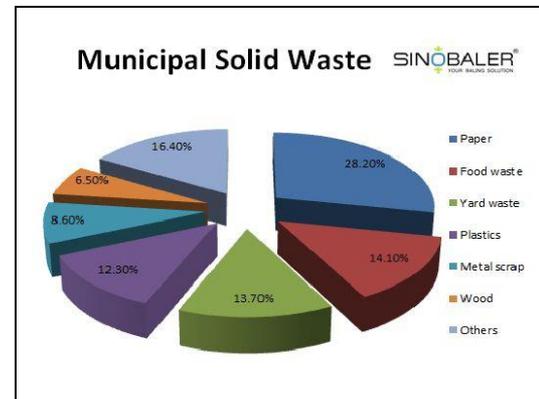
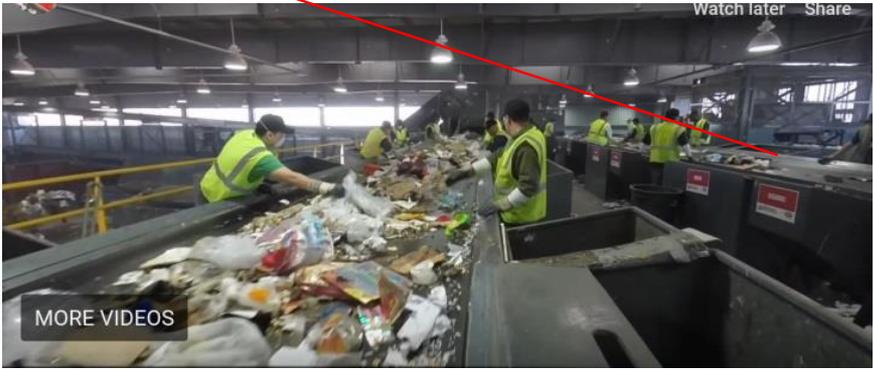
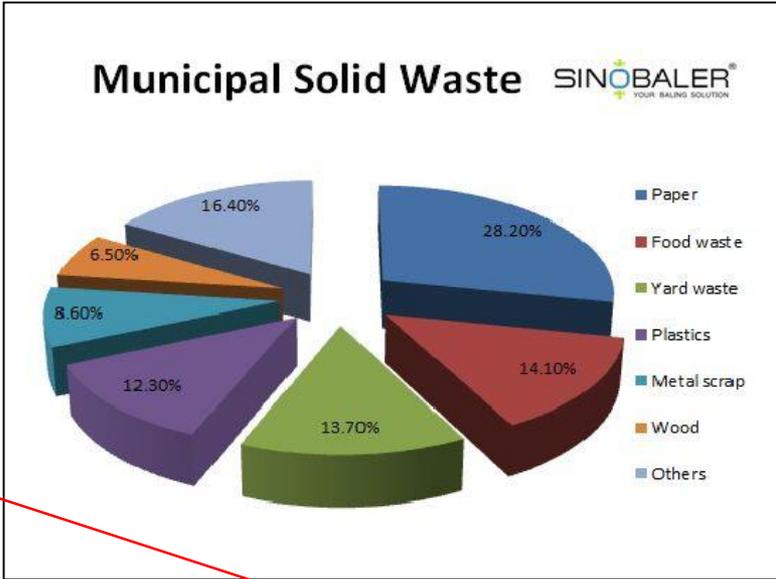
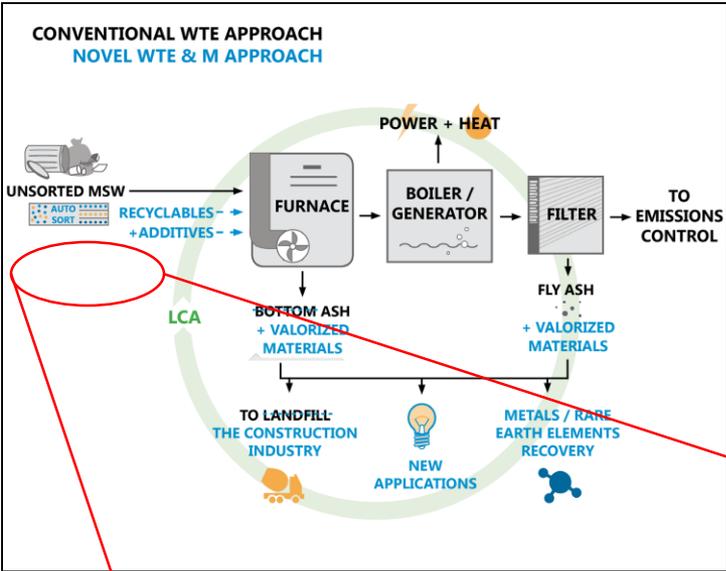


