Automation for Everyone: Disruptive Technologies

Presented by:

Mitchell Weiss, COO, Seegrid

Sponsored by:

SEEGRID®

MODEX 2014

Automation for Everyone

- Mitchell Weiss, COO, Seegrid
- Founded 2003
- Spin off of Carnegie Mellon University, Mobile Robotics Lab
- Manufacturer of vision-guided AGVs and 3D perception technology

MODEX 2014

Disruptive Technology

- The theory explains the phenomenon by which an innovation transforms an existing market or sector by introducing simplicity, convenience, accessibility, and affordability where complication and high cost are the status quo.
- Initially, a disruptive innovation is formed in a niche market that may appear unattractive or inconsequential to industry incumbents, but eventually the new product or idea completely redefines the industry.
- See more at:

  http://www.christenseninstitute.org/key-concepts/disruptive-innovation-2/

MODEX 2014

Disruptive Innovation

- Bring robotic perception to industrial and consumer applications
- Allow complex technology to be easily implemented
- Enables vehicle navigation in unimproved environments
- Train vision-guided AGVs like people

MODEX 2014

How

- Manufacture practical systems utilizing 3-D stereo vision for ranging, map building, modeling and navigation.
- Based on technology developed by Dr. Hans Moravec.
- IP includes patented technology and a deep software stack.

Core Technologies

TECHNOLOGY

- **Stereo Vision Sensing**
  - Captures large data sets quickly – can range 100's of points/second
  - Software centric
- **3D Evidence Grids**
  - Complex, compute intensive
  - Compensates for uncertainty

