

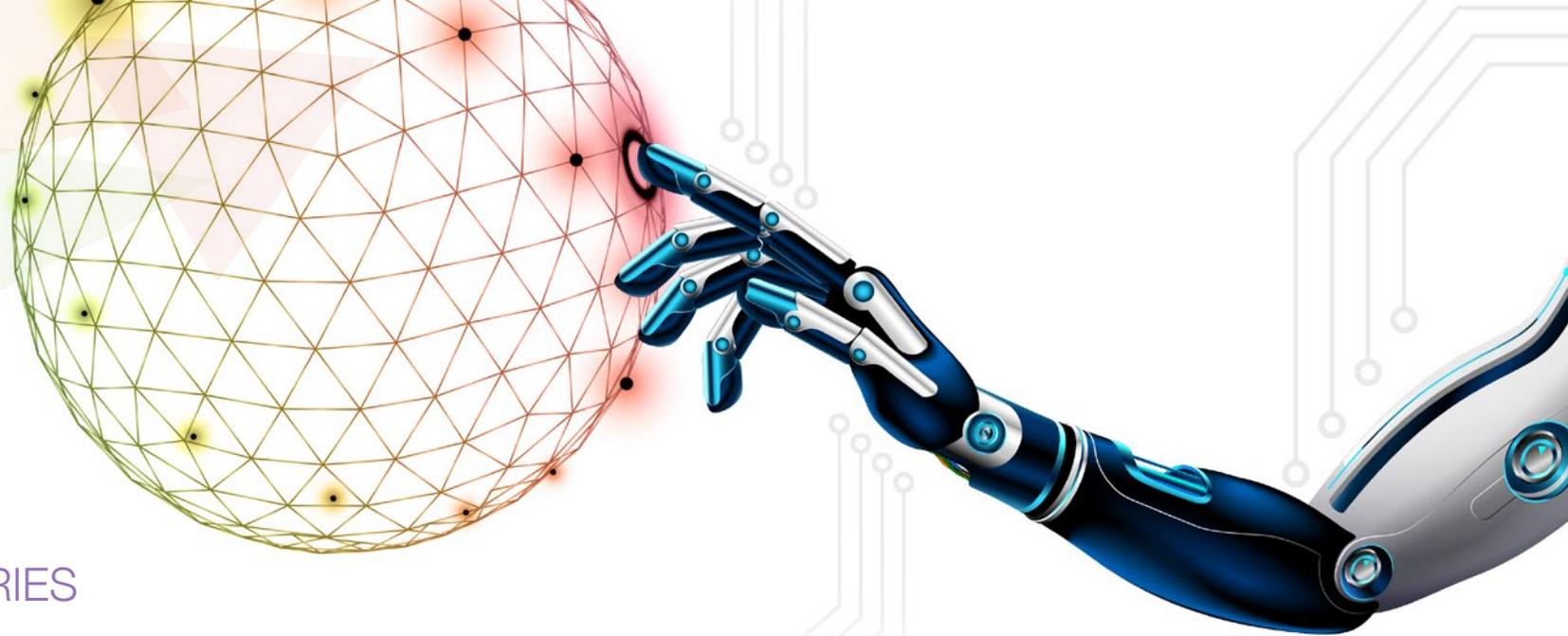


# THAILAND'S AUTOMATION & ROBOTICS

THE RISE OF AUTOMATION AND  
ROBOTICS INDUSTRIES



Thailand Board of Investment  
[www.boi.go.th](http://www.boi.go.th)



