknowledge/Not Acknowledge)
6. Enter the comment

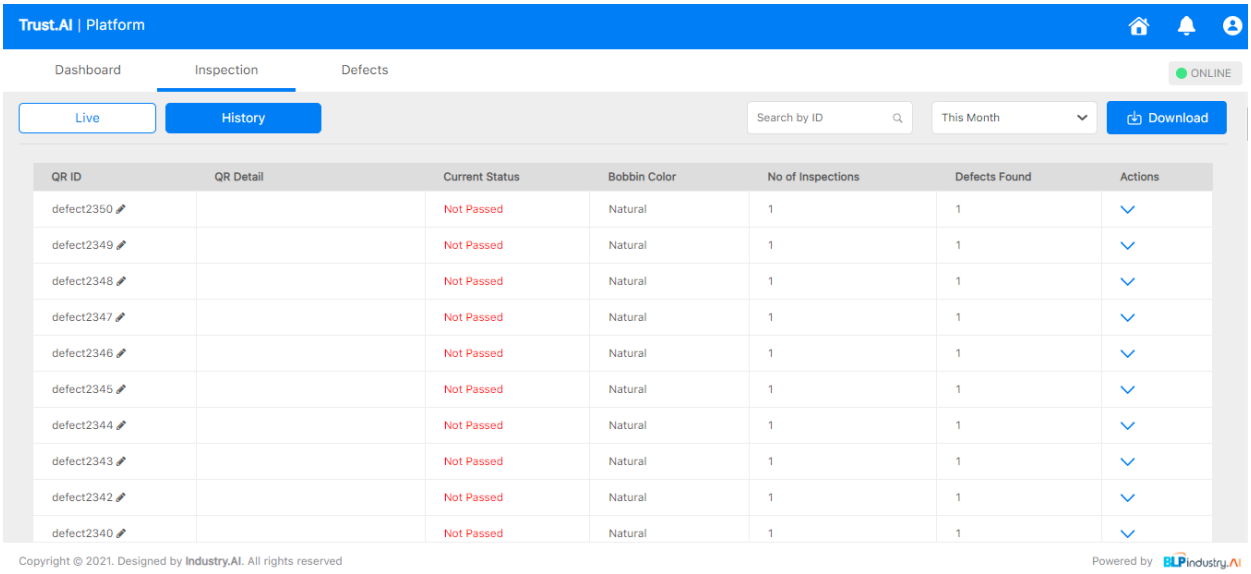
7 Click on save Acknowledgement



Acknowledgement we can do frame wise: In Latest inspection page we can see last 6 inspection done by operator.

History:

In this page we can see detailed history of Inspection of Bobbin.



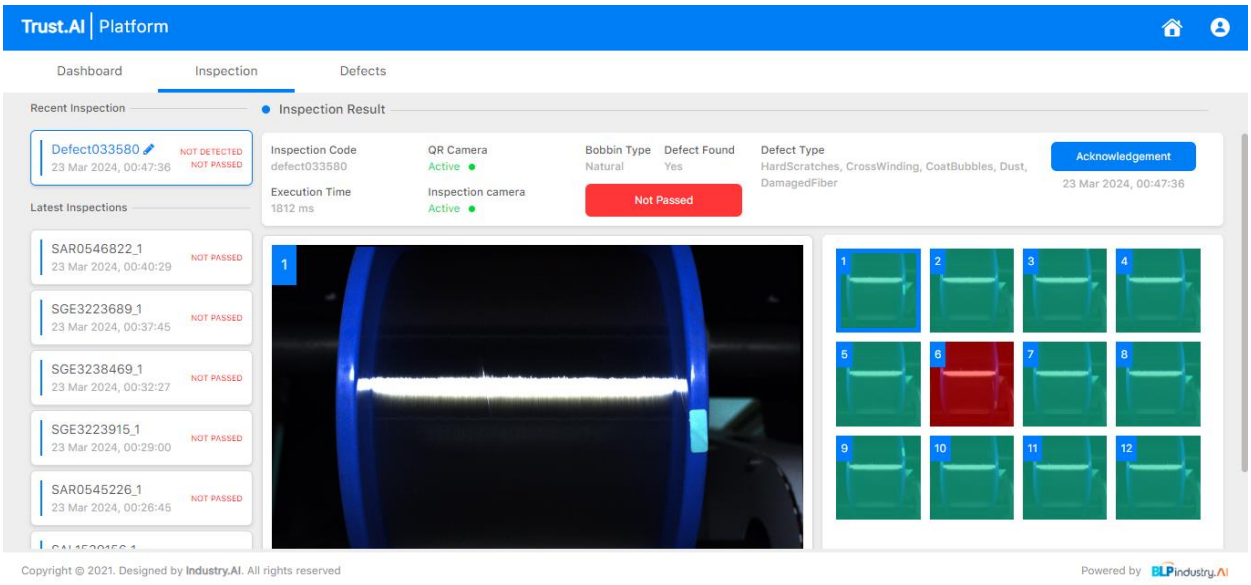
Here we can see overview of Barcode code, current status, Bobbin color, no of inspection done, Defects found and Action.

