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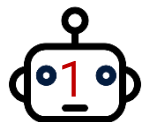
Design and Construction of Laboratory Model of Tomato Harvesting Robot

Provider:

Mir Sina Mousavi
(M.Sc Student)

Supervisor:

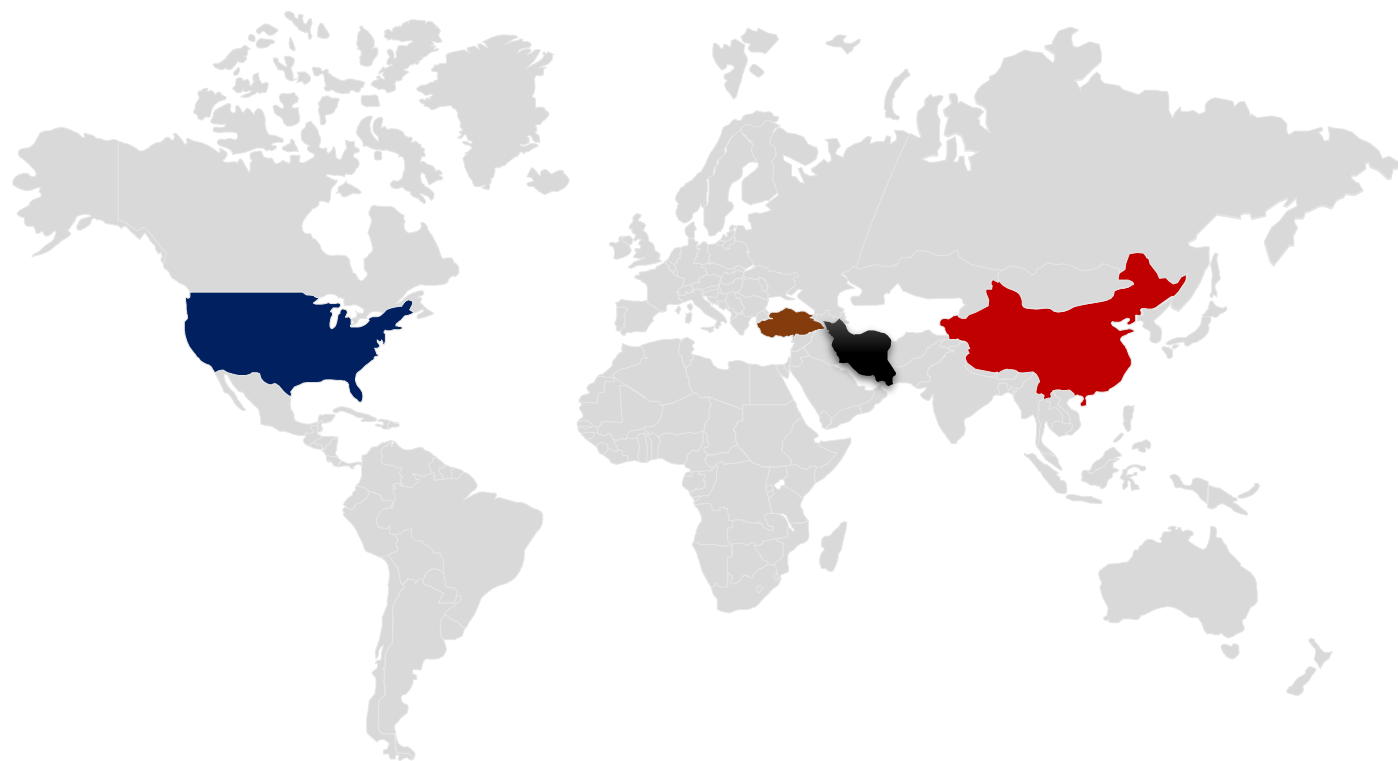
Dr. Jafar Massah
(Associate Professore)



Introduction



Production and Consumer Countries Statistics



USA
18.7 MT

Turkey
14.5 MT

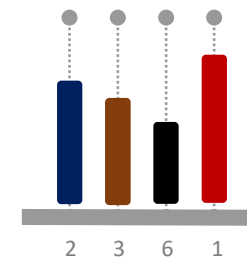
Iran
6.0 MT

China
52.6 MT

FAO

Consumer Iran Statistics: 3,394
Ton Per Year (Rank:7)

Production Iran Statistics: 6 Million
Tons Per Year (Rank:6)



In 2014, world production of
tomatoes was 170.8 million

Tomato world consumption
of tomatoes in 2003 was
102.8 million tons

RESOURCE REVIEW



RESOURCE REVIEW



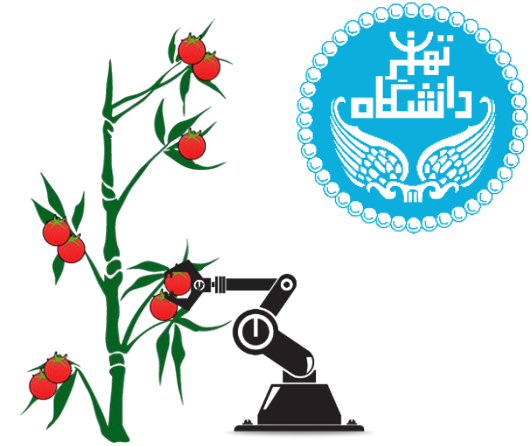
Foreign Research

Name of Researcher	Year	Subject	Description
Wang and et al.	2016	Design End-effector	+ High Control - No Intelligent
Sun and et al.	2016	Dual-arm Robot Design and Testing	- Only for Test - Complicated
Norio Matsumoto	2015	Tomato picking Robots Developed	- High Weight - High Volume
Kondo and et al.	2009	Tomato Cluster Harvesting Robot	+ Good Control - No Accuracy