## THE RISE OF AUTOMATION AND ROBOTICS INDUSTRIES

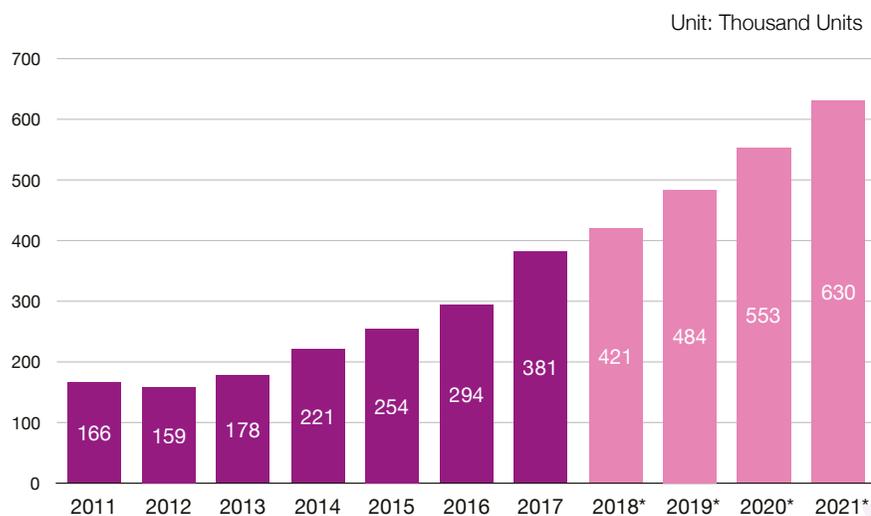
Over the past decade, the industrial automation and robotics industries have radically transformed global productivity. The capabilities of automation systems will significantly reduce investment costs and change the landscape of modern production. The rise in the global shipment of industrial robots clearly reflects the increasingly widespread use of the technology. The growth of the industry's global market is expected to continue its upward trend at a promising rate, potentially reaching 630,000 units worldwide by 2020.

As the technology becomes more intelligent, manageable and diverse, automation and robotics will play a bigger role in generating and creating value. In addition, concerns over the reliability, profitability and safety of automation have declined, helping to boost the growth of the industries.

## LARGE MARKET FOR INDUSTRIAL ROBOTS

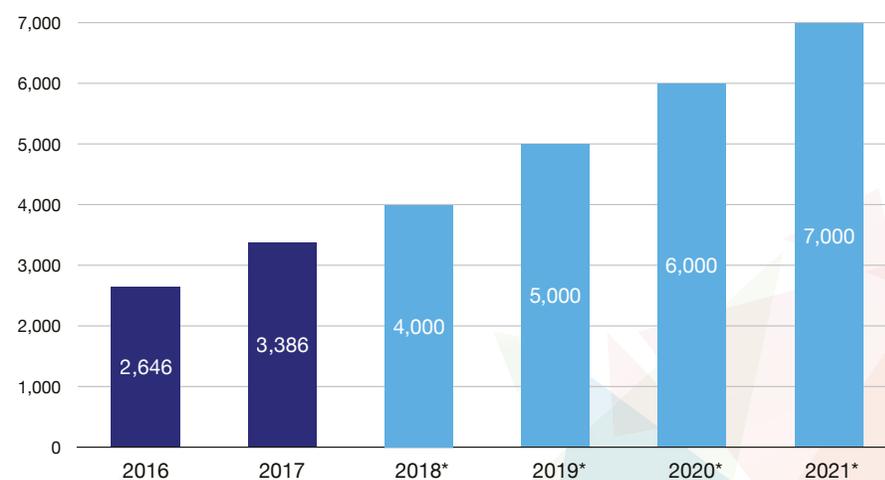
When it comes to the trend of using automation and robotics, Thailand is no exception. The country is already a significant market for industrial robots. In 2017, Thailand was the 3<sup>rd</sup> largest market in ASEAN and, by 2018, it was estimated to have become the 2<sup>nd</sup> largest. Recognizing the importance of automation and robotics, the Thai government has implemented various measures to promote the growth of these key industries. The use of industrial robots in the country is therefore expected to continue growing.

**Estimated Worldwide Annual Supply of Industrial Robots<sup>1</sup>**



Note: \* Forecast Data  
Source: <sup>1</sup> International Federation of Robotics as of 2018

**Forecast of Thailand's Industrial Robots Shipment<sup>1</sup>**

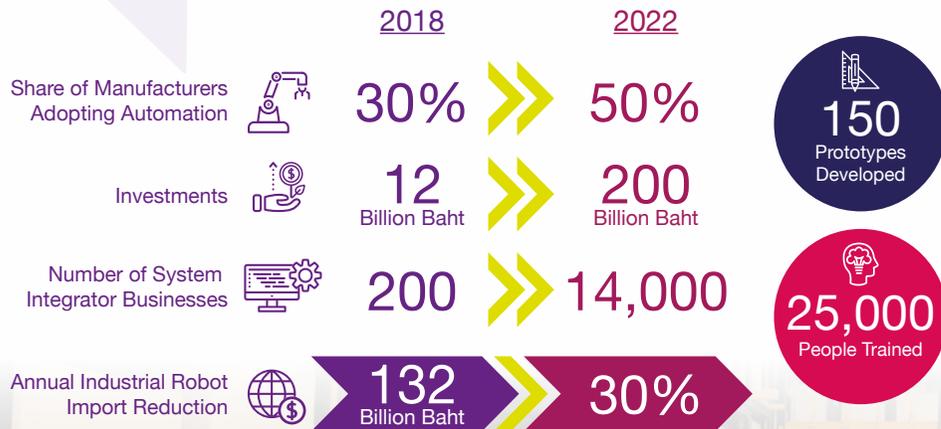


Note: \* Forecast Data  
Source: <sup>1</sup> International Federation of Robotics as of 2018