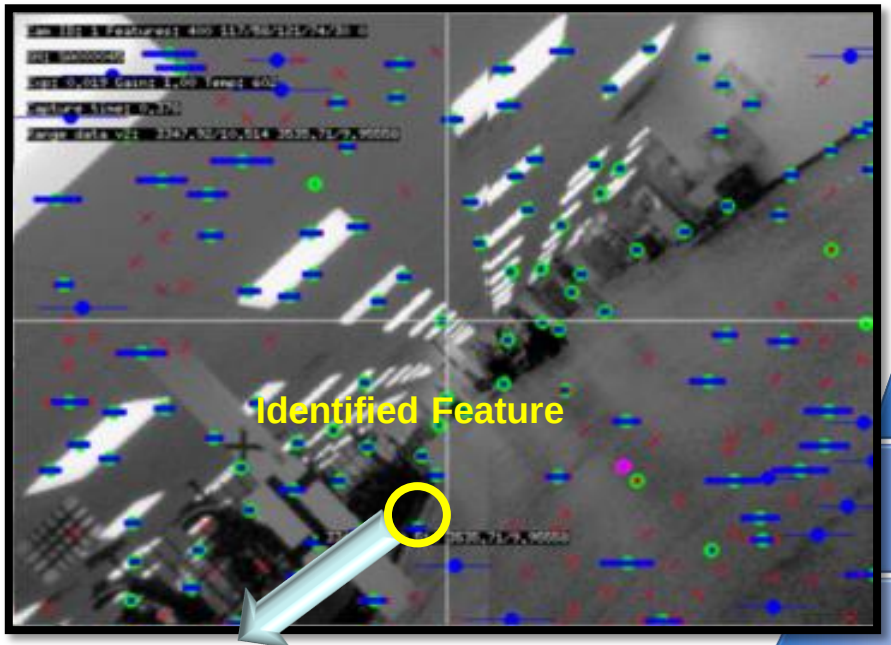
BENEFIT

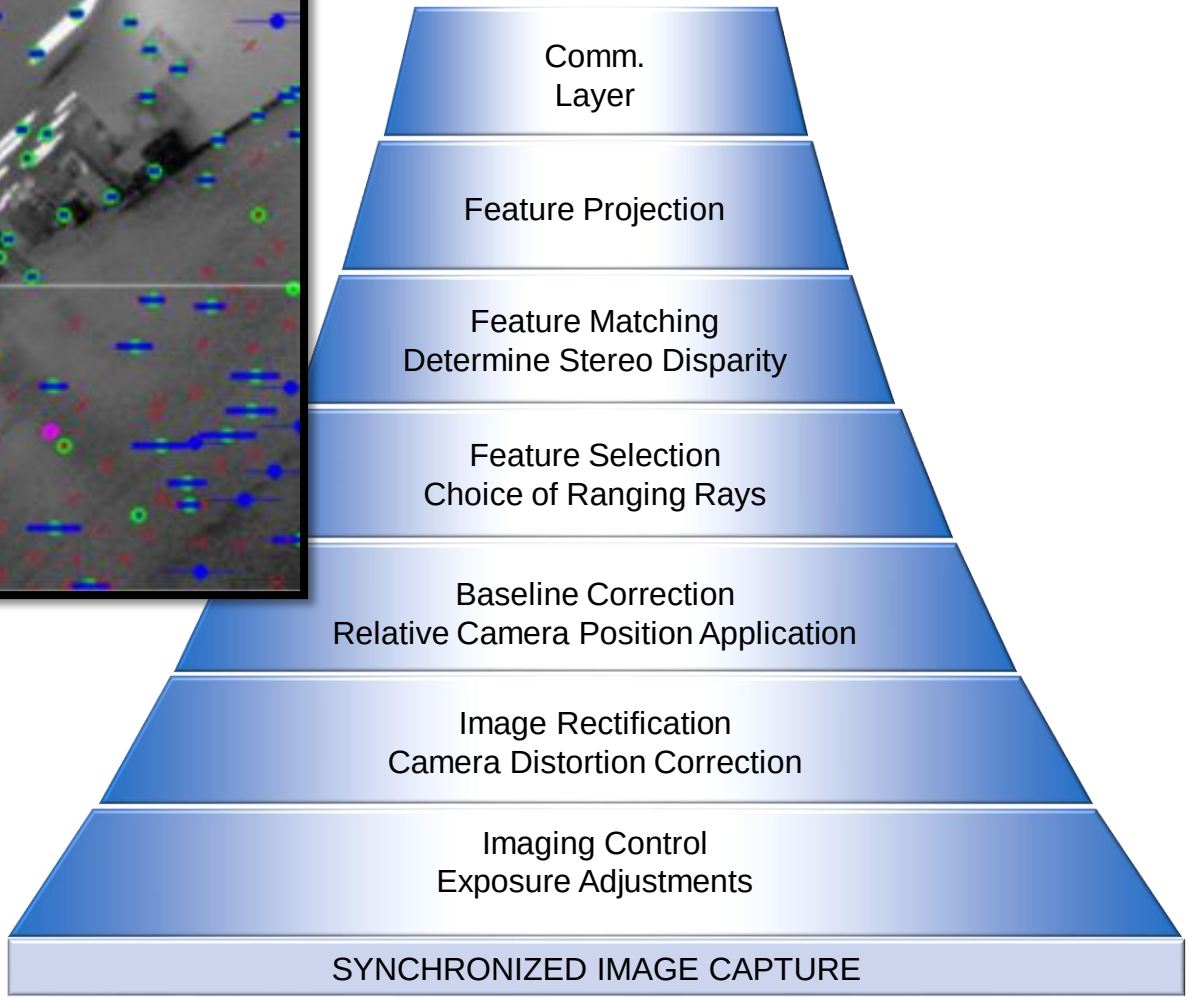
- **Non-Radiating, Infrastructure-Free**
  - Usable in stealth and existing operations
  - Long range, low energy
  - Low cost
- **Robust, Adaptable**
  - Based on statistics, not heuristics

