The Future of Mobile Robots in Logistics

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Interact Analysis
The Future of Mobile Robots in Logistics

Past

Present

Future?
Early Movers in Warehouse Robotics

• Founded in 2003
• First automated goods-to-person robot
• Customers included: The Gap, Walgreens, Staples, Gilt Groupe, Office Depot, Crate & Barrel, and Saks 5th Avenue
• Acquired by Amazon in 2012 ($775m)
• All customer contracts left to expire and no longer supported
• Amazon now only active user of Kiva robots.
• ~200,000 robots installed
Today’s Drivers of Growth for Mobile Robots

- Lack of available warehouse workers
- Consumer demands for faster, cheaper delivery
- Rising labor costs
- Proliferation of eCommerce
- Proliferation of omni-channel retail
- Changing buying habits & returns
Gap Left by Kiva Created New Approaches
AMRs for Order Fulfilment. Where are we today?

- Manual/humans
- Mobile/piece picking
- Person-to-goods
- Goods-to-person

Innovators | Early Adopters | Early Majority | Late Majority
AMRs for Order Fulfilment. Where are we today?

<table>
<thead>
<tr>
<th>Approach</th>
<th>Example Companies</th>
<th>Approx. # of deployments today</th>
<th>Approx. # of robots installed/site</th>
<th>Warehouse penetration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods-to-person</td>
<td>GreyOrange, Geek+, Swisslog</td>
<td>~50</td>
<td>20-200</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Person-to-goods</td>
<td>6River, Locus, Vecna</td>
<td>~25-50</td>
<td>~20-40</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Mobile Piece/Box Picking</td>
<td>inVia, IAM Robotics, Magazino</td>
<td>~10-20</td>
<td>~2-5</td>
<td>&lt;0.1%</td>
</tr>
</tbody>
</table>

Source: Interact Analysis
Investment in Mobile Robots Picks Up

Selection of Investments in Mobile Robot Companies

- **Fetch** - $20m
- **Seegrid** - $14m
- **OTT**O - $30m
- **Locus** - $25m
- **IAM Robotics** - $20m
- **inVia** - $9m
- **6River** - $15m
- **inVia** - $20m
- **GreyOrange** - $30m
- **Locus** - $16m
- **6River** - $25m
- **Geek+** - $150m
- **GreyOrange** - $140m
- **Fetch** - $25m
- **Seegrid** - $11.1m

Source: Interact Analysis © 2019 Interact Analysis
Opportunities for Mobile Robots

Processes

Cross-Dock  Order Picking  Case Picking  Replenishment
Pallet Conveying  Parcel Sortation

Robot Platform

Fork Trucks  Tuggers  Goods-to-person  Person-to-goods

Today: Just ~1.5% is automated

Rack  Case  Piece

FIND YOUR WOW
Forecasts for Mobile Robot Adoption

Estimated penetration rates of global warehouses

<table>
<thead>
<tr>
<th>Robot Configuration</th>
<th>2016</th>
<th>2018</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Piece Picking</td>
<td>&lt;0.1%</td>
<td>0.01%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Person-to-Goods</td>
<td>0.1%</td>
<td>0.4%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Goods-to-Person</td>
<td>0.1%</td>
<td>0.5%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Box/Unit Conveying</td>
<td>0.3%</td>
<td>1.6%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Pallet Conveying</td>
<td>0.4%</td>
<td>1.7%</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

Source: Interact Analysis
Mobile Robot Revenues

Forecast for Mobile Robot Revenues

- Mobile Piece Picking
- Person-to-Goods
- Box/Unit Conveying
- Pallet Conveying
- Goods-to-Person

Source: Interact Analysis
## Forecast Mobile Robot Shipments

<table>
<thead>
<tr>
<th>Form Factor</th>
<th>2018</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck-Load</td>
<td>20,897</td>
<td>136,859</td>
</tr>
<tr>
<td>Tugger/Pull</td>
<td>706</td>
<td>3,914</td>
</tr>
<tr>
<td>Forklift</td>
<td>2,112</td>
<td>10,051</td>
</tr>
<tr>
<td>Mounted Arm</td>
<td>113</td>
<td>10,577</td>
</tr>
</tbody>
</table>

Amazon today has ~200,000 deck-load robots sold each year.

Source: Interact Analysis
Leading Suppliers for Logistics

Leading Mobile Robot Vendors to Logistics – Based on 2017 Revenues

Source: Interact Analysis

Other leading vendors:
- Locus Robotics
- Scallog
- Vecna
- 6 River Systems
- GreyOrange
- IAM Robotics
- inVia Robotics
- Jaten
- Magazino
- MiR

This list is not exhaustive!
Who’s Using Mobile Robots?

E-commerce:
- zalando
- Flipkart
- JD.COM
- Alibaba.com

3PLs:
- DHL
- FedEx
- XPO Logistics
- DB Schenker
- Ryder
Exponential Growth Likely

- Innovators
- Early Adopters
- Early Majority
- Late Majority

- Goods-to-person
- Person-to-goods
- Mobile piece picking

Manual/humans
Adoption of Robots Accelerating

Example of a logistics company’s rollout of Autonomous Mobile Robots:

- **Initial pilot** (2016): 3-6 AMRs in 2-6 months
- **WMS Integration** (2017): 30-50 AMRs in 1-3 months
- **Wider rollout in facility** (2018): 1000+ AMRs in 3-9 months
- **Rollout out at all national facilities** (2019): 10,000+ AMRs in 2-5 years?

2-4 years

- **Rollout out at all global facilities** (2020-2022+): 10,000+ AMRs in 2-5 years?
Forecast for Mobile Robots in Logistics

Source: Interact Analysis
For more information
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