## UNTAPPED OPPORTUNITY GROWTH

Despite the already significant size of Thailand's robotics and automation systems markets, there is still room for major growth in this area. Research by SCB Economic Intelligence Center suggests that, in 2017, Thai companies still employed approximately 2 million workers to perform repetitive or labor-intensive tasks in automotive electronic parts production and food and beverage industries. This represents huge untapped opportunities for enterprises aiming to supply robotics and automation systems to businesses in Thailand.

### Thailand's Expectations Over The Next 5 Years<sup>1</sup>

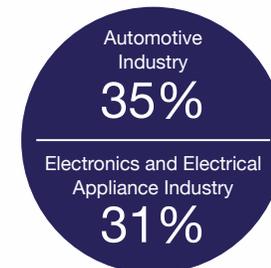


## THE NEED FOR AUTOMATION IN OTHER INDUSTRIES

Since 2010, the global automotive and electronics and electrical appliance industries have been the main customers for industrial robots (IR). This is also the case for Thailand with the country specializing in these two industries and ranked as one of the world's leading exporters. With these industries having led the way over the last three decades, it is reasonable to expect that they will continue to be the drivers of IR growth in Thailand.

Another industry which is a significant customer of IR is food and beverage. Thailand, as a net exporter of food and beverage, is home to many well-known international and local companies producing a wide array of products.

### Top Industry Adopting Industrial Robots<sup>1</sup>



### Thailand's Automotive Industry 2017



### Thailand's Electronics and Electrical Appliance 2017<sup>4</sup>



Source: <sup>1</sup>OpenGov Royal Thai Embassy of Washington D.C.

Source: <sup>1</sup> International Federation of Robotics as of 2017,  
<sup>2</sup> Organisation Internationale des Constructeurs d'Automobiles,  
<sup>3</sup> Bank of Thailand,  
<sup>4</sup> International Trade Centre

# SUPPLY CHAIN OF THAI AUTOMATION AND ROBOTICS INDUSTRIES

Thailand has established a strong supply chain in the automation and robotics industries. A majority of firms in the industries are in the business of System Integration (SI) and mechanical brain & software development. This represents massive opportunities for foreign companies to investment in parts & components manufacturing.

## Supply Chain<sup>1</sup>

## Capabilities of Thai Automation and Robotics Industries<sup>2</sup>

## Example of Players<sup>3</sup>



Focus on producing mechanic parts, such as gears, joints, and springs that can also be used in other industries' processes and importing highly complicated parts such as sensors from abroad.



Have a strong ability to develop programs or software, but only for in-house use or specific order requests, not for mass production.



Have a strong potential for service robots even at the starting point for industrial and medical robotics development.



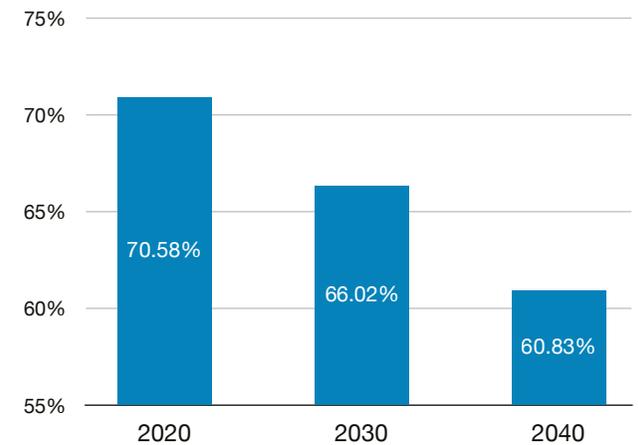
Most players are multinational companies.



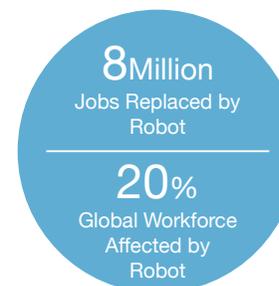
## SUPPORTING FACTORS: CHANGE IN DEMOGRAPHY

As is the case with many countries, Thailand is shifting towards an aging society. It can therefore be expected that there will be a decrease in the size of its workforce. This will create a need for enterprises to adopt robot and automation technology to compensate for the missing workforce. By 2030, it is forecast that 15% of Thai manufacturing workers will be replaced by robots.