Low Cost, Scalable, Modular Sorting Technology for Municipal Solid Waste

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President
nanoRANCH
UHV Technologies



Need for Sorting MSW



Why Sorting? Higher Profit

Example of Automotive Metal Scrap

Sorting of a Truckload (40,000 lbs) of Automotive Metal Scrap

		Weight (lbs)	Price \$/lb	Value \$	TOTAL \$
Un-Sorted Scrap		40,679	\$ 1.00	40,679	\$ 40,679
	Copper	14,170	\$ 2.20	\$ 31,174.00	
	Brass	8,890	\$ 1.80	\$ 16,002.00	
	Zinc	12,270	\$ 0.75	\$ 9,202.50	
	Aluminum	4,583	\$ 0.55	\$ 2,520.65	
	Coins	70	\$ 15.00	\$ 1,050.00	
	PCBs	12	\$ 1.00	\$ 12.00	
	SS	10	\$ 1.50	\$ 15.00	
	Leftover	674	\$ 0.25	\$ 168.50	
SORTED Scrap			TOTAL		\$ 60,145

Key to Value: Use/Recover/Recycle EVERYTHING

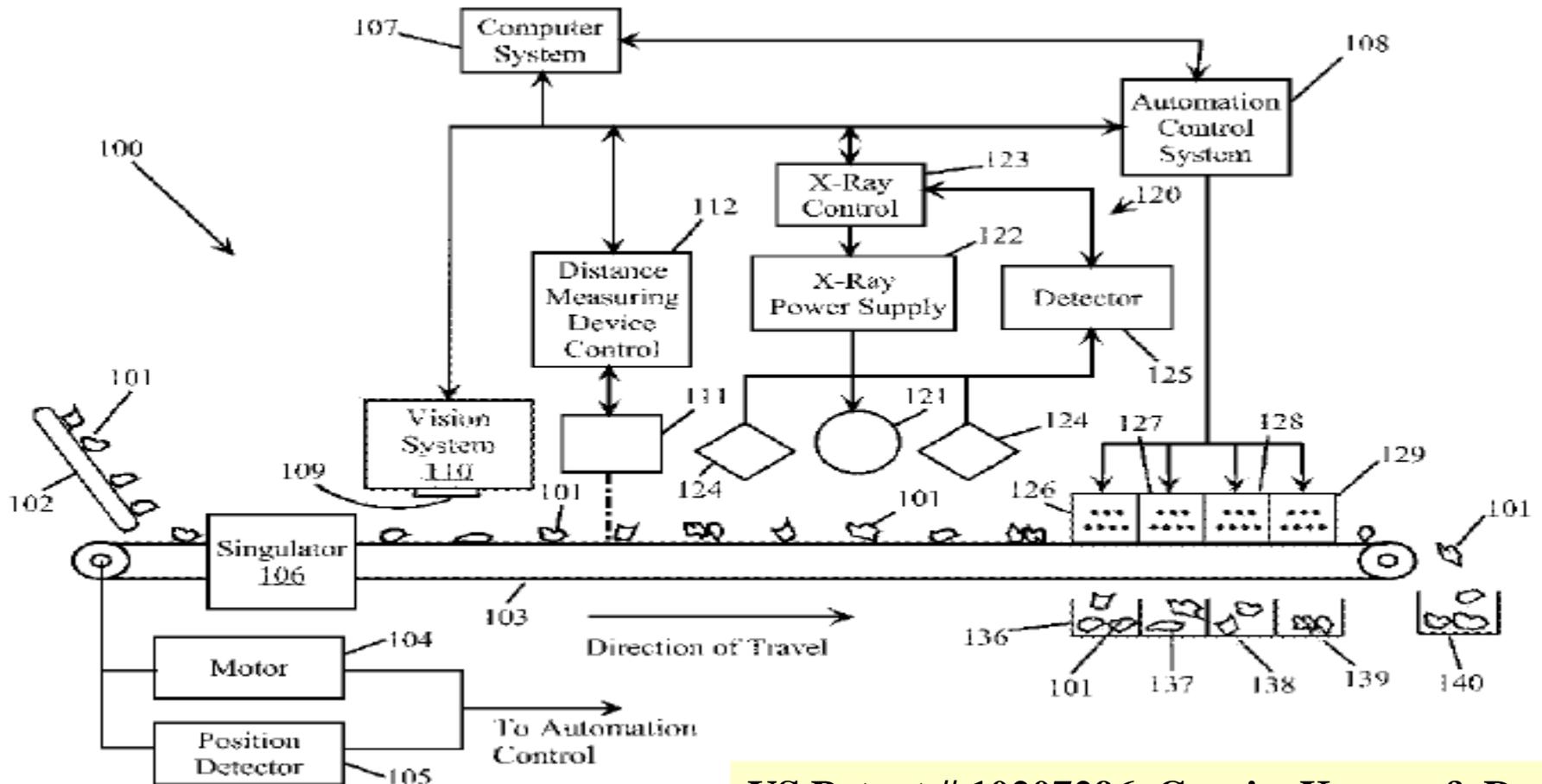
Requirements for MSW Sorting

- **Low Cost and extremely high throughput (~100TPH)**
 - Fully autonomous sorting and handling
 - Scalable to large width conveyors
- **Simultaneous Sorting of large number of output categories**
- **Multiple output streams for 16-32 product Categories**