Introduction

Goals, Idea and Importance Project



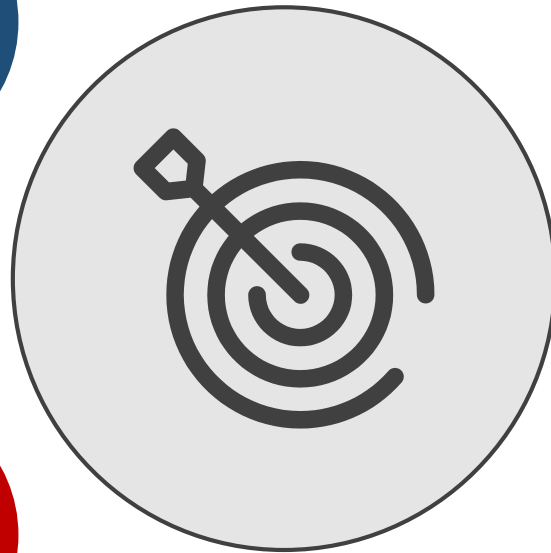
Greenhouse hydroponic

Tomato robot deployed for greenhouse hydroponic systems purposes



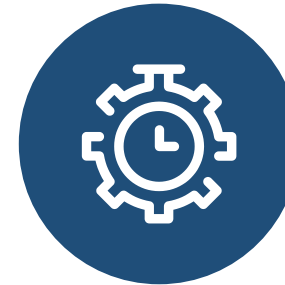
Image Processor

Design and Development Robot Image Processor with Ability to Identify the Target



Control Circuit

Design, Manufacture Robot and Programming Control Circuit

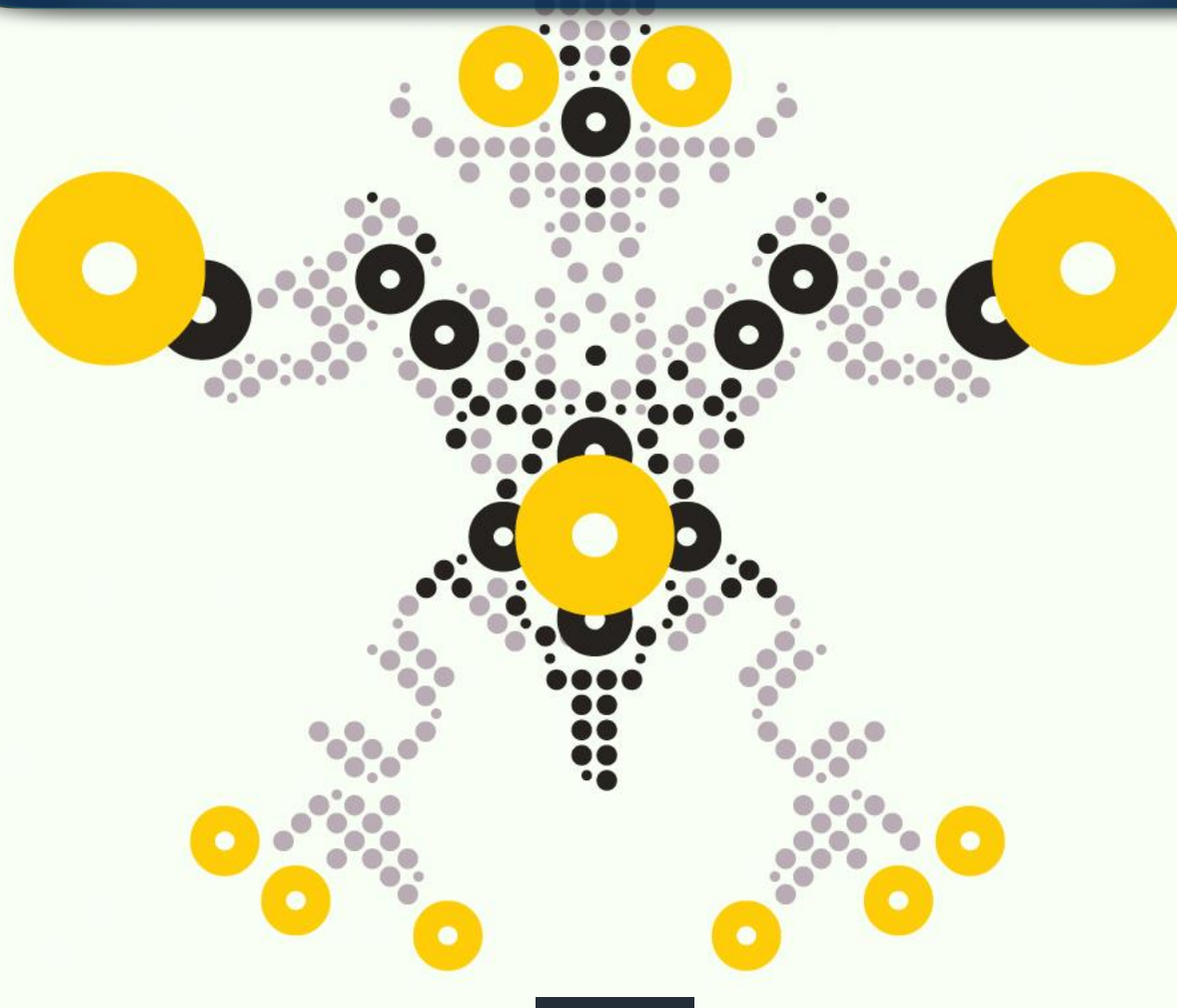


Mechanical

Design and Manufacture of the Mechanical of the Robot In Laboratory Environment

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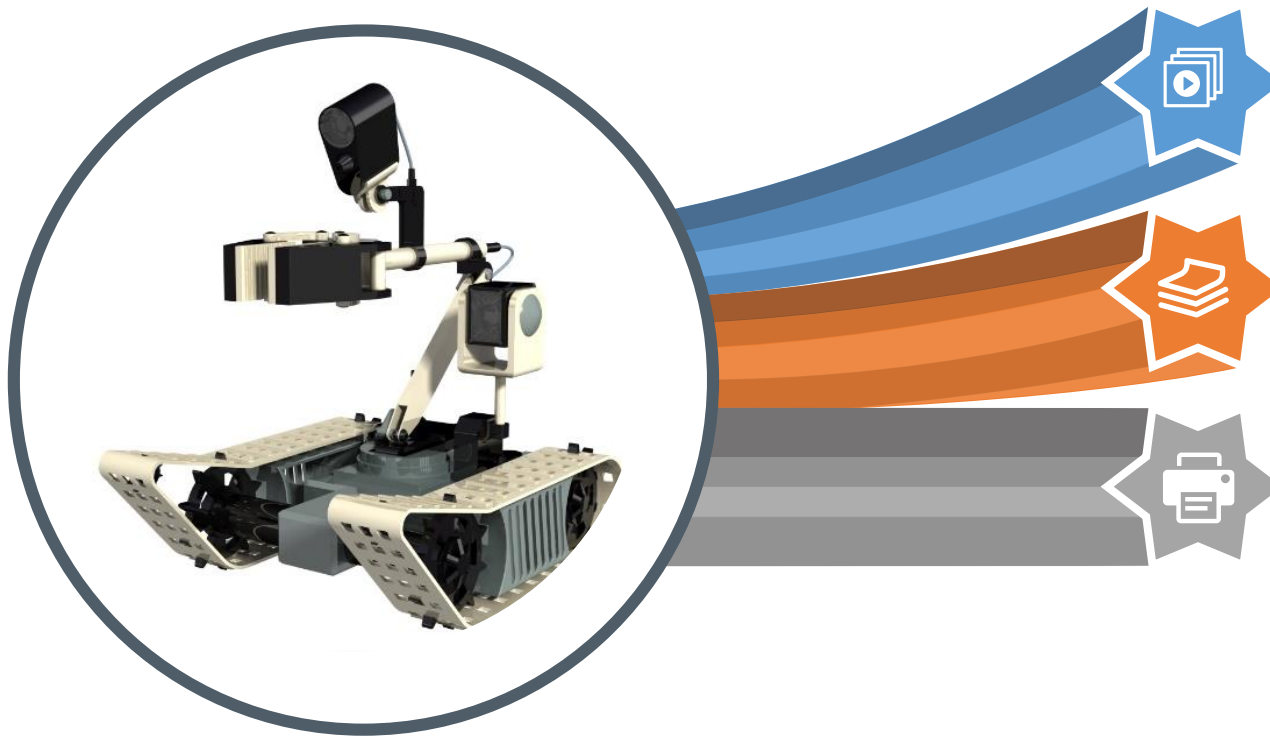
MATERIALS & METHODS