Share of Thailand's Working Age Population<sup>1</sup>



### World<sup>2</sup>



### Thailand<sup>3</sup>



Source: <sup>1,2</sup> National Science and Technology Development Agency, <sup>3</sup> Thai Automation and Robotics Association

Source: <sup>1</sup> United Nations, <sup>2</sup> McKinsey Global Institute, <sup>3</sup> SCB Economic Intelligence Center



## SUPPORTING FACTORS: AVAILABILITY OF SKILLED HUMAN RESOURCES

Thailand has a large supply of highly-skilled labor. On average, over 20% of all graduates each year study in automation and robotics related fields. In 2017, there were 346,100 new graduates from 148 surveyed universities and vocational schools. In that year, Thailand had 74,429 graduates in automation and robotics related fields, including 40,477 engineering students and 33,952 students in sciences, math and computing fields. The quality of Thailand's students and graduates is internationally competitive. This is reflected in Thailand's achievements in robot competitions and related events at the international and global levels.

Recent Thai Achievements	Year
Winner of Open Category (Elementary), World Robotic Olympiad <sup>1</sup>	2016
Host of Thailand Robotic Week and RoboCup Asia-Pacific <sup>2</sup>	2017
1 <sup>st</sup> Runner Up for World RoboCup Rescue (Robot) Competition in Japan <sup>3</sup>	2017
Winner of Advanced Robotic Challenge, World Robot Olympiad <sup>4</sup>	2017
2 <sup>nd</sup> Runner Up for ABU Asia-Pacific Robot Contest in Japan <sup>5</sup>	2017
Host of World Robotic Olympiad Competition <sup>6</sup>	2018
Won 10 prizes at Robot Challenge in China <sup>7</sup>	2018
Won 6 prizes at International Robotic Olympiad in Hong Kong <sup>8</sup>	2018

Source: <sup>1,4,6</sup> World Robot Olympiad Association,  
<sup>2,3</sup> RoboCup Federation,  
<sup>5</sup> ABU Robocon 2017,  
<sup>7</sup> RobotChallenge Community,  
<sup>8</sup> Hong Kong Robotic Olympic Association

## SUPPORTING FACTORS: AUTOMATION AND ROBOTICS PROGRAMS

To support automation and robotics growth in Thailand, many institutions have provided support for research and development and human resource training. Some universities also offer specific programs which mainly focus on robotics and automation engineering.

### Example of Automation and Robotics Programs



#### King Mongkut's University of Technology North Bangkok (KMUTNB)

- Bachelor of Engineering in Robotic Engineering and Automation System



#### Chulalongkorn University

- Bachelor of Engineering in Robotics and Artificial Intelligence Engineering



#### King Mongkut's University of Technology Thonburi (KMUTT)

- Bachelor of Engineering in Automation Engineering
- Bachelor of Engineering in Mechatronics Engineering



#### Kasetsart University

- Bachelor of Engineering in Electrical-Mechanical Manufacturing Engineering



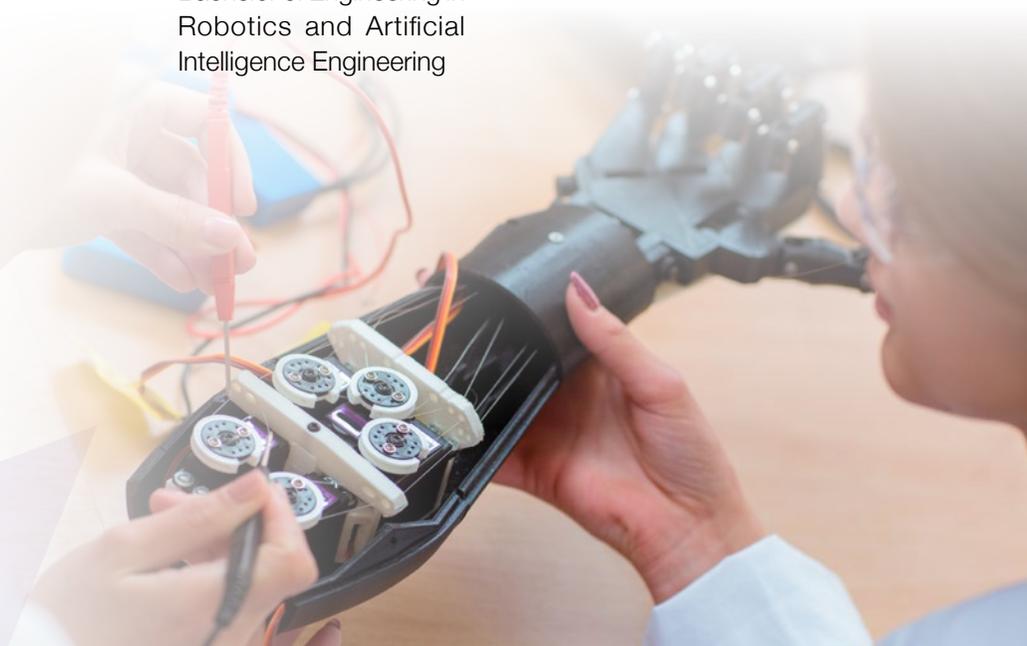
#### King Mongkut's Institute of Technology Ladkrabang (KMITL)