- **Modular, adaptable design for integrating in current manual sorting facilities**
- **User Friendly software can be trained for any “Look’**
- **High selectivity and accuracy**
- **High speed pickup of various types of irregular shaped, hardness, breakable materials**

UHV's Patented Technology

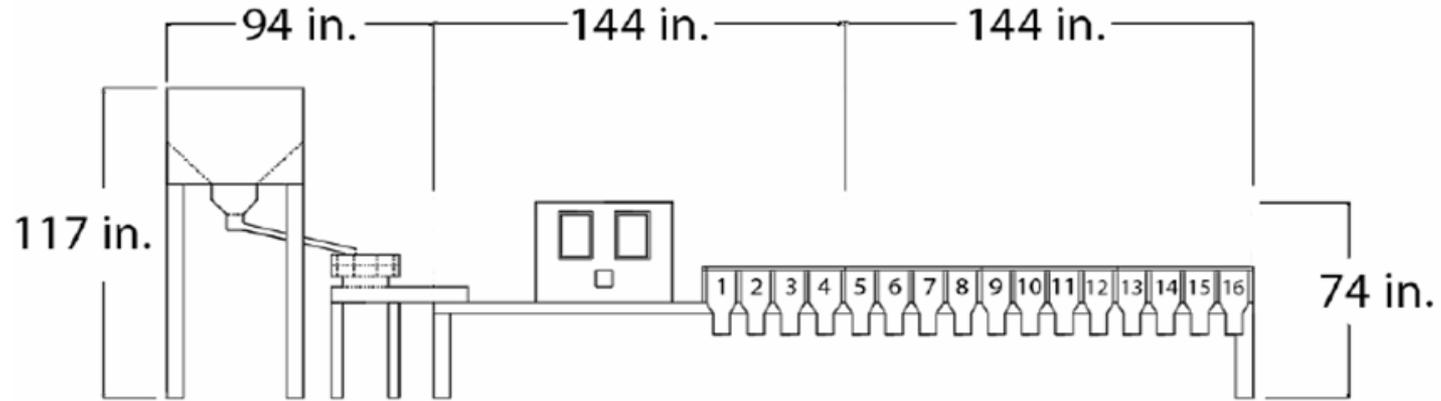
- Latest Artificial Intelligence Technology developed with US-DOE ARPA-E METALS funding over the last 5 years
- Selection of categories based on 'LOOKS'
 - Simple Example: Al cans, plastic bottles & glass bottles from municipal waste
 - Different aluminum alloys for wrought, extrusions and cast products
 - Zorba into as many as 15 different outputs such as copper, brass, zinc, SS etc.
- Multiple output streams for 16-32 product Categories
- Adjust output stream composition to meet requirements
- User Friendly software can be trained for any "Look"
- Almost 100% accuracy is possible
- Sorting accuracy increases as you run more material
- Technology is scalable for width
- Air-jet, vacuum, electro-magnetic rejection & robotics for pick-up

