AUTOMATED VEHICLE INSPECTION LAYER STORAGE AND DATA ESTABLISHMENT STRUCTURE

Project Reference No.: *47S_BE_3818*

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Keywords:

Centralized Storage, Data Digitization, Data Accessibility, Quality Control, Python-based System

Introduction:

The project evaluates the impact of the 'Automated Vehicle Inspection Sheet Storage and Data Management System' in addressing complex issues related to manual automobile inspection check sheet management. The conventional process involved collecting two check sheets per vehicle (for the left-hand and right-hand sides), which led to manual sorting, filing, and storage challenges, including misplacement, damage, and time inefficiency during segregation. Additionally, decentralized storage hindered access to specific sheets for defect investigation. To overcome these challenges, the project introduces an innovative Python-based system with frontend and backend functionalities. This system automates the entire process, digitizing check sheets, extracting body details and dates, and centralizing data storage. Notable features include a user-friendly interface for specifying criteria such as date ranges and body numbers, enabling quick and efficient retrieval of stored check sheets. By streamlining the digitization process, the project enhances resource efficiency, reduces errors, and improves data accessibility, empowering automotive quality control teams with informed decision-making capabilities.

Objectives:

The objective of the "**Automated Vehicle Inspection Sheet Storage and Data Management System**" project is to create a comprehensive digital solution to address the inefficiencies and risks associated with manual handling of vehicle inspection check sheets. By implementing a Python-based system with front-end and back-end functionalities, the project aims to:

a. **Streamline Data Collection and Management:** Automate the digitization of vehicle inspection check sheets to reduce manual sorting, filing, and storage, thereby minimizing the risk of misplacement, damage, and data fading.

b. **Centralize Data Storage:** Establish a centralized repository for all inspection data, facilitating easier and faster access to specific sheets, and improving the ability to conduct defect investigations.
c. **Enhance Data Accessibility and Retrieval:** Implement a user-friendly interface that allows quick retrieval of stored check sheets based on various criteria, such as date range or body number, to expedite defect analysis and quality control processes.
d. **Improve Resource Efficiency and Productivity:** Reduce the time and effort required for manual sorting, filing, and data retrieval, allowing employees to focus on more strategic and value-added tasks, ultimately leading to improved productivity and reduced bottlenecks.
e. **Reduce Risk of Human Errors:** Minimize the potential for errors in data handling and misfiling through automation and digitization, thereby ensuring greater accuracy in inspection data and supporting informed decision-making in quality control.

Methodology:

Modern technology is used to digitize the inspection check sheets and extract important data including body information and dates. This solution dramatically increases resource utilization by expediting the inspection check digitalization process. Manual sorting and filing is no longer required, freeing up labor for more strategic and beneficial activities. Additionally, process automation lowers the possibility of mistakes brought on by manual handling, improving data accuracy. Perhaps most notably, this innovative strategy greatly improves data accessibility. The centralized database makes it possible to quickly retrieve particular inspection check sheets, which makes it easier to find and fix defects. This feature equips professionals in the business with accurate, effective, and knowledgeable quality control procedures. Users can enter particular criteria, like date ranges and body numbers, into the system's user-friendly interface to quickly retrieve relevant data.

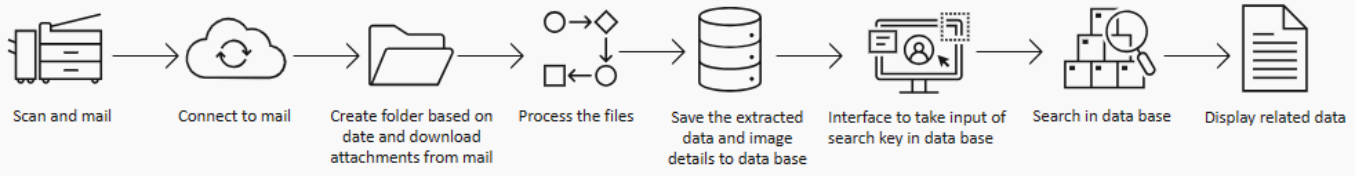


Fig 1- Solution work flow

Steps of storage implementation:

Step 1: Connect to mail and search for received mail form pre fed email id.

Step 2: Folder creation based on the date.

Step 3: Download the attachments from the mail and store in the folder created.

Step 4: Close the connection.