- Bachelor of Engineering in Automation Engineering
- Bachelor of Engineering in Robotics and Artificial Intelligence Engineering



#### Assumption University

- Bachelor of Engineering in Mechatronics Engineering



## SUPPORTING FACTORS: RESEARCH CENTERS FOR AUTOMATION

Many Thai academic institutions have been actively devoting time and resources to research on automation and robotics.



Working under the Department of Mechanical Engineering in the Faculty of Engineering at Chulalongkorn University, the Regional Center of Robotics Technology (RCRT) is one of the leading robotics technology and manufacturing research centers in Thailand. The center's topics of research mainly cover the control of mechanical systems. In most cases, the results have been transferred and utilized by real-world industries as well as experts in other related fields.



The Institute of Field Robotics (FIBO) was established in 1995 as a center of excellence in robotics and technology management. FIBO offers undergraduate and graduate programs in robotic and automation engineering. It also features a number of research laboratories – the Bio-Inspired and Educational and Robotics Lab (BEaR Lab), the Micro Robotics Lab, and the Unmanned-Vehicles and Autonomous Robots for Exploration Laboratory (UVAX), to name a few.

## SUPPORTING FACTORS: DOMESTIC AND INTERNATIONAL NETWORK

The Centre of Robotics Excellence (CoRE), established under the initiative of the Ministry of Industry, is a network of leading organizations related to the development of robotics in Thailand. Through collaboration among networking agencies, CoRE aims to enhance the use and the supply of robotics and automation systems by promoting technology transfer from academia to the industrial sector, developing human resources, and developing prototypes of industrial robots, among other initiatives.

To enhance its capacity, CoRE also plans to sign Memorandum of Understanding (MoU) with research centers in foreign countries such as Germany, Japan, Taiwan, and the USA for the purpose of advanced technology transfers.

### Domestic Network



### International Network

-  Germany: KIT (wbk) Technische Universität Darmstadt
-  Japan: DENSO
-  Taiwan: Industrial Technology Research Institute of Taiwan
-  USA: Massachusetts Institute of Technology

Source: Ministry of Industry



## SUPPORTING FACTORS: ASSOCIATIONS AND INSTITUTIONS

There are many institutions and organizations which support technological development and facilitate entrepreneurs in the fields related to automation and robotics.

### Public Agencies

	<b>National Science and Technology Development Agency</b> Supports R&D on five target areas, including, agriculture & food, health & medicine, energy & environment, bioresources & community and manufacturing & service Industries
	<b>National Metal and Materials Technology Center</b> Creates and enhances capabilities in materials technology through R&D, technology transfer, HRD and infrastructure development
	<b>Electrical and Electronic Products Testing Center</b> Supports R&D and product testing of electrical and electronic products
	<b>National Innovation Agency</b> Supports R&D of innovative products and embed innovative strategic direction of firms

### Research Institute

	<b>Thai-German Institute</b> Assists transformation of Thai manufacturing technology and automation system to meet with International standards
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### Associations

	<b>Thai Robotics Society</b> Supports research and networking within robotics community and provide public information related to robots
	<b>Thai Embedded Systems Association</b> Developer's network for electronic design industry for developers, by developers
	<b>Thai Machinery Association</b> Facilitates Thai machinery market, and support research and development of Thai manufacturing system

