# **Robotic Solutions for** the Food Industry

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# Srivatsa Mahesh

## A Quick Introduction To My Experience & Role At Cybernetik:

- Bachelor's in Mechanical Engineering at University of Buffalo
- Master of Science in Automotive Engineering from RWTH Aachen, with focus on building algorithms for motion control and path planning for robots
- Visiting Researcher at ETH, Zurich
- Business and technology development for robotic applications in food, chemical, and manufacturing industries.







# **Presentation Flow**

## Scope:

Understanding the role of Robotic Automation in the Food Industry.

- Why Does The Food Industry Need Robots? 1.
- 2. Applications In Food Industry
- З. Types of Robots
- Types of End of the Arm Tooling (EOAT) 4.
- Sensory Integration 5.
- 6. Design Considerations







And what are the gains from integrating them?





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## The foremost advantages of automation – quality and speed.





## 02 Meet rising food demands of growing populations.









### \_\_\_\_\_ 03 Mass Production & Processing of food, making them affordable.

























Robots drastically boost food safety and hygiene.











**Customizability** for differing operations, products, and cycle times.









![](_page_10_Picture_3.jpeg)

## Robots continue working even during pandemics!

![](_page_10_Picture_6.jpeg)

### 10 **Improved productivity** by approximately 25%\* with robots. \_\_\_\_\_

![](_page_11_Picture_2.jpeg)

![](_page_11_Picture_3.jpeg)

![](_page_11_Picture_5.jpeg)

### 11 ———— Factors driving this growth

- Gains in **productivity** and **efficiency**.
- Shrinking areal footprint.
- Rising **labour** costs.

![](_page_12_Picture_6.jpeg)

• Advances in gripper and robotic vision technology.

![](_page_12_Figure_10.jpeg)

![](_page_12_Picture_11.jpeg)

Robotic automation is applied along the processing and packaging line.

![](_page_13_Picture_2.jpeg)

![](_page_13_Picture_5.jpeg)

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# Primary Packaging: Vision Systems guided robots.

![](_page_14_Picture_2.jpeg)

![](_page_14_Picture_3.jpeg)

![](_page_14_Picture_5.jpeg)

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# Primary Packaging: Pick and Place System

![](_page_15_Picture_2.jpeg)

![](_page_15_Picture_3.jpeg)

![](_page_15_Picture_5.jpeg)

![](_page_15_Picture_13.jpeg)

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# Primary Packaging: Handles delicate products.

![](_page_16_Picture_2.jpeg)

![](_page_16_Picture_3.jpeg)

![](_page_16_Picture_4.jpeg)

![](_page_16_Picture_5.jpeg)

### 01 Primary Packaging: Products handled

- Chocolates
- Pastries
- Cheeses ullet
- Berries
- Eggs, Meat & Poultry

![](_page_17_Picture_7.jpeg)

![](_page_17_Picture_9.jpeg)

![](_page_17_Picture_11.jpeg)

## 02 Secondary Packaging: Integrate Products

![](_page_18_Picture_2.jpeg)

![](_page_18_Picture_3.jpeg)

![](_page_18_Picture_4.jpeg)

![](_page_18_Picture_5.jpeg)

![](_page_19_Figure_1.jpeg)

# Secondary Packaging: Erect, load, and seal several package formats.

![](_page_19_Picture_3.jpeg)

![](_page_19_Picture_4.jpeg)

![](_page_19_Picture_7.jpeg)

![](_page_19_Picture_15.jpeg)

![](_page_20_Figure_1.jpeg)

# Secondary Packaging: Complex carton and orientation handling.

![](_page_20_Picture_3.jpeg)

![](_page_20_Picture_4.jpeg)

![](_page_20_Picture_7.jpeg)

### 03 Case Packing \_\_\_\_\_

![](_page_21_Picture_2.jpeg)

![](_page_21_Picture_3.jpeg)

![](_page_21_Picture_6.jpeg)

## 04 — **Tertiary Packaging: Palletizing**

![](_page_22_Picture_2.jpeg)

![](_page_22_Picture_3.jpeg)

![](_page_22_Picture_6.jpeg)

## 04 — Tertiary Packaging: Stretch Wrapping

![](_page_23_Picture_2.jpeg)

![](_page_23_Picture_3.jpeg)

![](_page_23_Picture_6.jpeg)

A variety of robots with their own unique strengths and capabilities.

