PROJECT PROPOSAL

Prototype for Automated Carton Cycle Counting

Using Computer Vision and Drones

Murtaza Ali Khokhar

[*murtaza.khokhar@ebm.com.pk*](mailto:murtaza.khokhar@ebm.com.pk)

# Project Overview

This project aims to develop a prototype for an automated carton cycle counting system at EBM’s master carton storage facility at Port Qasim. The system will utilize drones equipped with computer vision (CV) technology to perform cycle counts of biscuit cartons. The goal is to enhance inventory accuracy, reduce manual labor, and improve overall efficiency in warehouse operations.

Manual cycle counting in large warehouses is often labor-intensive, time-consuming, and prone to human error. These challenges are particularly significant in a high-volume environment like EBM’s warehouse, where 2 million units of cartons are stored and moved regularly. Automating this process using drones and computer vision can significantly improve accuracy, speed, and safety, while also freeing up human resources for other tasks.

The prototype will serve as a proof of concept, demonstrating the feasibility and benefits of using advanced technologies like drones and CV for inventory management. It will lay the groundwork for potential full-scale implementation across the facility .

# Project Objectives

## Primary Objective

Develop and demonstrate a functional prototype of an automated carton cycle counting system using drones and computer vision.

## Secondary Objective

* Assess the accuracy and reliability of the system in a controlled warehouse environment.
* Identify potential challenges and limitations in the deployment of such a system.
* Provide insights and recommendations for further development and scaling.
* Produce a daily-use count cycle system that can cater to general human inaccuracies.

# Scope of Work

Requirement Analysis & Planning

* Define technical requirements for the drone and computer vision systems.

System Design and Prototype Development

* Design the system architecture, focusing on drone navigation, computer vision algorithms, and data processing.

Pilot Testing and Evaluation

* Deploy the prototype in a selected section of the warehouse.

Analysis, Refinement, and Reporting

* Analyze the results from the pilot testing phase, focusing on the system’s accuracy and efficiency.

# Deliverables

* A functional prototype of the automated carton cycle counting system using drones and computer vision.
* A detailed report on the prototype's performance, including accuracy metrics, operational efficiency, and identified challenges.
* Documentation of the system architecture, computer vision algorithms, and integration protocols used.

# Constraints

* The **resolution of the camera is dependent** on the available components, whether it being the camera attached to the drone or any external component attached to it.
* The **flight path, height and duration of the drone are not set** and are not expected to be of ready-to-use standard.
* The lighting needed for favorable images might need to be tested.
* The **accuracy** of the model deployed is expected to be in the **range of 70-90%**
* The size of the cartons is expected to be ***master-sized* and of a rectangular base area.**