## SUPPORTING FACTORS: THAI AUTOMATION AND ROBOTICS ASSOCIATION (TARA)

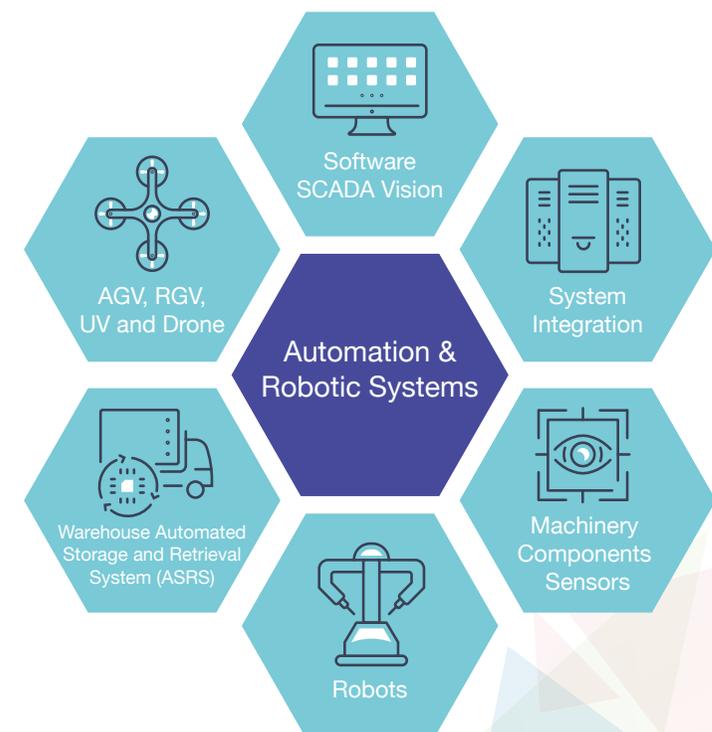
Comprised of members of the Thai business community whose specialization is in automation and robotics systems working together to help transform the country, the Thai Automation and Robotics Association (TARA) has been established since 2018. Its establishment is in line with the government's Thailand 4.0 plan - an economic model based on science, technology, and innovation.

TARA works extensively with Thailand Board of Investment (BOI) and the Center of Robotics Excellence (CoRE) to help enterprises invest in automation and robotics systems. In addition, TARA performs other duties such as:

- Providing a list of registered Thai System Integrators (SI);
- Offering training and providing technical knowledge to Thai SI; and
- Fostering design and integration for factory automation

To date, TARA has approximately 100 members covering six areas of technical capability. Logistics and healthcare are two sectors in which demand for automation and robotics are set to increase, partly due to labor shortage and Thailand's direction towards an aging society.

### TARA's Technical Capability<sup>1</sup>





## SUCCESS STORY:



### CT ASIA ROBOTICS AND DINSOW

Established in 2009, CT Asia Robotics Co., Ltd. is a Thai company with a vision to help in areas where there is a shortage of human resources, such as healthcare services. Since it was founded, the company has been highly successful in developing and commercializing a series of robots, with "Dinsow" being considered the most well-known of these at the international level.

## EXAMPLE OF THAI ROBOTS

A great number of companies and institutions in Thailand have already produced a wide variety of robots, some of which have won international awards while others are now in service performing various tasks.



### ZEABUS AUV:

An autonomous underwater vehicle (AUV) developed by Kasetsart University, ZEABUS AUV has participated in the RoboSub Competition since 2014.



### BART LAB Surgical Robot:

Developed by BART LAB, Faculty of Engineering, Mahidol University, this surgical robot system is used to assist surgeons and enhance performance.



### Ohm:

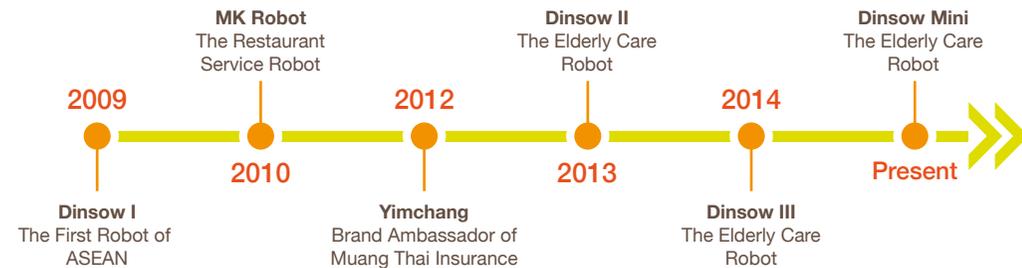
A receptionist robot, Ohm was developed from an earlier-generation robot called "Namo" and is capable of recording and projecting memories through a built-in video camera and projector.