MODEX 2014

Leverages Moore's Law

Stereo Vision Technology

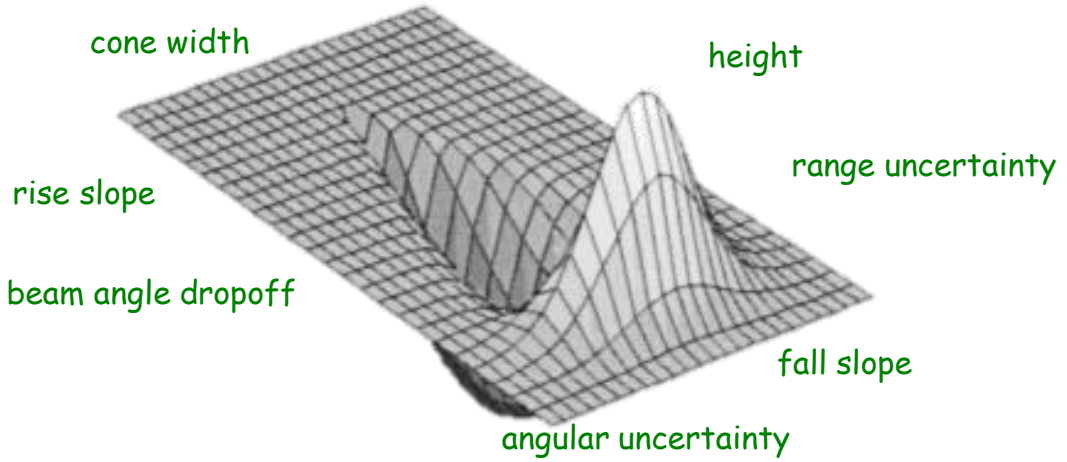




MODEX 2014

Evidence Grid-3D Modeling Stack

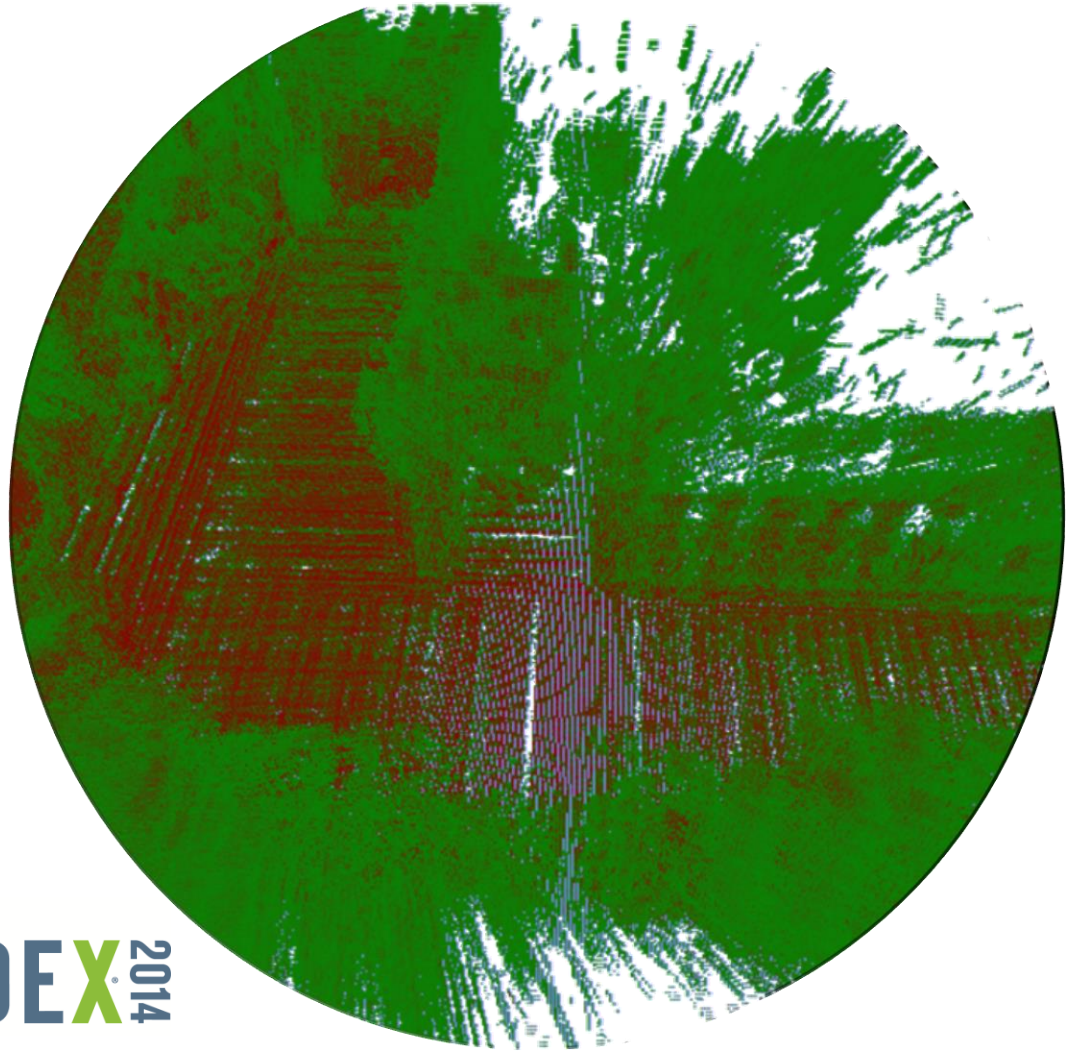
- Compute efficient technique for providing higher precision
- Statically based approach
- Robust, not brittle



