

Drone Powered Automation of Warehouse Inventory and Yard Operations

By Tata Consultancy Services | Category: Implemented Innovations

TCS reimagined warehouse inventory operations to significantly improve the visibility of inventory stock verification and cycle counting operations and reduce the overall process turnaround time at the warehouse by employing smart autonomous UAV powered solutions. The smart autonomous UAV based solution is now extended to identify and locate trailers parked in associated yard areas, thereby providing a more comprehensive, end-to-end automation solution addressing use cases related to stock verification and counting, detection of damaged inventory, locating inventory in parked trailers in the yard and auto-reconciling the generated insights with the Enterprise Warehouse and Yard Management Systems.



The Context

Warehouses require continuous monitoring of inventory stock levels of various products and an accurate stock count is critical and fundamental to effectively meet the market demand. The current processes to ensure accuracy visibility is completely manual and employs use of forklift equipment to access / reach the inventory placed up to a height of 45 ft. at the warehouse locations. The continuous and all round usage of equipment and manual stock taking at warehouses (typically of the size of 500,000 to 2 million sq. ft. in area) was found to be time consuming, energy inefficient and fraught with human safety issues - thereby providing an opportunity to reimagine the entire processes through automation. Additionally, challenges were also identified in effectively locating and retrieving the right trailer parked in open yard areas in a timely manner, thereby slowing down distribution to the downstream supply chain consumers.



The Innovation

Deploying a Smart UAV driven automation processes has significantly reduced the overall process turnaround time while improving the visibility of inventory at the Warehouse locations, in identification and location of trailers at the yard while positively impacting the overall process efficiency, human safety aspects and reduced energy consumption requirements. Two key challenges were addressed by the current solution leveraging Smart Aerial Autonomous Drones (UAVs) at the Warehouse and associated Yard areas through effective end to end process automation:

Reimagining Inventory stock verification, cycle counting and reconciliation processes

Reimagining yard operations using Unmanned Aerial Vehicles (UAVs / autonomous drones) by identifying and locating trailers parked in open yards.



Overcoming Challenges

Not having ready access to a live warehouse to continuously iterate, test and engineer solutions, identifying and evaluating right commercial off-the-shelf hardware (drone and associated payloads) to build a fit-for-purpose solution, continuously improve the sophistication of autonomous flights / processing automation to run the solution while working within the capabilities provided by the state-of-the-art COTS hardware.

A simulated warehouse environment was further set up at TCS Bangalore and Cincinnati, US (ready warehouse space was immediately available for use). Various drone hardware vendor OEM portfolios were independently evaluated against the required solution architecture principles and capabilities to identify the best match of hardware and payload. Capabilities for automation towards autonomous flights were built leveraging the TCS R&I work from the embedded systems & robotics and machine vision labs.

Impact of the Innovation

expected revenue impact

\$2.9 mn