![](_page_24_Picture_2.jpeg)

![](_page_24_Picture_4.jpeg)

## 6-Axis Robots: Mobility, handles complex operation, large reach.

![](_page_25_Picture_2.jpeg)

![](_page_25_Picture_3.jpeg)

![](_page_25_Picture_4.jpeg)

## Applications: De-palletizing, Case Packing, Tray Packing,

![](_page_25_Picture_8.jpeg)

### 02 3-Axis Gantry Robots: High load range.

![](_page_26_Picture_2.jpeg)

![](_page_26_Picture_4.jpeg)

Applications: Pick-Place, Unitizing, Palletizing, Packaging.

![](_page_26_Picture_8.jpeg)

## 03 SCARA: Low Footprint, Speed, Accuracy.

![](_page_27_Picture_2.jpeg)

# Applications: Packaging, Pick-Place.

![](_page_27_Picture_4.jpeg)

![](_page_27_Picture_9.jpeg)

## 03 Collaborative Robot: Safely operate around humans.

![](_page_28_Picture_2.jpeg)

![](_page_28_Picture_3.jpeg)

![](_page_28_Picture_4.jpeg)

Applications: Packaging, Pick-Place, Cutting-Slicing, Palletizing,

![](_page_28_Picture_8.jpeg)

## 03 **Delta**: Extremely High Speed, Overhead Install Minimises Footprint.

![](_page_29_Picture_2.jpeg)

# Disassembly.

![](_page_29_Picture_4.jpeg)

Applications: Pick-Place, Sorting, Assembly, Packaging,

![](_page_29_Picture_8.jpeg)

# Types of End of Arm **Tooling (EOAT)**

Specialised tools for highly specific tasks.

![](_page_30_Picture_2.jpeg)

![](_page_30_Picture_4.jpeg)

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# Vacuum Grippers: Use difference in air pressure for smooth gripping.

![](_page_31_Picture_2.jpeg)

![](_page_31_Picture_3.jpeg)

![](_page_31_Picture_5.jpeg)

### 02 **Bionic Grippers**: Mimics nature to find perfect grip. \_\_\_\_\_

![](_page_32_Picture_2.jpeg)

![](_page_32_Picture_3.jpeg)

![](_page_32_Picture_6.jpeg)

### 03 Multi-finger Grippers: Optimal force application. \_\_\_\_\_

![](_page_33_Picture_2.jpeg)

![](_page_33_Picture_3.jpeg)

![](_page_33_Picture_6.jpeg)

![](_page_33_Picture_13.jpeg)

# **Sensory Integration**

Smarter robots equipped through data.

![](_page_34_Picture_2.jpeg)

![](_page_34_Picture_3.jpeg)

![](_page_34_Picture_4.jpeg)

![](_page_34_Picture_6.jpeg)

**Sensory Integration** 

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# Vision System: Improves Traceability, Productivity, Set Up Utilization.

![](_page_35_Picture_3.jpeg)

![](_page_35_Picture_4.jpeg)

![](_page_35_Picture_7.jpeg)

**Sensory Integration** 

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## Touch Mechanism: Haptic/force feedback for pick-place of fragile food.

![](_page_36_Picture_2.jpeg)

![](_page_36_Picture_3.jpeg)

![](_page_36_Picture_6.jpeg)

For making the most out of your robots and production lines.

![](_page_37_Picture_2.jpeg)

![](_page_37_Picture_4.jpeg)

## Fundamentals: Payload, Reach, Inertia, and Speed. 0

![](_page_38_Picture_2.jpeg)

![](_page_38_Picture_3.jpeg)

![](_page_38_Picture_6.jpeg)

![](_page_38_Picture_14.jpeg)

### 02 \_\_\_\_\_

![](_page_39_Picture_2.jpeg)

![](_page_39_Picture_3.jpeg)

![](_page_39_Picture_5.jpeg)

## 03 **ROI Calculation Methodology**

![](_page_40_Picture_2.jpeg)

![](_page_40_Picture_3.jpeg)

![](_page_40_Picture_4.jpeg)

![](_page_40_Picture_5.jpeg)

## 04 \_\_\_\_\_ **Clean-ability**

![](_page_41_Picture_2.jpeg)

![](_page_41_Picture_3.jpeg)

![](_page_41_Picture_5.jpeg)

# 05 — Temperature Control

![](_page_42_Picture_2.jpeg)

![](_page_42_Picture_3.jpeg)

![](_page_42_Picture_5.jpeg)

### 06 **Stainless Steel Construction & Corrosion Resistant** \_\_\_\_\_

![](_page_43_Picture_2.jpeg)

![](_page_43_Picture_3.jpeg)

![](_page_43_Picture_5.jpeg)

![](_page_43_Picture_13.jpeg)

# Thank You

# Srivatsa Mahesh

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![](_page_44_Picture_3.jpeg)

# Q&A Time

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