Step 5: Access the file, navigate through all the PDFs present.

Step 6: Convert PDF to image, apply image processing technique. Find the QR code and read the QR data.

Step 7: Establish a connection with data base if present, else create a data base.

Step 8: Store the date, file name, QR data and image path in the data base and in an excel file.

Step 9: Close the connection of database.

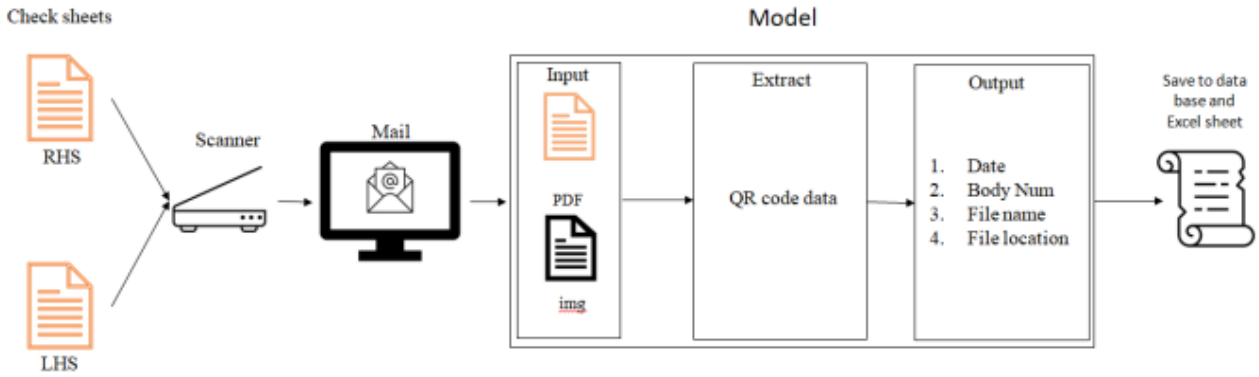


Fig 2. Flow chart of storage process

Steps of retrieval implementation:

Step 1: Establish the connection with the data base.
Step 2: Input the date frame and the body num.
Step 3: Check for the data match in the data base
Step 4: Once match found display the check sheets with that body num.

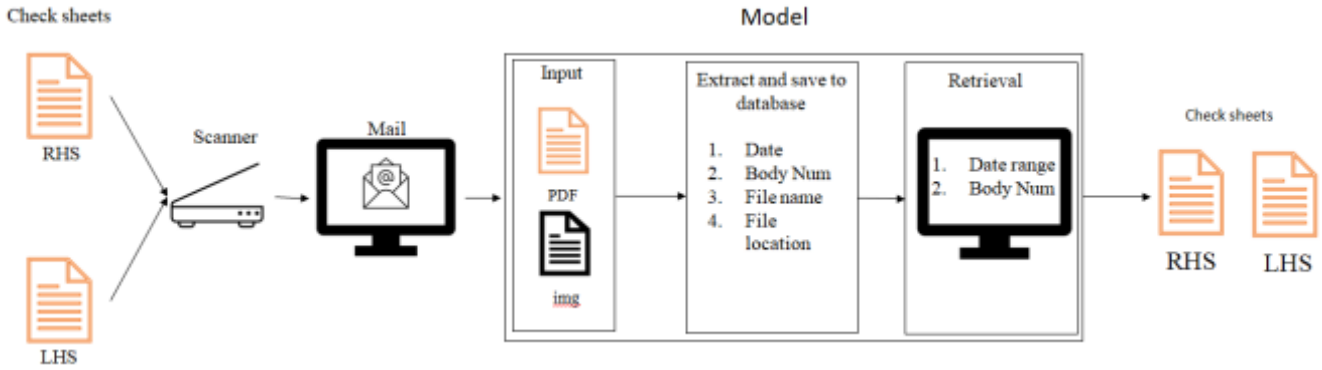


Fig 3. Flow chart for retrieval

Results and Conclusions:

