The Future of Robotics in the Warehouse

Presented by:
Tom Pollard
Applications Engineer,
Cimcorp North America
Presentation Goals

- What does the current landscape look like?
- What are some of the key industry trends & developments
- How will these impact the use of robotics technology in the warehouse activities
What is Robotics

• The branch of technology that deals with the design, construction, operation, and application of robots
What is a Robot?

• A machine capable of carrying out a complex series of actions automatically, esp. one programmable by a computer.

• Robot = Automation

• Automation does not necessarily mean robot
Traditional Warehouse

- Pallets in -> store -> pallets out
- Lights-out warehousing has been around for many years
- Technology is very mature
- There has never been a better time to invest
  - Palletizers
  - ASRS
  - Layer Pick
  - AGV
ASRS
Layer Picking Robots

- Can hold hundreds of SKUs
- High throughput, good ROI
Case Picking Robots

- Can hold hundreds of SKUs
- Pick 1, 2…. 10 cases @ time
Goods To Person Robots

- Can hold thousands of SKUs
- Maximize human traits
- Goods to Robots Robots?
Order Fulfillment Centres

• Multi Channel under one roof
  – Wholesale (pallet, layer)
  – Retail (DSD – case, piece)
  – Online / Mobile (piece)

• More orders
• More complexity
• Faster turnaround

✓ Robotics can help with all of this
Material Flow

Receiving

Put away / Storage

Pallet Picking

Layer Picking

Case Picking

Piece Picking

Palletize

Floor Load

Truck Loading
Industry Trends/Forces

1. Algorithms
2. Sensing Technology
3. Open source software
4. Big Data
5. Processing Power
Algorithms

• Logic will continue to progress exponentially
• Processing power plays a big part
• Better logic will make for a more efficient system
Algorithms – Mixed Palletizing

• Mixed pallet build logic has created new application for robotics
• More stable loads
• Better cube utilization
Algorithms – Load Planning

• Extended to trailer load planning
• Better planned pallets can mean better planned loads

Axle Weight

12,000 lbs

Axle Weight

34,000 lbs

Axle Weight

34,000 lbs

80,000 lbs
Algorithms

- Better planned loads can mean better planned routes
- Better planned routes mean faster, more efficient deliveries
- Less trucks, less drivers
- Savings can be in the millions
- All enabled by Robotics
Sensing Technology

• Most robotic operations have been based on targeting
• BCR, Photo eyes, encoders etc.
• Rely on electrical inputs and outputs to figure out where things are
Sensing Technology

• More powerful processors & algorithms are allowing for more complicated operations
Sensing Technology Application

• Autonomous Mobile Robots
• More flexibility than traditional AGV
• Laser range finder for localization and obstacle avoidance
Motion Sensing Devices

• Off the shelf gaming device is becoming a standard for low cost, high flexibility vision based robotic control
• Applications using this sensing have not moved into the industrial space as they have not proven to be robust enough for the environment
• ………but it’s close
• Open source application development a key
• Will industry embrace it?
• Will end users develop it?
Sensing Technology Application

- Hobby robot
- Low cost open-source robot
- $2,000
Sensing Technology Application

- Gaming sensor being industrialized at a fast pace
Sensing Technology Application
Sensing Technology Application
Trailer Unloading
Sensing Technology Application
Trailer loading
Sensing Technology Application

• Combines 2D & 3D image processing
• No pre-programming of SKUs necessary
Robots working alongside Humans

• Leverage advantage of each other
  – Complimentary tasks
  – Repetitive tasks (robots)
  – Dexterity / variety (humans)

• Advances in safety systems
  – Vision, sonar, lasers
  – Torque sensing motors
Cage-free robot

- 360° sonar & camera
- Slows speed when humans close by
- Torque sensing motors
- Compliant joints
- No sharp edges
- Vision cameras
Robot Working Alongside Humans

at Praxis Packaging
Big Data

• Big data is a popular term used to describe the exponential growth and availability of data, both structured and unstructured
  – Transaction data, sensors, machine-machine
  – Unstructured text documents, email, video, audio, stock ticker data and financial transactions
Industry Trends/Forces

• Big data may be as important to business – and society – as the Internet has become
• Why? More data may lead to more accurate analyses
• More accurate analyses may lead to more confident decision making.
• Better decisions can mean greater operational efficiencies, cost reductions and reduced risk.
Industry Trends/Forces

Big data growth

Big data market is estimated to grow 45% annually to reach $25 billion by 2015

Growth of Global data - Zettabytes
Zettabyte = one million petabytes

2010 Stored data* - Petabytes
Petabyte - one quadrillion (short scale) bytes

*greater than
Sources: Nasscom -CRISIL GR&A analysis
Acquisition → Marshalling → Analysis → Action

Data Acquisition
- IBM
- SAP
- SAS
- TIBCO
- Ab Initio
- Microsoft
- Oracle
- Informatica
- Splunk
- Numenta
- Syncsort

VLDW and BI Appliances
- SAS
- Oracle
- HP
- IBM
- Ab Initio
- TIBCO
- Oracle
- Informatica
- Splunk
- Numenta
- Syncsort

Analytics
- EMC
- SAS
- IBM
- HP
- Oracle
- Teradata
- Tableau
- IBM
- Paracel
- Teradata

BPM & Action
- IBM
- TIBCO
- Oracle
- EMC
- Adobe
- Pega
- OpenText
- SAP

Including Complex Event Processing (CEP) tools

Data Providers
- LexisNexis
- comScore
- Windows Azure
- Marketo
- Nielsen
- Symphony
- MapR
- MongoDB
- Splunk
- MarkLogic
- Surfacing
- Tableau
- IBM
- SAP
- HP

No SQL
- Oracle
- IBM
- HP
- Microsoft
- Teradata
- Informatica

Data Virtualization
- Composite
- IBM
- Teradata
- Oracle
- IBM

BI Tools
- Oracle
- Microsoft
- SAP
- IBM
- Pentaho
- Tableau
- MicroStrategy
- Google
- QlikView

Content Management
- IBM
- Atlassian
- Alfresco
- Adobe

Data Governance
- IBM
- SAP
- Kalido
- Microsoft
- Oracle
- Information Builders

And all your own data
And your partners data

Capgemini - Capping IT off
Manuel Sevilla - 2012
How can Big Data influence Robotics in the Warehouse?

• Analytics can optimize a system solution like never before
• Big Data, Analytics & Algorithms will give robotics the smarts it needs to be viable
Finnish Dairy Example

Finnish Dairy empowering the robotic picking system to plan production

- Keep record of historical orders (volume, SKUs, seasonal)
- Look ahead to actual orders (up to 48 hrs)
- Use analytics to find the optimal mix of
  - Satisfy customer orders without fail
  - Inventory level
  - Maximize production line efficiency
- Better decisions can mean greater operational efficiencies, cost reductions and reduced risk.
Summary / Takeaways

• Data collection, processing power & algorithms means we can design more complicated and efficient solutions

• Advancements in sensor technology will allow robots to do more than what is practical today

• More affordable sensors & Open Source robotics will allow more Small & Medium sized companies to be able to afford robots
For More Information:

Speaker email: tom.pollard@cimcorp.com
Website: www.cimcorp.com
Or visit ProMat 2015 Booth 4237