Core Concept

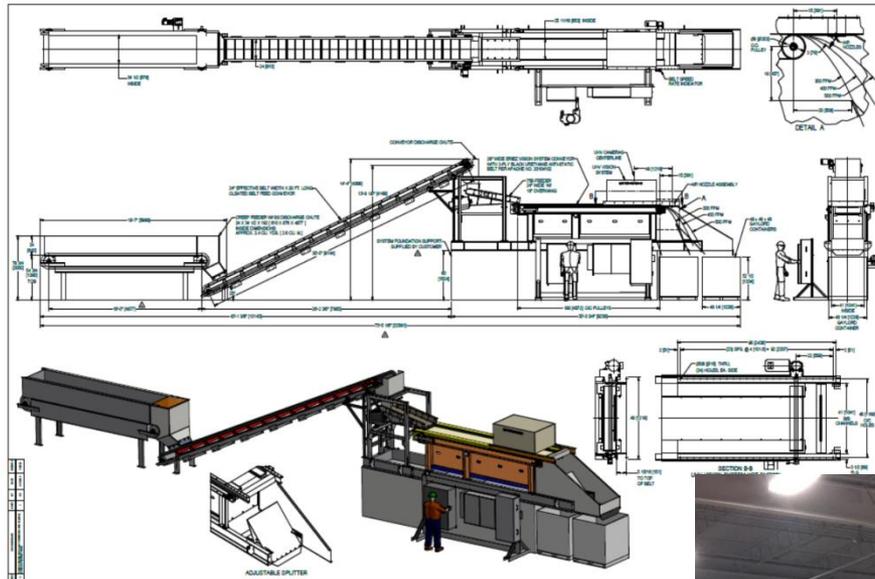


US Patent # 10207296, Garcia, Kumar & Das

UHV's Metal Sorters-1



