

# TOP MOBILE VISION: Cloud Video for Waste Management

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## Introduction

Top Mobile Vision provides durable cameras and monitors for commercial vehicles, including trash and recycling trucks. TMV monitors and records images, GPS information, and captures cloud-based video recordings.

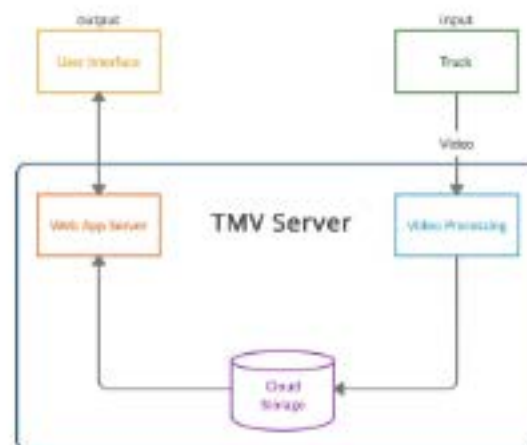
Currently, TMV has cameras attached to waste trucks and identifying numbers on trash bins, with video monitoring capabilities accessible via a remote system. Videos are stored with GPS coordinates in relation to each truck. If the truck's camera is offline, one cannot access the video stream of that truck.

## Objectives

The software solution that we create should detect a bin lift by extracting the bin ID from a video containing a bin with a QR code sticker attached. For 24/7 monitoring and information access, we should create a user-friendly web interface for TMV's customers.

Each user should be able to interact with the web application in a customizable way. For example, the customer service manager of a waste collection company should be able to track the status of a customer (that has 1 or more bins) so that they can verify whether it has been collected and when it will be collected next. Furthermore, the operations manager of a waste collection company should be able to have a dashboard-like view of the truck and its attached information so that they can easily search for key attributes of each bin. As a third example, the inventory manager of a waste collection company should be able to track the history and progress of bins so that they can report potential problems or metrics.

## High-Level Architecture



## Discussion

When we started this project, we were planning to use computer vision algorithms to detect the presence of a bin in a video. However, we discovered that with the available hardware, the cost of implementing such algorithms is high and not resource efficient.

After discussing this issue, we decided to use QR code stickers to achieve the same goal more efficiently.

## Expected Results

Our QR code solution should allow for near perfect bin detection accuracy, that is, ideally every bin that the camera sees should be identified by our software. The stickers should be durable and our solution should be scalable.

## Methods

- We create QR code stickers for each bin, which are more reliable than plain text.
- We transfer video files from trucks into cloud-based storage systems for fast and reliable access.
- Each bin is tagged by GPS location on a map for efficient searching.



## Future Directions

In the future, QR code stickers will be distributed to more bins to reach more customers, which will save time and resources, resulting in higher customer satisfaction.

Our web application could be expanded to a mobile application to provide easy access for customers on the go.

A real-time notification system could be implemented to alert customers on live events (web and mobile application).

Smart cameras could be installed on the trucks to recognize each bin and process its data before uploading it to our server. This has the potential to result in a faster turnaround time and more efficient solution.

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