a. Front page

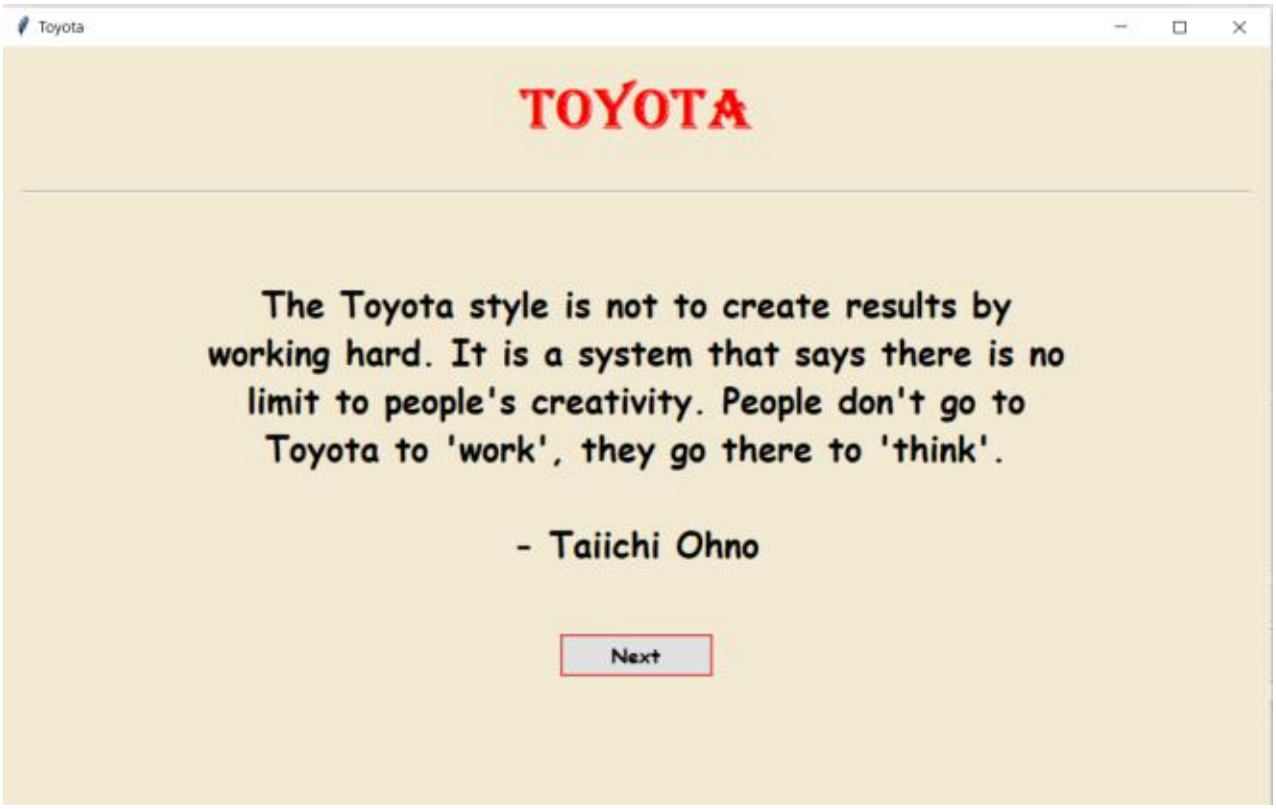


Fig 4- Front page

b. Second Page

Fig 5 - Second page

c. Process page

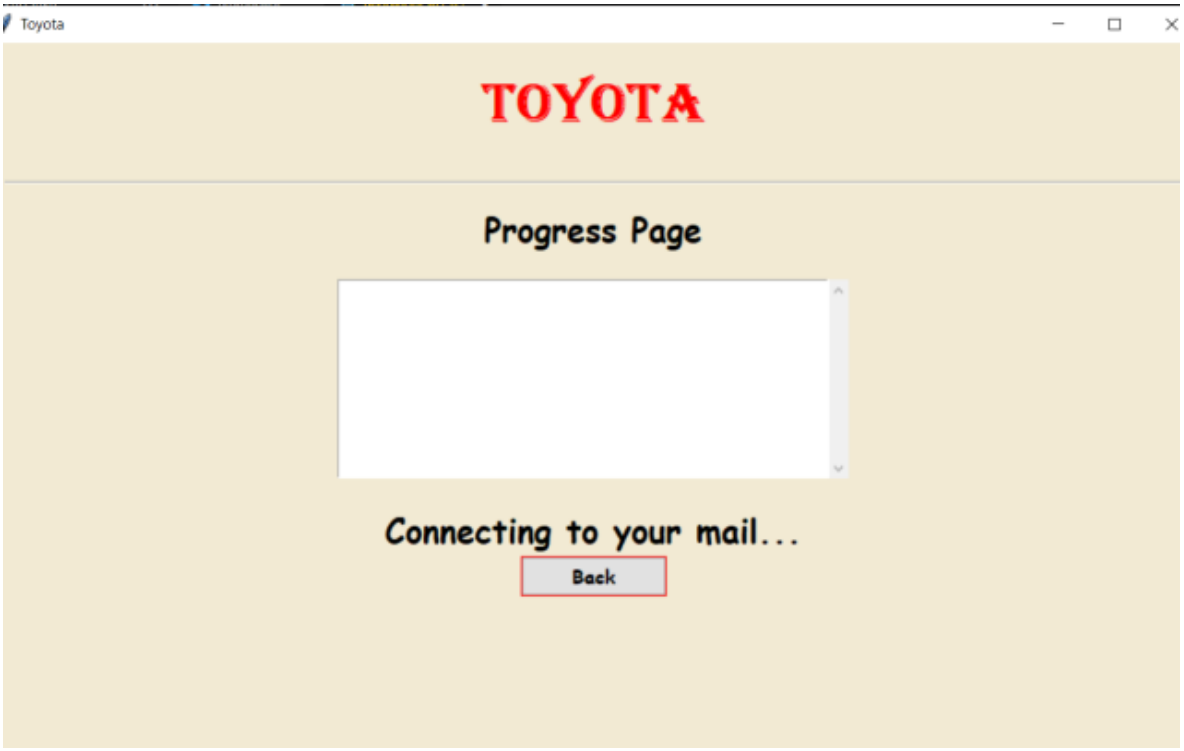