Materials & Methods

Robot Design and Manufacturing Process



Design and Manufacture of the Mechanical of the Robot

Design and Manufacture Robot Control Circuit

Design and Development Robot Image Processor

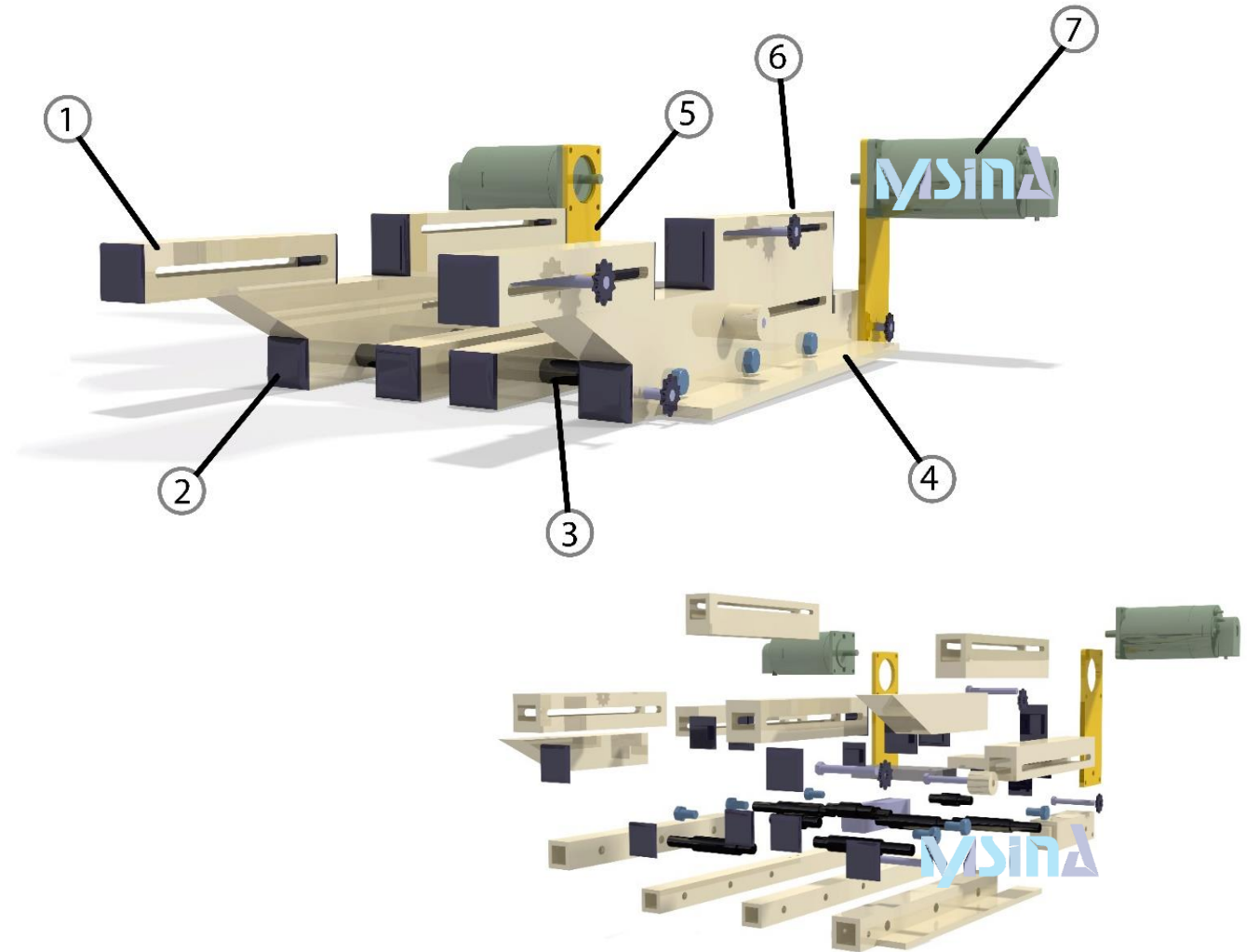


Materials & Methods

Robot Mechanical Design



Item	Name	QTY
1	Profile	12
2	CAP	14
3	Join Link	3
4	Adjusting screw	8
5	Chain	2
6	Gear	6
7	DC Motor	2