MODEX 2014

Compensates for Sensor Variability

Enables 3D Models



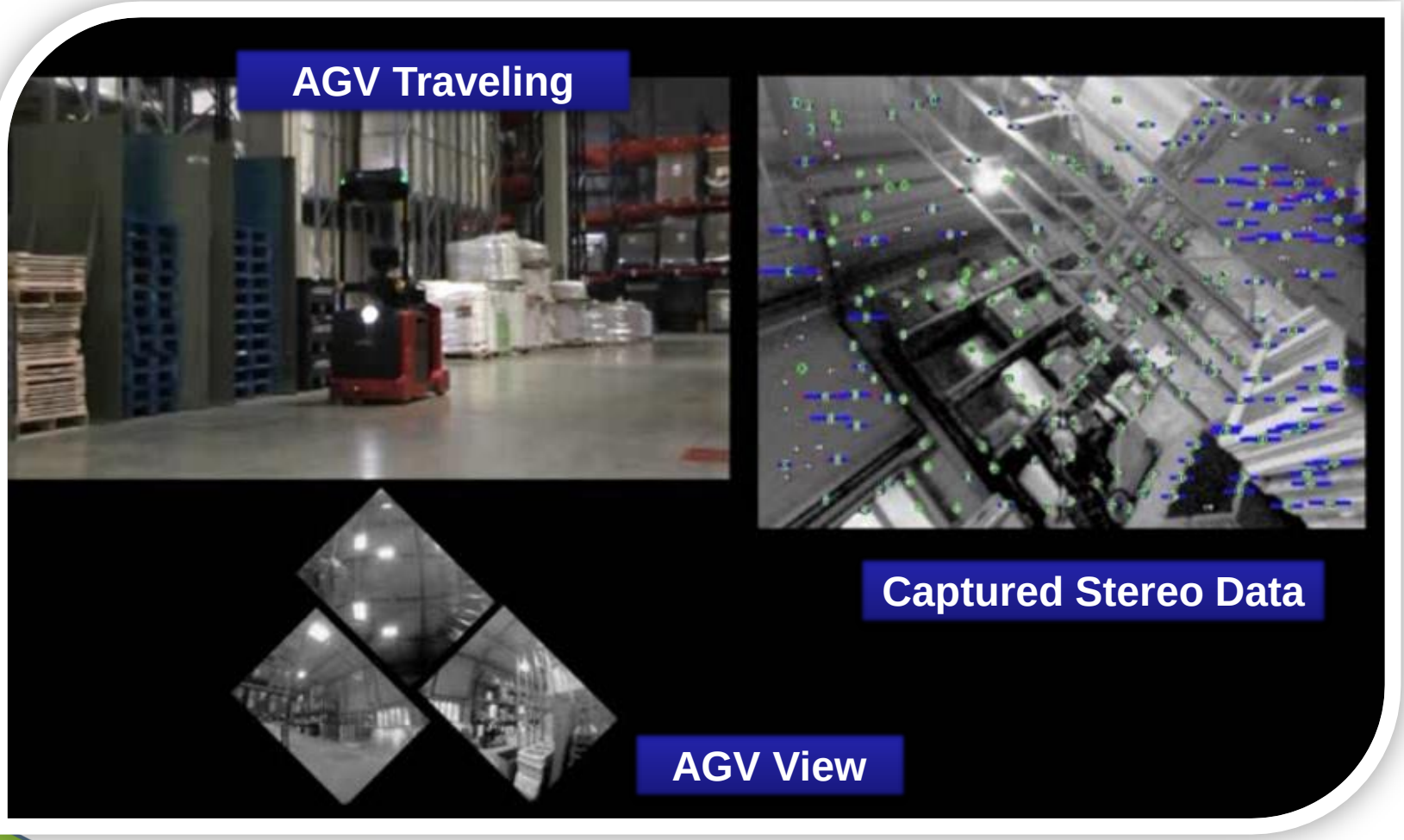
MODEX 2014

Potential Applications

- On-the-go 3D map building (realtors, inspectors, adjusters, contractors)
- Assistive technologies (vision impaired, mobility)
- Augmented reality
- 3D interaction, gaming, control (TV and media players)
- Self driving vehicles

MODEX 2014

Self Driving AGV Tow Tractor



MODEX 2014

Disruptive Technology

When it's right it …

- Is easily adopted
- Is transparent
- Is simple
- Enables new opportunities

Disruptive Technology

Brought to the world

- Vision-Guided AGVs
  - Flexible
  - Simple
  - Affordable
  - Scalable
  - No facility infrastructure

MODEX 2014

Benefits of Vision-Guided AGVs

- Reduce labor and operating costs
- Increase employee safety
- Reduce product and facility damage
- Improve efficiency and productivity

MODEX 2014

Automotive Parts Manufacturing Case Study

Challenges and Needs:

- Deploy a process that would increase efficiency and reduce the overall costs of material handling.
- Adaptable and flexible solution for ever-changing floor and facility layouts.

Solution: 10 Vision-Guided AGVs:

- Two tow tractors transport product between manufacturing process.
- Three tow tractors transport inbound freight from the support facility and deliver within the manufacturing area.
- Four double length pallet trucks move product from manufacturing to shipping areas to the shipping staging lanes.
- One single length pallet truck with towing attachment transports empty racks on carts on the manufacturing line and brings finished product back to the finished goods store.

Automotive Parts Manufacturing Case Study

Results