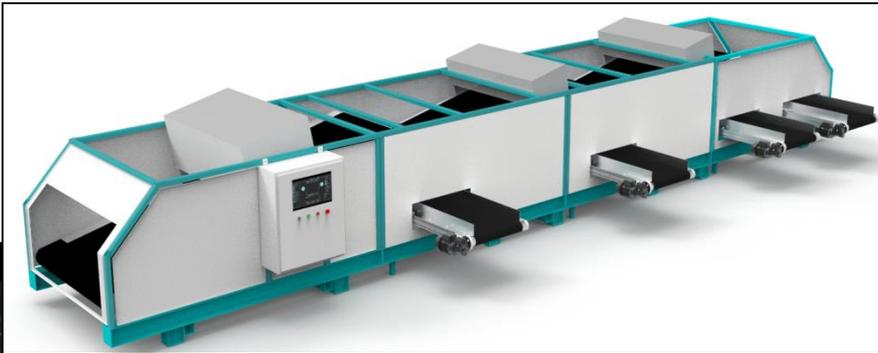
UHV's Metal Sorters-2



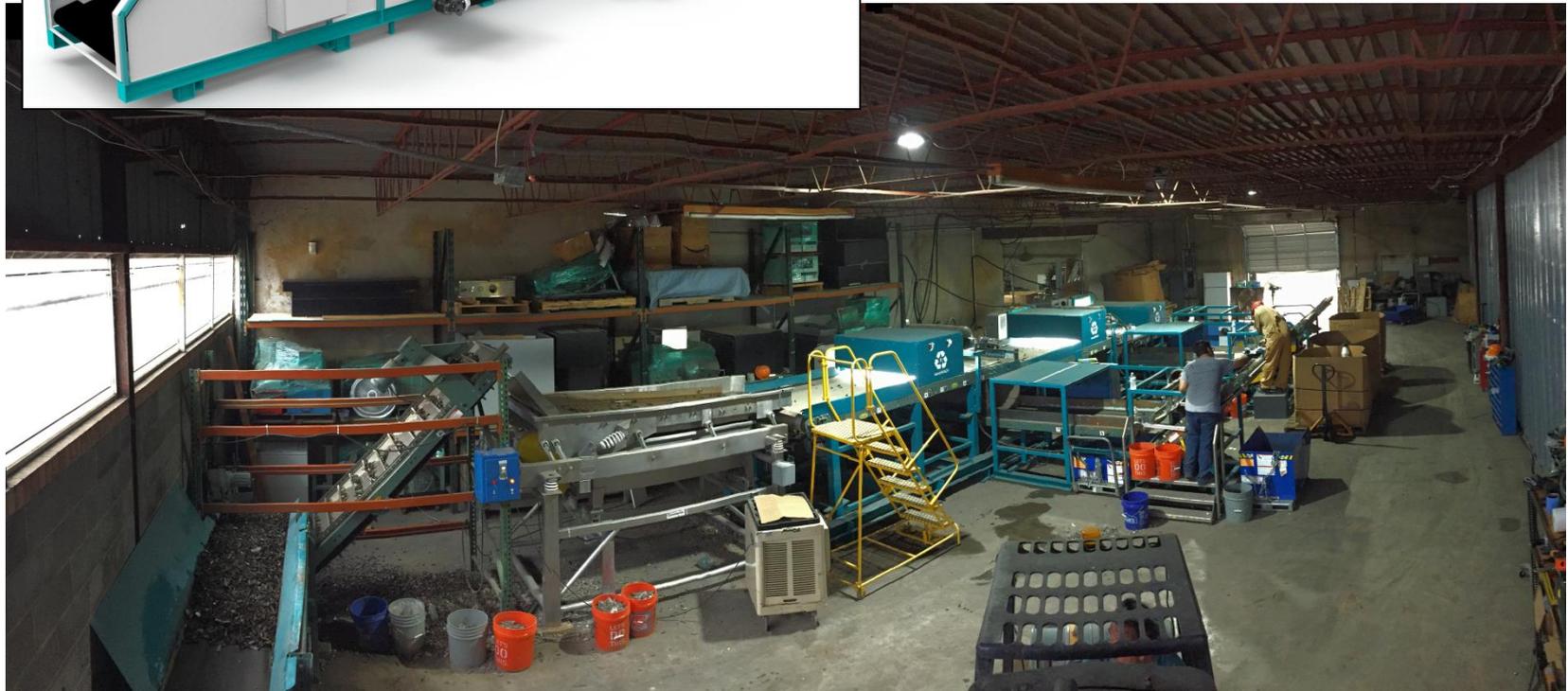
30 million lbs/yr Automotive
Scrap Sorter in Erie, PA



