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PHYSICAL INVENTORY SYSTEM USING DRONES

BY

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INDUSTRY APPLICATION

- Empty Bin Validation
- Physical Inventory Count
- Yard Management

CAPABILITIES OF DRONE

- High resolution camera for crisp and clear images with Aerial Stabilization Technology
- Long operation range
- Contains an Inertia Measurement Unit that records and relays even the smallest changes in tilt and movement.
- Access real time video feed with an exclusive transmission frequency between the Controller and the drone.
- Altitude and ultrasonic sensors to avoid crash.

INTRODUCTION

In today's world, where organizations are thriving to achieve 24x7 operability in warehouses, processes like physical counting often require shutting down warehousing operations for days. Prohibitive opportunity costs and high manpower costs are driving organizations to avoid, in totality, activities and processes such as cycle count and physical inventory that do not add any direct value to the customer service. With the exception of fully automated warehouses that require no human interaction and hence minimal margin for error, all warehouse operations across industries, globally, require such processes for maintaining accuracy of bin stocks that directly impact the speed of operations. This paper explores the concept of carrying out inventory counts in large warehouses and yards leveraging technological amalgamation of quad-copter drones, image processing and warehouse management system.

CHALLENGES IN MANUAL PROCESSES

Although the Inventory Counting is a critical process in warehouse operations, customers are seldom willing to pay for it. The key challenges in a manual process are:

- ▶ Manual physical typically requires atleast two warehouse resources, one with a lift truck to pull the load down from the rack and another resource to check the contents. This makes the process extremely inefficient that requires ~6 to 8 man minutes per pallet location and about 3 to 4 minutes
- ▶ Being a non-value add process in its truest sense, Physical Counting is often done during off-business hours, which means over-time pay, that further escalates the manpower costs
- ▶ Since the process is a manual in nature and performed during off-business hours, it is subject to amplified degrees of human error

A typical 3PL warehouse has about 13% empty bins at any point in time. If these bins can be validated for accuracy automatically, it will result in a saving of 40 man hours per week!



SOLUTION DESIGN

The solution leverages a professional drone that operates based on instructions issued by the warehouse management system. A brief workflow is as below:

WMS issues sequence of bins for which the inventory count needs to be carried out

These bin numbers are converted into co-ordinates from a predefined warehouse layout that the drone consumes.

During the flight path, the drone takes high resolution pictures of the bin –which will include Bin Number, Pallet LPN, and product bar codes.

The image processing engine, strips the digital information from these pictures and pushes it back to the WMS. If a specific format is not found in the data extracted, it commands the drone to take another image of the same bin.

The WMS then processes the data and notifies the supervisor if any discrepancies are found.

SUCCESSFUL USE CASES

- ▶ Validation of empty bins
- ▶ Bin number – Pallet LPN – Product mapping across the warehouse
- ▶ HU – Product mapping across the warehouse
- ▶ Location management in large pipes yard
- ▶ Yard management – truck identification in the yard

CONCLUSION

The usage of drones for executing Physical Inventory process in the warehouse has a potential of reducing the time consumption by almost 93%. Also, there are huge savings to be made in reducing the effort of manual barcode scanning of high shelves which is both time consuming, dangerous, and energy inefficient. In addition to these, the requirement of forklifts and handheld RF reader are also minimized which helps in cutting on the costs. In future, Drones will do other tasks as well like continuous inventory, searching for items, and once found will mark them.



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