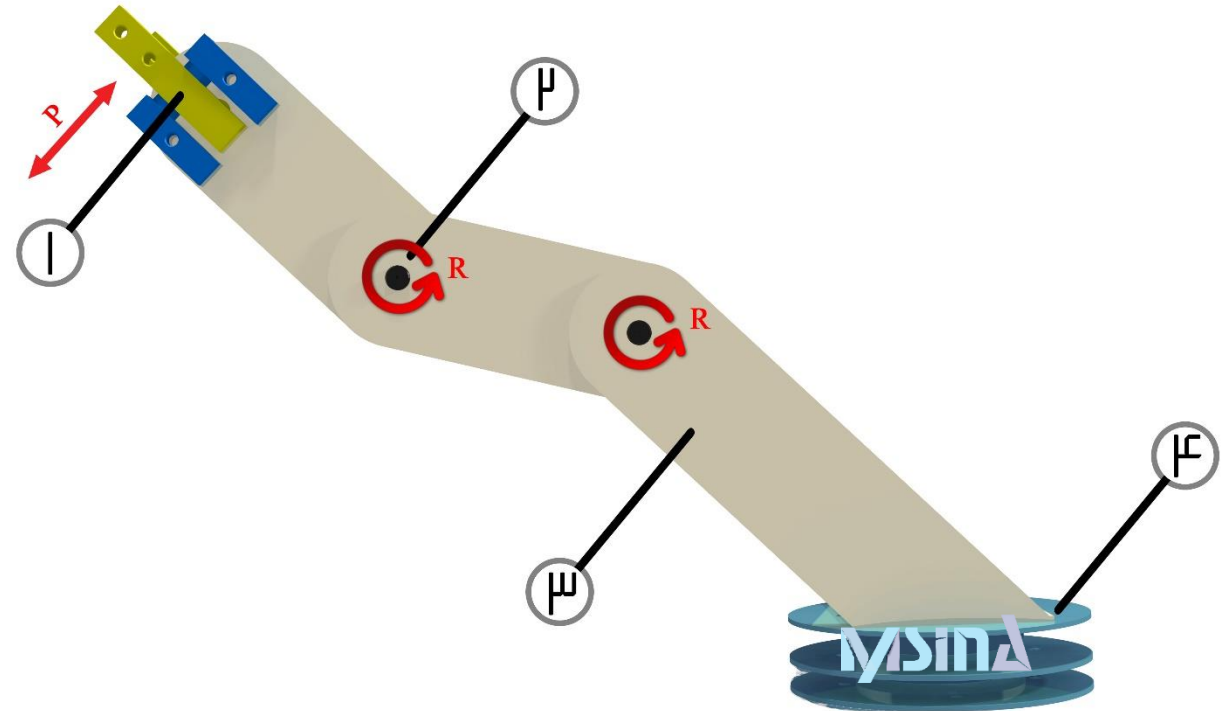


Materials & Methods

Main Components of the Robot Arm



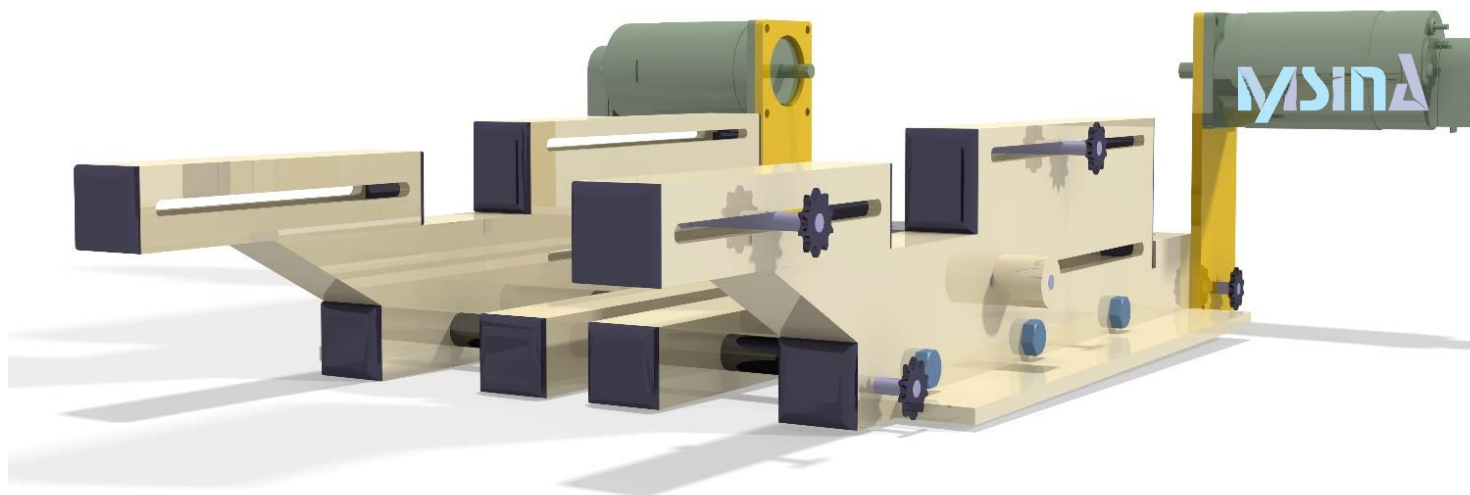
Item	Name	QTY
1	Gripper	12
2	Servo Motor	14
3	Link Plate	3
4	Base	8