We have a droop-down functionality to see the data for This month,

last month and we have also functionality of custom date selection. We have search functionality as well to search the Barcode id. With download functionality we can download the history data in excel format.

When we click on details page, we can see the full bobbin image Folder name where image is uploaded, Date and time of execution, Total execution time, Defects type, Frame Acknowledgement.

Below is the screenshot for this page:

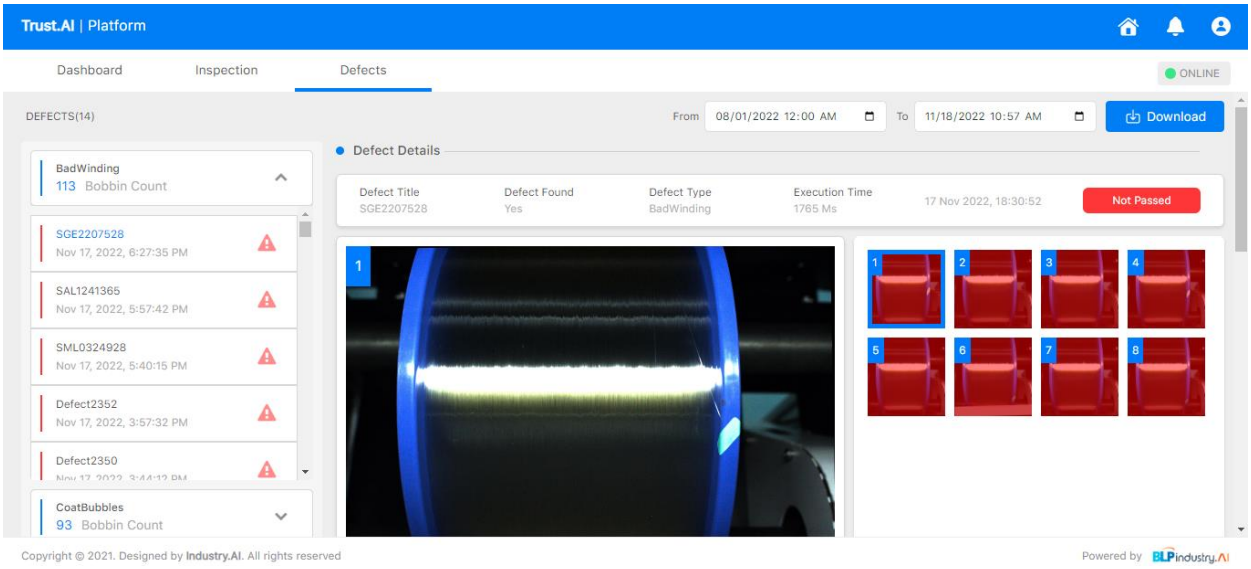


Defects:

In this page we can see Defects Details Like Defect Title, defect found, Defect type, Execution time,

We have time range selection for history data. We can see the list of defects type in left side with execution date and time. There is also Bobbin count for each defect.

We are representing the passed and not passed bobbin. Passed is if there is no defects and not passed means there is some defects found it may be any type of defects like coat bubbles, hard Scratch, Dent ETC.



KPI Formula:

Total Inspection: No of inspection done on that particular time range

If we are selecting shift wise each shift having 8 hours and shift timing is mention in dashboard. Shift A will start from 7 AM - 3PM. Shift B will start from 3PM- 11 PM and shift C will start from 11 PM- 7 AM. If we select current month in time range selection drop-down it will display the data with current date and time. In calculation we have to take hours and minute as well.

Defective Bobbin count: It is the count of defective Bobbin while inspection. For example, we have done the inspection of 30 Bobbin and we found 5 defective bobbins so our **defective Bobbin count** will be 5.

Production Quality: $\frac{(\text{Total Inspection} - \text{Defective Bobbin Count}) * 100}{\text{Total Inspection}}$

Average parts per Hour: $\frac{\text{Total Inspection}}{\text{Total Time (Hr.)}}$

Technologies Used:

Front End: Angular
API Backend: Node JS
Image Processing: Python
Database: Firebase

…… **Thank You**……