UHV's Metal Sorters-3



**100 million lbs/yr Automotive
Scrap Sorter in Fort Worth, TX
\$0.02/lb sorting cost**



UHV's Modular AI Sorter



**Modular AI Module for installing
on an Existing Conveyor**



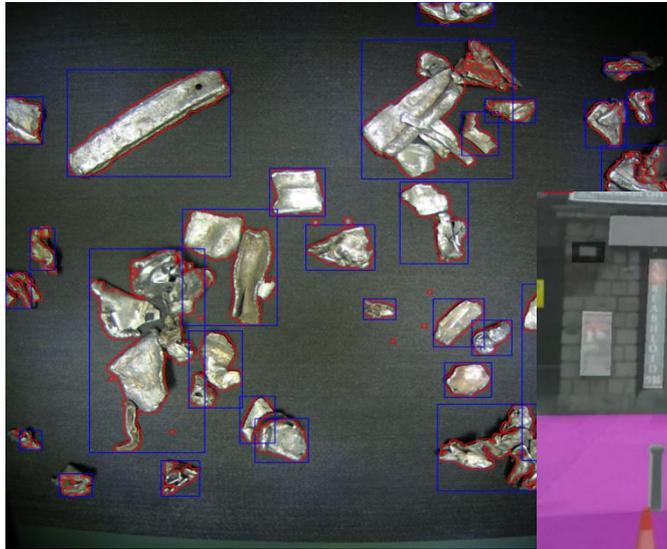
- **Low Cost**
- **Replaces Manual Labor**
- **Higher Speed**
- **Adaptable Width**
- **Multiple Actuators**
 - Air Jets
 - Electro-pneumatic
 - Electro-magnetic
 - Vacuum

Knowledge/Technology Gaps and Challenges for MSW

GOAL: How to maximize total value as compared to incineration.

- **Clear demonstration of increased value by new technology(ies)**
- **What is in various MSW streams**
 - **Recyclables: paper, cardboard, plastics, glass, metals, electronics**
 - **High Valorization Value: wood, yard waste, food waste**
 - **Residuals: stones, brick, etc.**
- **Value proposition for different uses of Recyclables**
 - **Recycle vs Incineration**
- **Output stream purity requirements for recycling**
- **Low cost (Capex) and high throughput (~100TPH) sorting equipment**
 - **Fully autonomous sorting and handling**
 - **Scalable to large width conveyors**
- **High speed pickup of various types of irregular shaped, hardness, breakable materials**

How AI Works-1



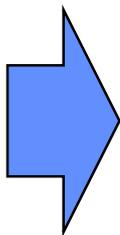
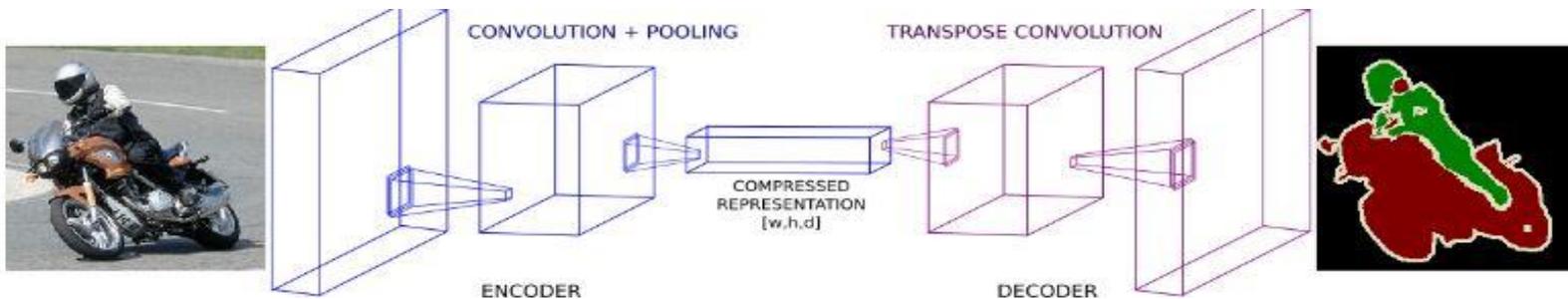
Latest AI/ML Technologies for Industrial Applications



UHV's AI Projects:

1. ARPA-E METALS project for High Throughput Scrap Metal Sorting
2. ARPA-E ROOTS project for CT Imaging of Roots
3. US Air Force project for Identification from Drone Images
4. US Air Force project for Determination of Missile Attitude

How AI Works-2

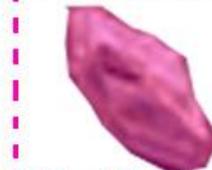


milk bottle 99%



Composition:
99% Glass

cereal box 97%



Composition:
99% Cardboard

3 Minute Video