- **Increased Efficiency**: Vision-guided AGV fleet provides consistent flow of internal component movements as well as inventory reduction due to more frequent deliveries to the manufacturing lines.

- **Reduced Cost**: With vision-guided AGVs improving overall efficiency, there is an overall reduction in material handling cost.

- **Improved Safety**: Vision-guided AGVs deliver automotive parts reliably and in a predictable manner. Their use eliminates employee, product, and facility damage, creating a safer work environment.

MODEX 2014

Grocery Distribution Case Study

Challenges and Needs:

- Eliminate wasted hi-lift travel from the reserve back to the dock.
- Improve efficiency in the distribution center, reduction in hi-lift travel time.

Solution: 8 Vision-Guided AGVs

- 20-30% of all inbound freight is handled by vision-guided AGV double length pallet trucks.
- AGV pallet trucks are utilized for inbound delivery of pallet in the DC.

Results:

- Increased productivity with replenishment hi-lifts in aisles because operators now have more products to move in shorter distances.
- Reduced manned travel from putaway by 20-30% and increased hi-lift pallet per hour by 20%.
- Team members reallocated to more value-added roles in the DC such as replenishment and selection.

MODEX 2014

Vision-Guided AGVs: Disruptive Technology

Robotic vision-guided technology is a disruptive technology that redefined the AGV market. Consumer applications in a vast majority of markets globally are serviced by vision-guided AGVs and those markets are benefiting from innovation in the materials handling industry.

MODEX 2014

THANK YOU

Mitchell Weiss
mweiss@seegrid.com

www.seegrid.com

Visit our MODEX 2014 Booth 7317