Fig 6- Main process page

d. Search Page

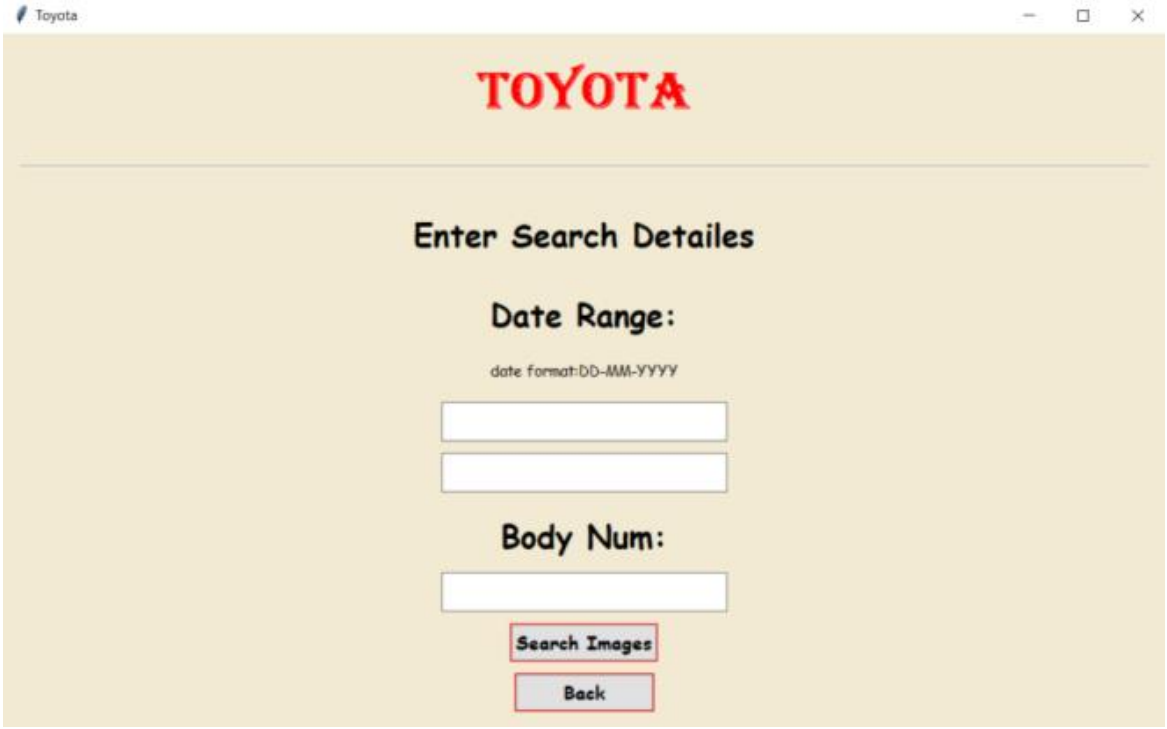
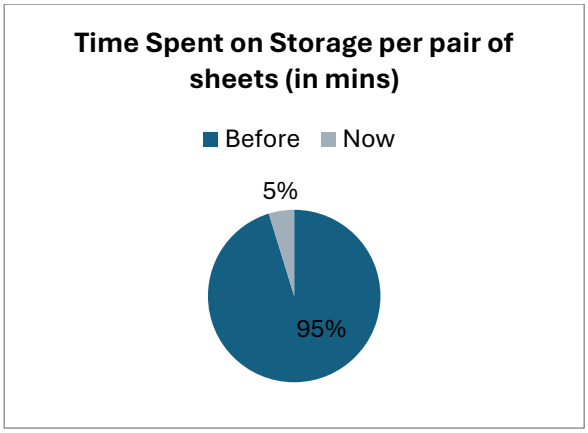
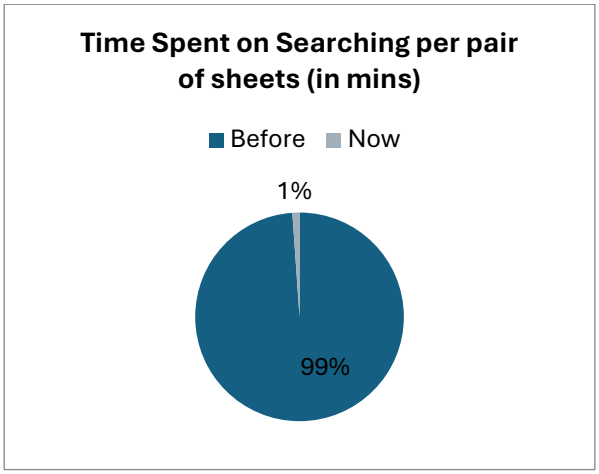