Materials & Methods

Robot Mechanical Design



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Design Robot Control

Main Components of the Robot Control



Servo Motor
Power Transfer
Arm

RB-Hit-30-120



Ultrasonic
Measure of
Distance

SRF02



DC Motor
Power Transfer
Chain

12V / 100W



Encoder
Measure Linear
Distance

ECW1J-B24

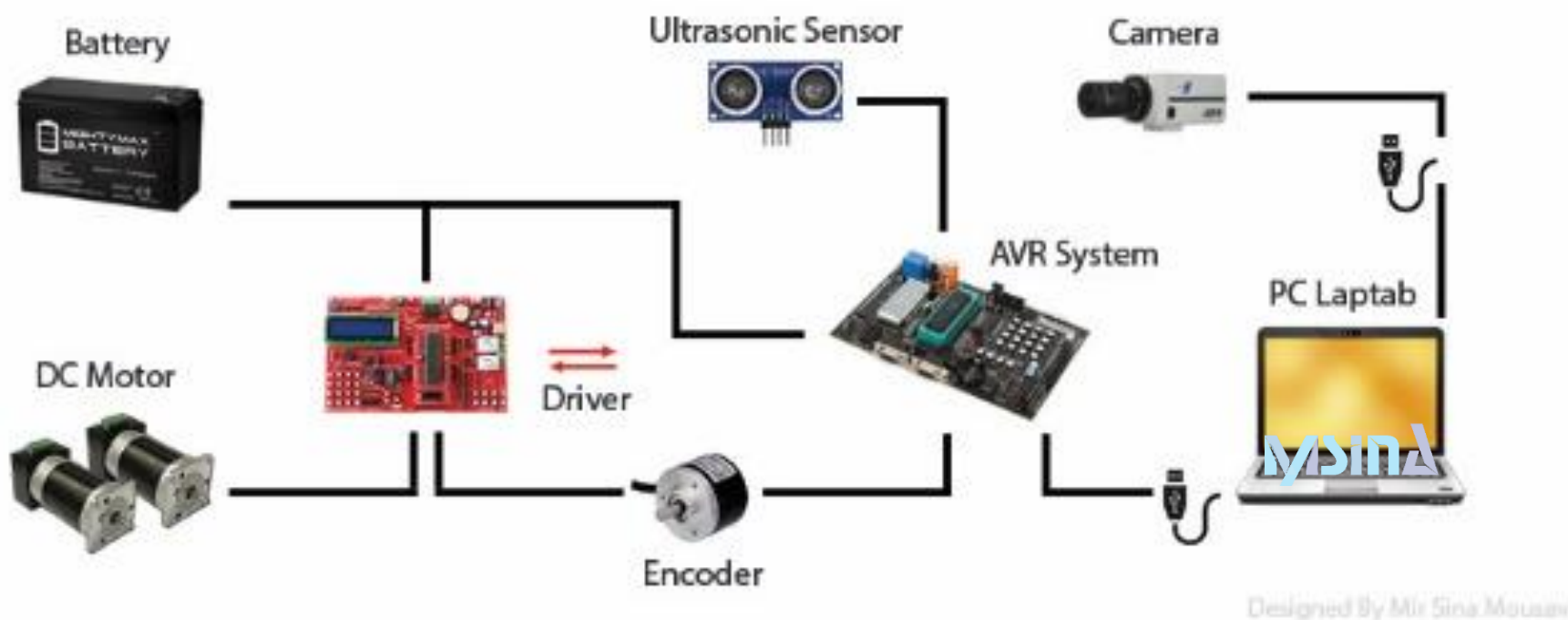


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Position of the Robot

Flowchart Image of Robot Performance

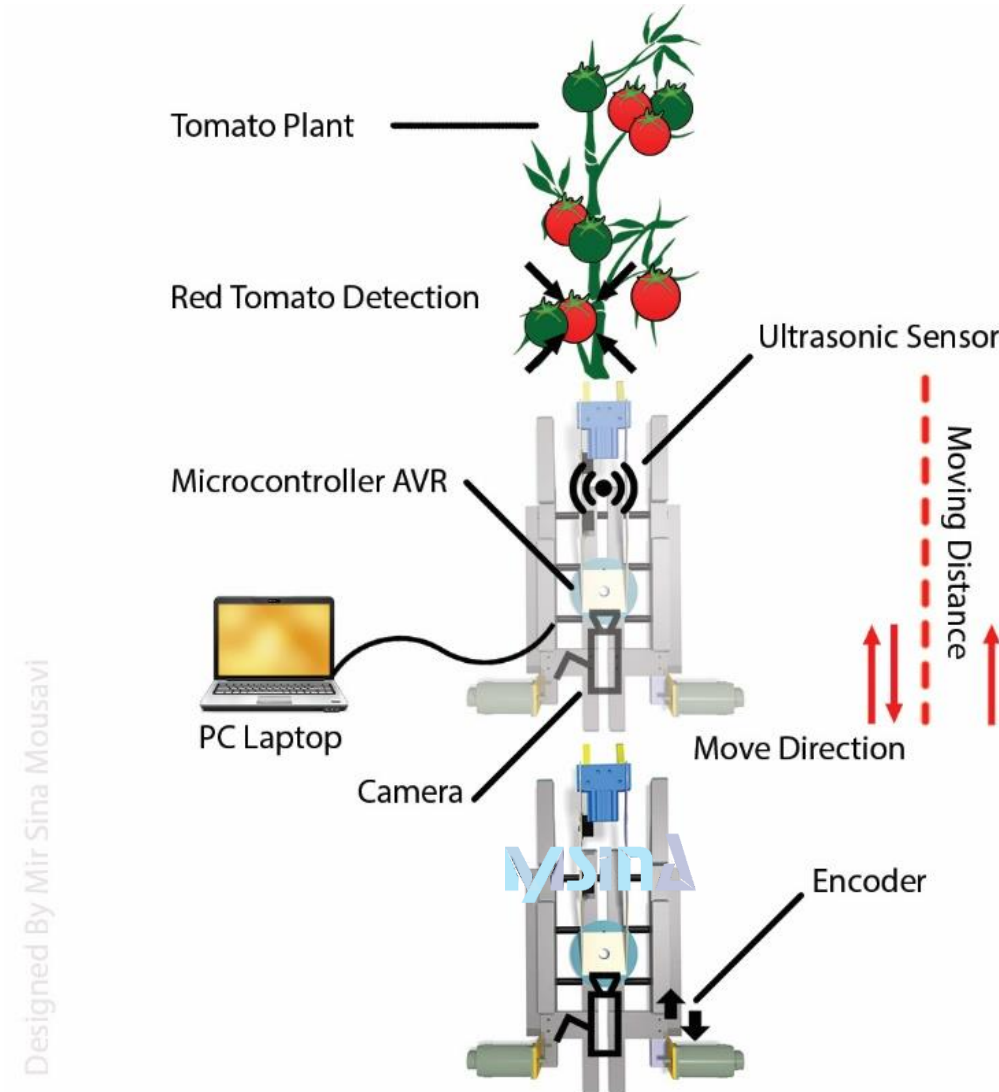


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Position of the Robot

Schematic Image of Robot Movement





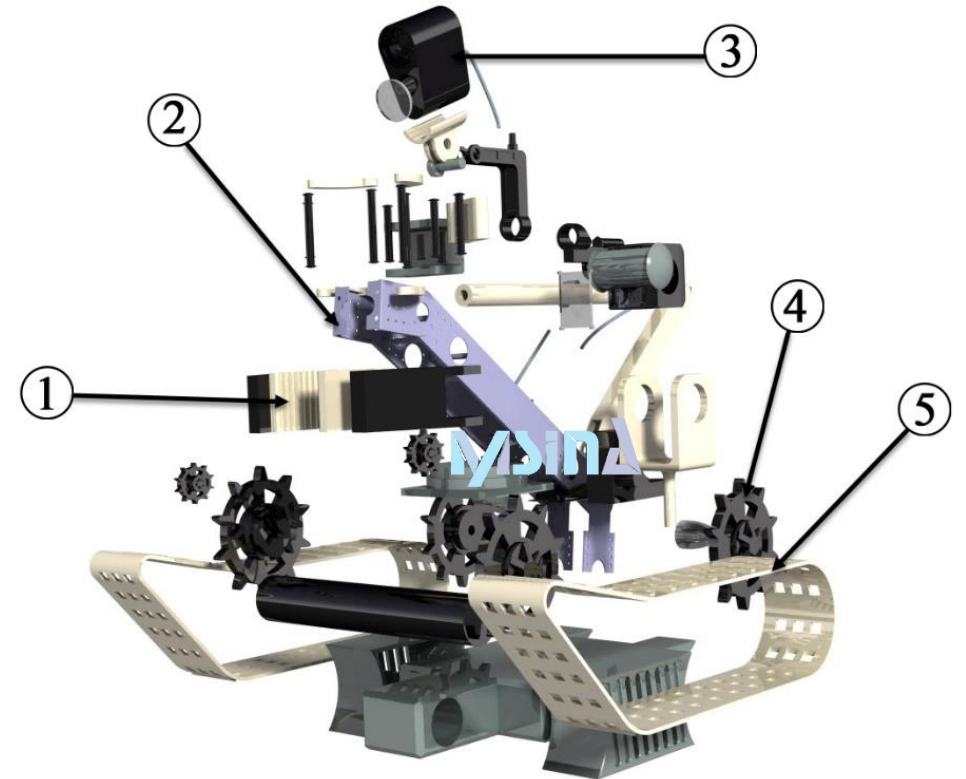
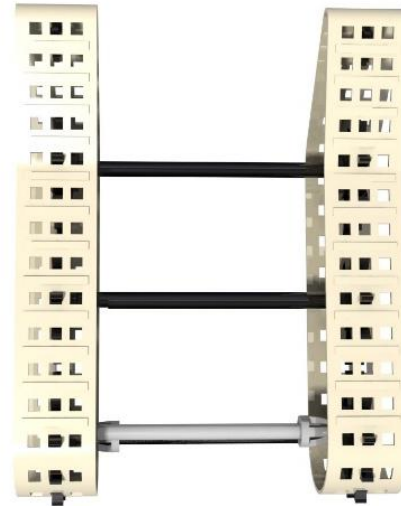
Materials & Methods

