# SPARROW

SGM 1/28



- Visited IKEA and Costco, and talked to employees about their inventory procedures
- Inventory taken every week (IKEA) or 2x a year (Costco) by pairs of people manually counting items. **Benefit of drones**: Huge potential savings (not paying 100s of workers overtime to work overnight)
- Potential problems for drones
  - Barcodes not visible, multiple barcodes per item, or handwritten barcodes
  - Shelves may have uneven heights
  - o Different items on a single pallet
- Common issue encountered by retail stores: Customers move and misplace items, making stock counts/locations inaccurate
- **Pain point**: Inventory counts in the system are not always up to date, especially during store hours, when customers can move items. Faster fix is needed for when customer requests a missing item.
- **Insight**: "Retail" stores/warehouses are less structured and prone to error due to customers as compared to "storage" warehouses. Each type of warehouse has its unique needs.



## **Inventory Stock Taking**

- Counting of on-hand inventory often by hand
- Mostly periodic as required for auditing or verification
- Warehouses: forklifts, barcode scanners
- Goal: moving from a periodic inventory model to a continuous inventory model

## Relevant Systems

- InventAIRy and DroneScan: automated mapping of warehouse environment and inventory identification via barcodes
- RFID reading drones for steel yards
- Kiva Systems (Amazon Robotics)
- Others

#### Software Market

- Warehouse Management Systems (WMS) market breaks down into four types of vendors
  - Application megasuite
  - Supply chain management suite
  - Specialists
  - Independent components
- SAP Extended Warehouse Management
  - Inventory tracking and management module



#### **Current Problems**

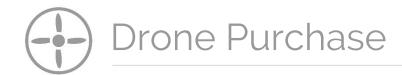
- Customers misplace items
- Full inventory sweep is time-consuming
- Highs cost associated with frequent counting
- Item retrieval is slow

#### Drone

- Fully automated navigation
- Path input
- Follow tape & input height
- Following a person
- Remote control

### **Computer Vision**

- CV-based counting of items
- Scanning barcodes
- Scanning RFIDs
- CV detection of item presence/absence
- Take photos for human inspection

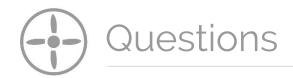


Bought a 3DR Solo, with the gimbal and GoPro HERO4

## **Features**

- Has a flight simulator
- 4K camera, 12 Mp photos
- 1 GHz Linux computer in controller
- Open-source SDK





- Any updates on warehouse contacts?
- Opinions/thoughts on VC presentation?



## @SparrowEng