### Fhasai:

Providing robot-assisted therapy for children with autism spectrum disorders, Fhasai was the winner of the medical robotics idea contest, Med Bot 2014, developed by Mahidol University.



## Timeline of CT Asia Robotics' Robots



The first robot in the Dinsow series, Dinsow I, was originally built to be used for advertising purposes at events. The Dinsow robots have since gone through further development, with more recent models being used for elderly care services.



Having first exported Dinsow to Japan in 2014, CT Asia Robotics' flagship product has achieved considerable success in the Japanese market, which is itself renowned for its own robotics technology.

Apart from Japan, CT Asia Robotics also exports its robots to Sweden and has been engaged in negotiations over exports to Germany and Singapore. Currently, the company records sales of over 70 million baht annually.



## BOI INCENTIVES: BASIC INCENTIVES

The BOI recognizes the importance of automation and robotics and offers a wide range of tax and non-tax incentives for eligible activities that meet national development objectives.

### Tax Incentives

Group	Eligible Activities	Corporate Income Tax Exemption	Exemption of Import Duty*
A1	<ul style="list-style-type: none"> <li>Automation machinery and/or automation equipment with engineering design, including automation system integration and control system configuration</li> <li>Embedded software</li> <li>High value-added software                             <ul style="list-style-type: none"> <li>Develop and provide analysis and data management software services, including big data, data analytics and predictive analytics software</li> <li>Develop system software for advanced-technology devices, including business process management</li> </ul> </li> <li>Research and development</li> <li>Engineering design</li> <li>Scientific laboratories</li> <li>Calibration services</li> </ul>	8 years (no cap)	✓
A2	<ul style="list-style-type: none"> <li>Automation machinery and/or automation equipment with engineering design, including control system configuration</li> </ul>	8 years	✓
A3	<ul style="list-style-type: none"> <li>Assembling of Robots or Automation Equipment and/or Automation Parts</li> <li>Machinery, equipment and parts and/or repair of mould and die</li> </ul>	5 years	✓

### Non-tax Incentives

- 100% foreign ownership
- Permit to own land
- Permit to bring in skilled workers and experts to work into the Kingdom

Note: \* Exemption of import duty on machinery and raw materials used in production of export products.

## BOI INCENTIVES: INCENTIVE UNDER THE MEASURES FOR IMPROVEMENT OF PRODUCTION EFFICIENCY

To stimulate the use of automation and robotics systems, the BOI has also offered incentives under the Measures for Improvement of Production Efficiency for enterprises which upgrade their technology and machinery for manufacturing.

In order to be considered for incentives, applicants must submit an investment plan for the development of the automation system being either partially or fully integrated into the production process. Eligible projects may be either BOI or non-BOI promoted projects.

### Incentives\*

# 1

**Exemption of  
Import Duty on  
Machinery**

# 2

**Corporate Income Tax  
Exemption**

- 3-year CIT exemption on the revenue of an existing project, with a CIT exemption cap not exceeding 50 percent of the investment capital\*\*.

- In case of investments in automation systems, the CIT exemption cap will be raised to 100 percent of the investment capital\*\*, on the meeting of certain conditions regarding the linkage to the automation industry.

Note: \* CIT exemption period shall start from the date of revenue derivation after promotion certificate issuance.

\*\* Excluding cost of land and working capital.