Robot Mechanical Design

Main Components of the Robot in Explosive Form



Item	Name	QTY
1	Gripper	1
2	Arm	3
3	Camera	1
4	Rack	12
5	Chain	1



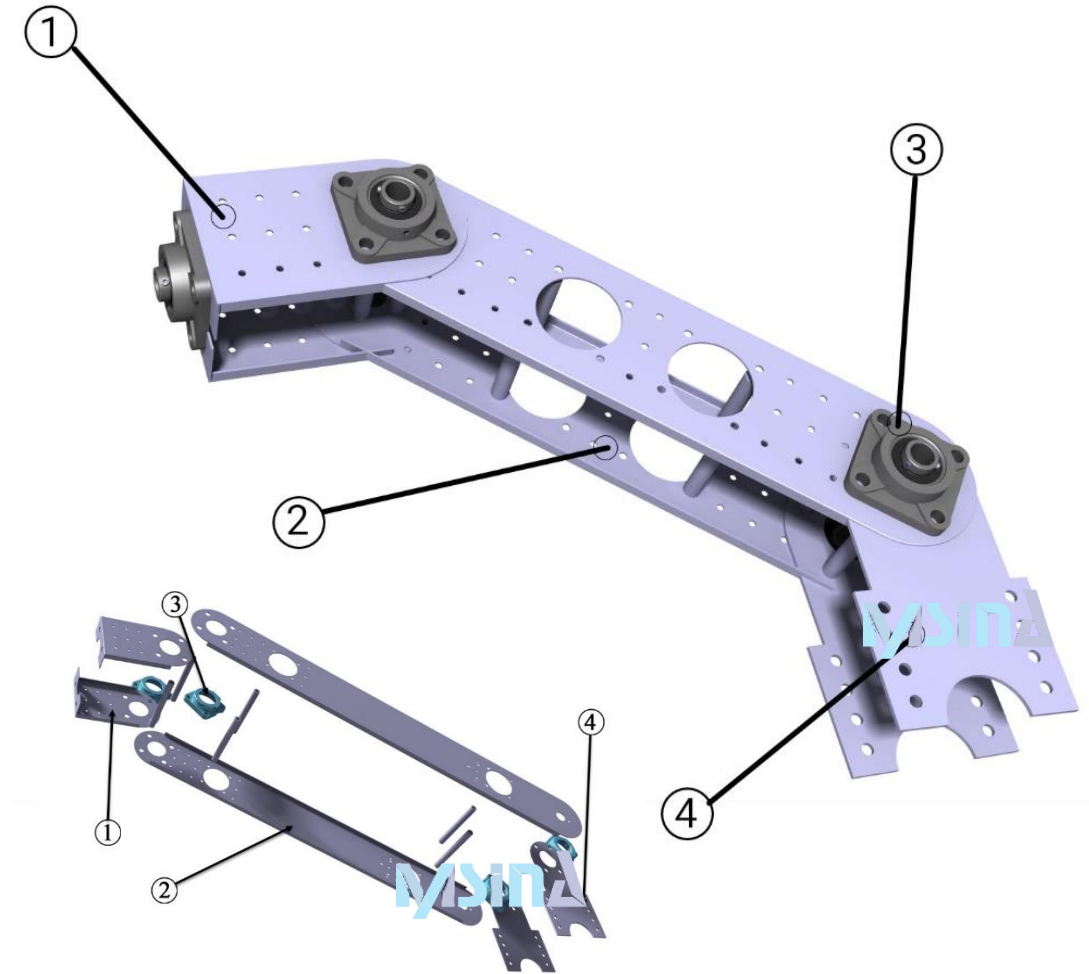


Robot Mechanical Design



Main Components of the Robot Arm in Explosive Form

1		Head Plate L: 150mm W:100
2		Middle Plate L: 650mm W:100
3		Bearing Housings UCF204
4		Base Plate L: 350mm W:150



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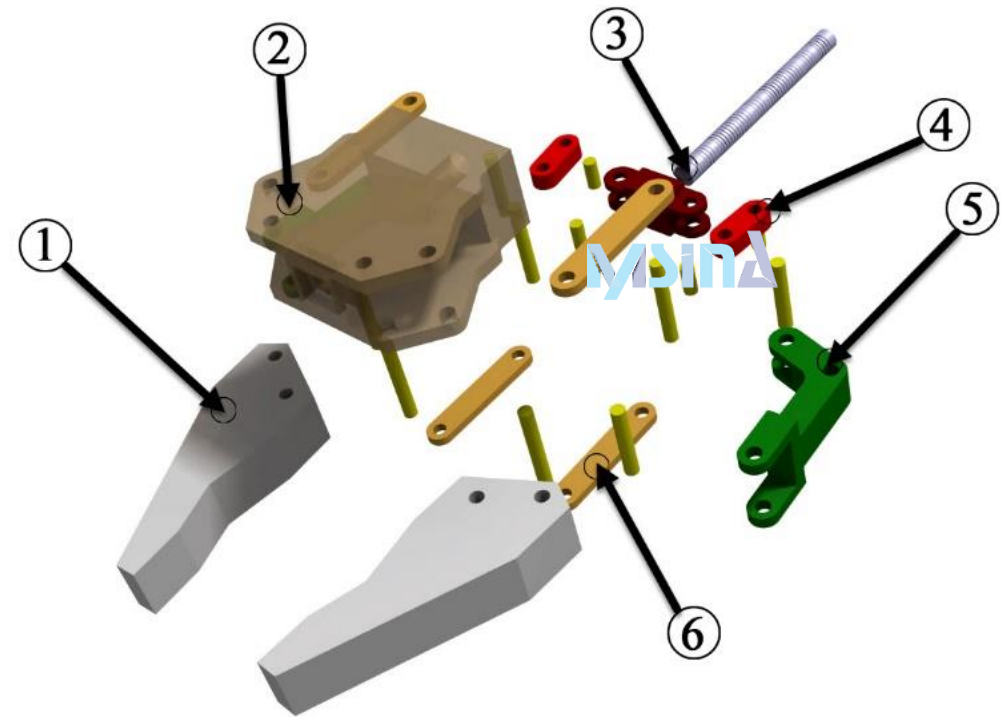