Fig 7- Search page

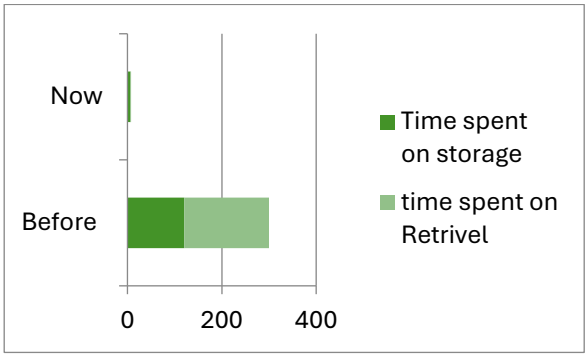
The project stands as a testament to the impact of technology on quality control in the automotive sector. By leveraging the capabilities of Python, this project has not only optimized operations but has also elevated standards in data management, workforce utilization, and time efficiency. It serves as a compelling illustration of how innovation can yield significant benefits, reducing costs, and enhancing overall quality within the industry.



Img 12- Pie Chart for Storage



Img 12- pie chart for searching



Img 13- Comparison Between Before and After Condition of the total process time taken in mins

What is the innovation in the project?

The innovation in the "Automated Vehicle Inspection Sheet Storage and Data Management System" project lies in the transformation of a traditionally manual and error-prone process into a streamlined, automated, and digitally-driven system.

key aspects:

f. Automated Digitization
g. Centralized Data Storage
h. Centralized Data Storage
i. Enhanced Data Retrieval and Accessibility
j. Reduction in Human Errors
k. Resource and Time Efficiency

Scope for future work:

- Future work could explore integrating the automated system with other quality control and production management systems within the automotive industry. This integration could facilitate a more seamless flow of data, enabling more comprehensive insights into vehicle manufacturing processes and quality assurance.
- Additional features for data analytics and reporting could be introduced to provide deeper insights into inspection trends, defect rates, and quality control metrics. This could help quality control teams identify patterns and make more informed decisions for continuous improvement.
- Developing mobile applications or interfaces for the system could increase accessibility for quality control teams, allowing them to retrieve and analyze inspection data on the go. This could be particularly useful for field inspections or remote teams.