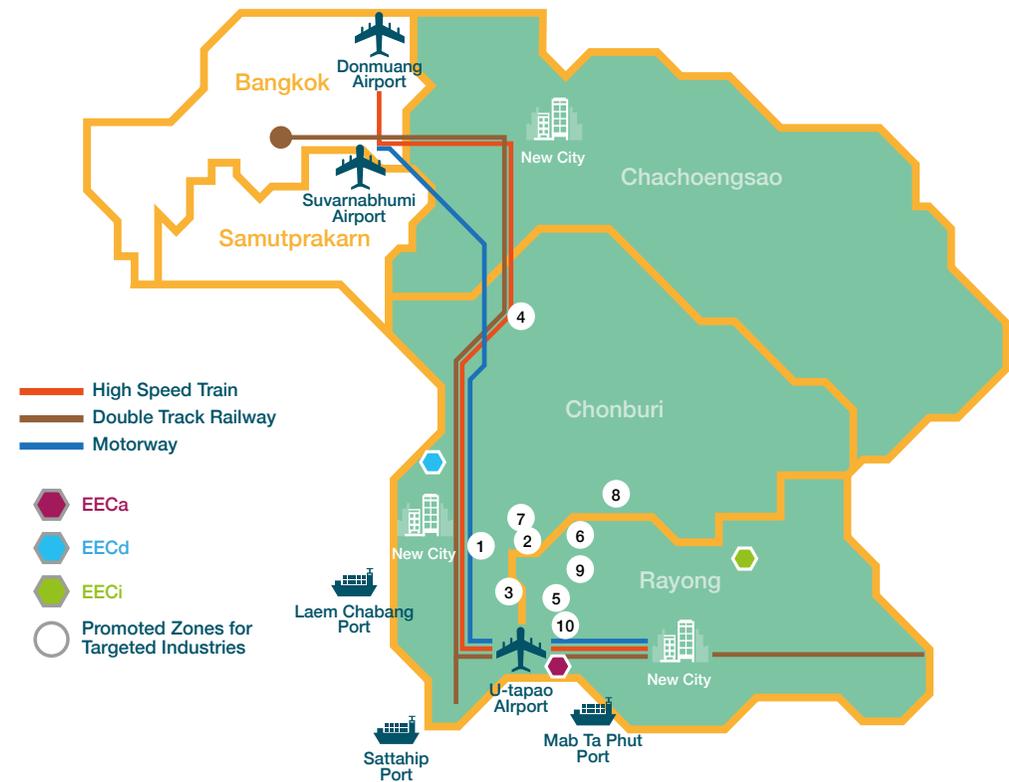
## BOI INCENTIVES: INCENTIVES FOR INVESTMENT IN THE EASTERN ECONOMIC CORRIDOR (EEC)

The BOI also recognizes the importance of investment in relevant activities in targeted locations. It has therefore been providing additional incentives for investment in the EEC. Promoted zones for specific industries related to automation and robotics include the Eastern Economic Corridor of Innovation (EECi) and Digital Park Thailand (EECd). Eligible activities located in these zones may receive additional incentives, on top of the basic incentives provided by the BOI.

### Tax Incentives

EECi		EECd	
Eligible Activities	Additional Incentives	Eligible Activities	Additional Incentives
<ul style="list-style-type: none"> <li>Automation machinery and/or automation equipment with engineering design</li> <li>Embedded software</li> <li>High value-added software</li> </ul>	4 years of CIT exemption	<ul style="list-style-type: none"> <li>Embedded software</li> <li>High value-added software</li> <li>Research and development</li> <li>Engineering design</li> <li>Scientific laboratories</li> <li>Calibration services</li> </ul>	4 years of CIT exemption
<ul style="list-style-type: none"> <li>Assembling of robots or automation equipment and/or automation parts</li> <li>Machinery, equipment and parts and/or repair of mould and die</li> </ul>	2 years of CIT exemption and a 5-year 50% CIT reduction		

Activities including automation machinery and/or automation equipment with engineering design; machinery, equipment and parts and/or repair of mould and die; and assembling of robots or automation equipment and/or automation parts located in promoted zones for targeted industries are eligible for a 5-year 50% CIT reduction, in addition to the BOI standard incentives.



### Promoted Zones for Targeted Industries

1. Pinthong Industrial Estate (PIP4) (Chonburi)
2. Pinthong Industrial Estate (PIP5) (Chonburi)
3. Amata City Chonburi Industrial Estate (Chonburi)
4. Amata City Chonburi Industrial Estate (Project 2) (Chonburi)
5. WHA 36 Industrial Estate (Rayong)
6. WHA Eastern Seaboard Industrial Estate 1 (Rayong)
7. WHA Eastern Seaboard Industrial Estate 2 (Chonburi)
8. WHA Eastern Seaboard Industrial Estate 3 (Chonburi)
9. WHA Eastern Seaboard Industrial Estate 4 (Rayong)
10. Smart Park Industrial Estate (Rayong)

The abovementioned activities, if located in promoted industrial estates or zones in the EEC provinces, may also be granted a 3-year CIT reduction in addition to the basic package.

Applications for incentives under the EEC scheme must be submitted by 30 December 2019. In addition, investment projects under the scheme must establish a collaboration with education or research institutions in forms such as Co-operative Education (CoE), Dual Vocational Training (DVT), Work Integrated Learning (WiL), or a similar cooperation, under the minimum condition that the number of students participating in the collaborative program is at least 5% of the project employees or 25 people, whichever is lower.

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