Robot Mechanical Design



Main Components of the End Effector

Number	QTY	Name
1	2	Paw
2	1	Body
3	1	Screw
4	2	Base Pin
5	2	Clamp
6	4	L Clamp





Design Robot Control

Main Components of the Robot Control



Servo Motor

Power Transfer

Delta / 75KW-
3000r/min



DC Motor

Power Transfer

Wheel

24V / 250W



Servo Drive

Control Position

Delta / 750W-
ASDA-B2



Controller

Robot Control

Radonix PC Pro
LAN-6Axis





Schematic Image of Robot Movement





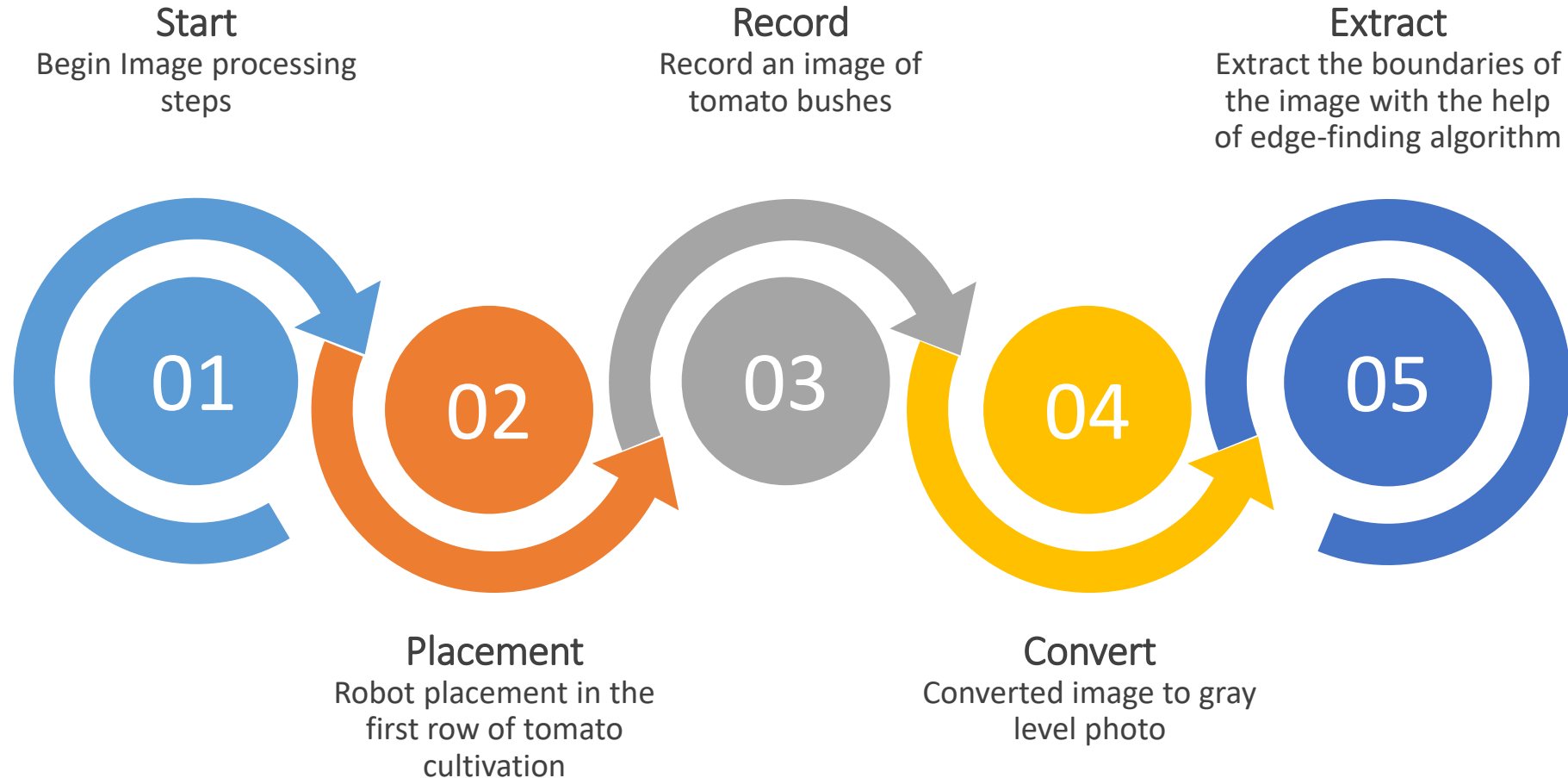
IMAGE PROCESSING





Product Identification Algorithm by Robot Camera

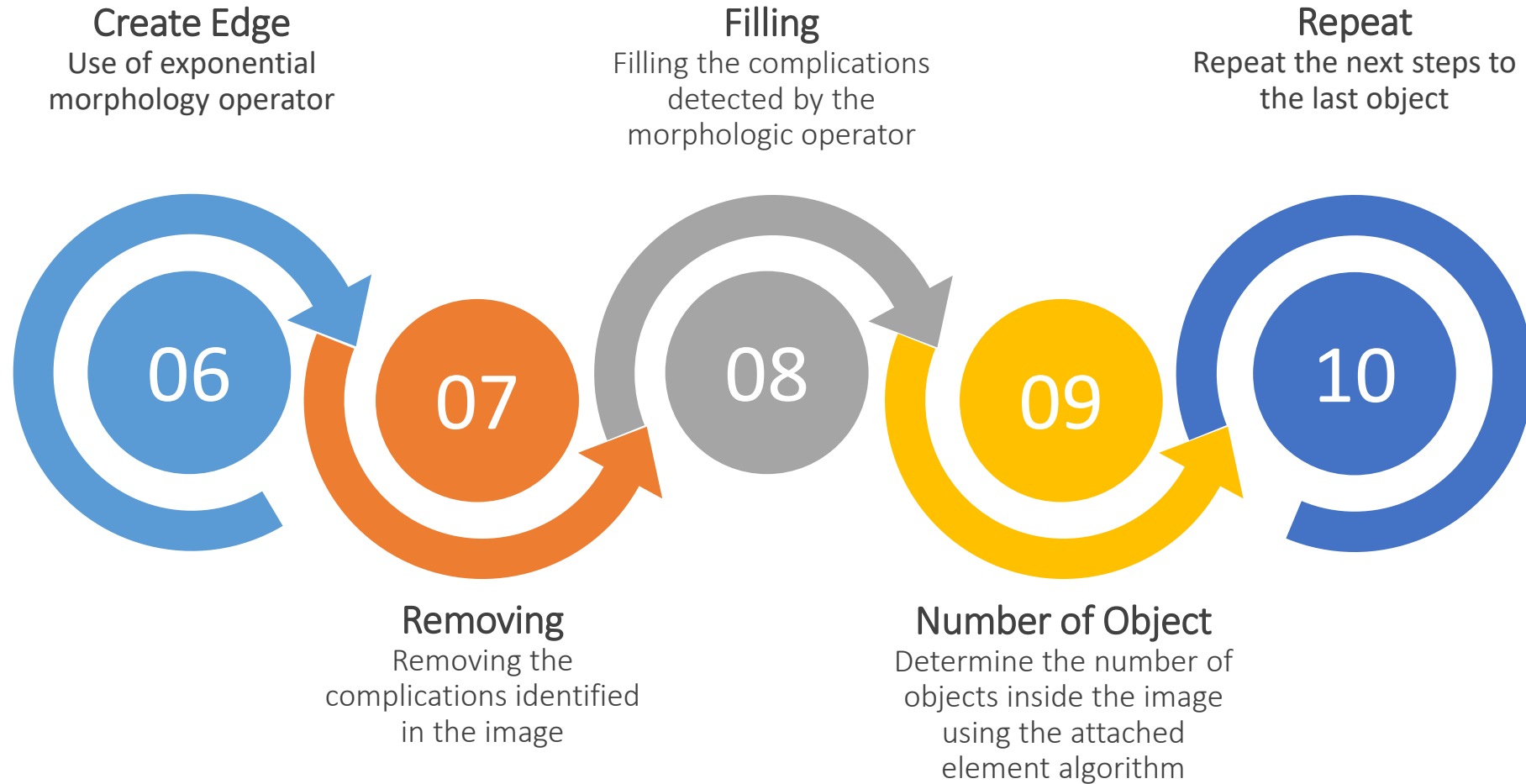
Image Processing





Product Identification Algorithm by Robot Camera

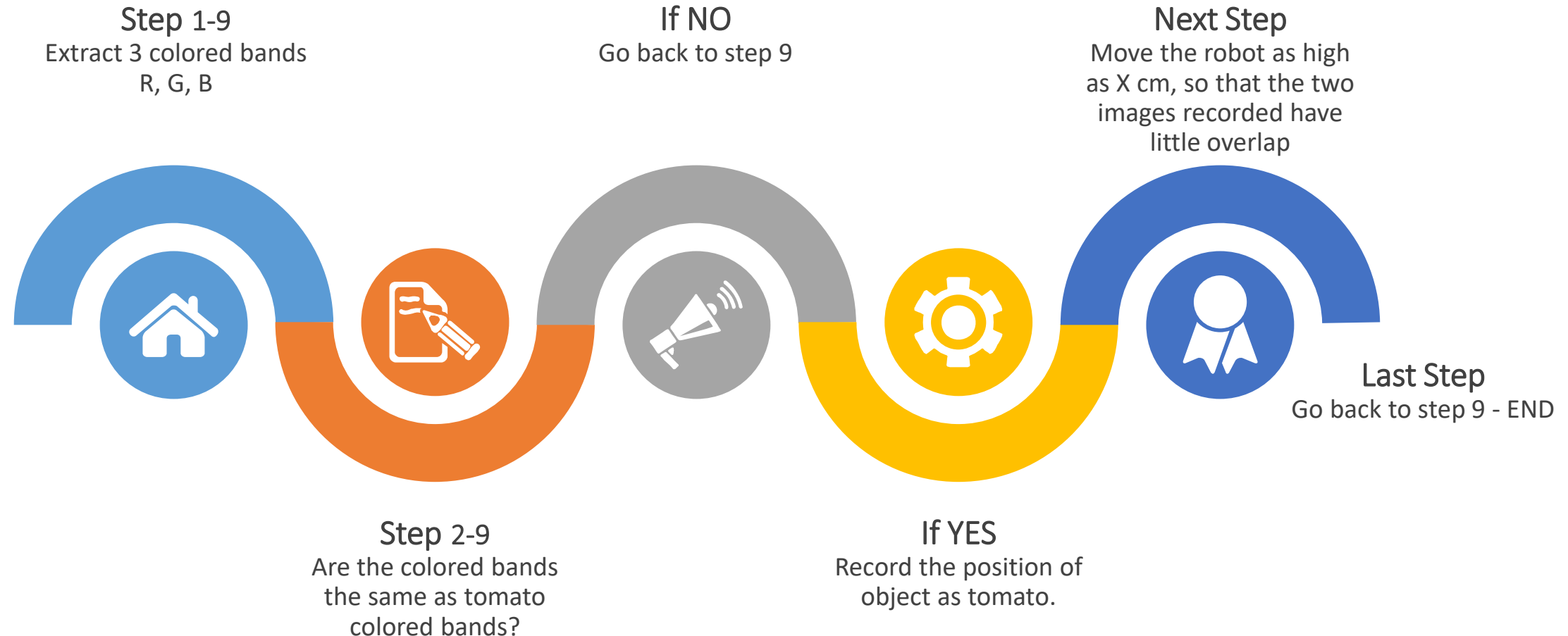
Image Processing





Product Identification Algorithm by Robot Camera

Image Processing





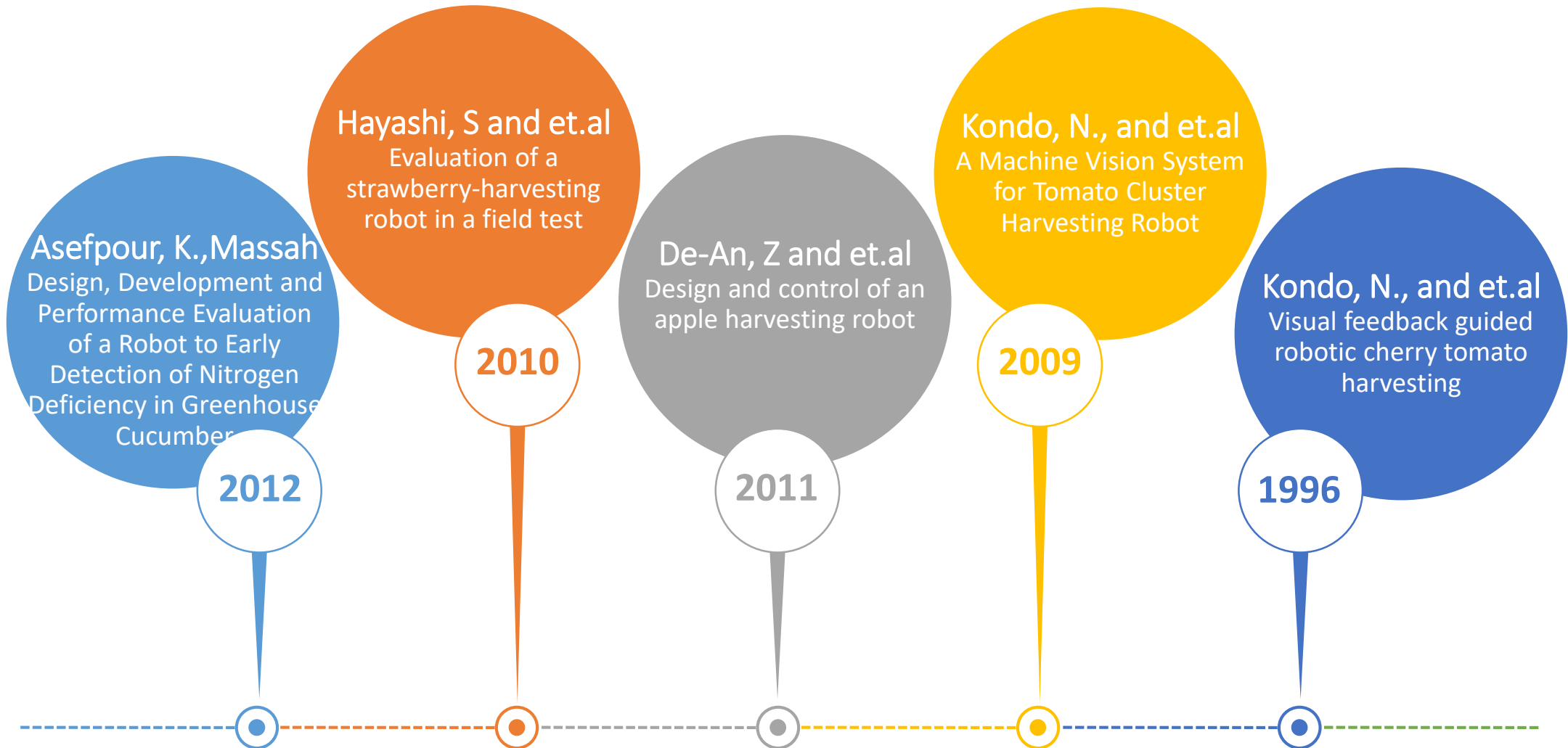
REFERENCES





References

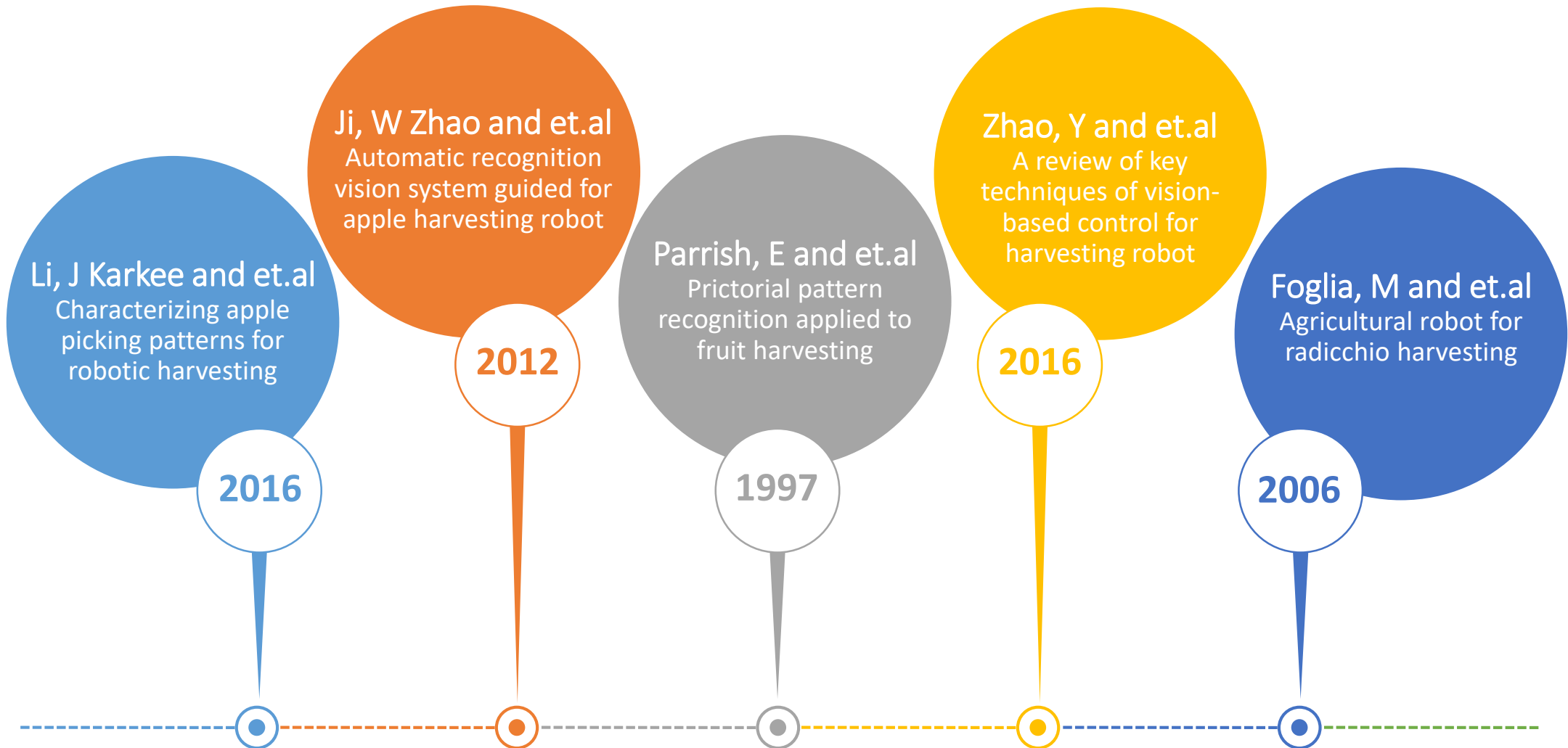
Main References





References

Main References





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My Advisors:

Dr. Mohammad Reza Kamandar

Dr. Keyvan Asefpour

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Eng. Arash Karimi

Dr. Keyvan Asefpour



Provider:
Mir Sina Mousavi
(M.Sc Student)

Supervisor:
Dr. Jafar Massah
(Associate Professore)

THANK YOU
EVERYONE

MSina