Hoang-Long Cao

English for Robotics

Tiếng Anh chuyên ngành Robot và Cơ điện tử

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Preface

This book is for students who majored in Robotics or Mechatronics. It aims at helping students (especially Vietnamese students) to learn both technical English and knowledge in robotics (and mechatronics).

The book is regularly updated to state-of-the-art knowledge in robotics and partially mechatronics and AI since these fields are closely connected.

There might be some mistakes in this book since I am not an English native speaker. Please let me know so I can correct them.

Hoang-Long Cao

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Resourses

This book has been created using the **Rmarkdown** (Allaire et al., 2020) and **bookdown** (Xie, 2020) packages within the RStudio (RStudio Team, 2018) environment.

[1] `mailto:hoanglongcao@gmail.com`
[2] `http://creativecommons.org/licenses/by-nc-sa/4.0/`

English definitions are from Cambridge Dictionary[3], and Dictionary.com[4].

Pictures are from Freepik[5]. Icons are from Flaticon[6].

About the author

I am Hoang-Long Cao (http://hoanglongcao.github.io). I am currently a postdoc researcher at the Vrije Universiteit Brussel, Belgium and a lecturer at Can Tho University, Vietnam. My research topics are social robotics, human-robot interaction, and human-robot collaboration.

[3] https://dictionary.cambridge.org
[4] https://dictionany.com
[5] http://freepik.com
[6] https://www.flaticon.com/

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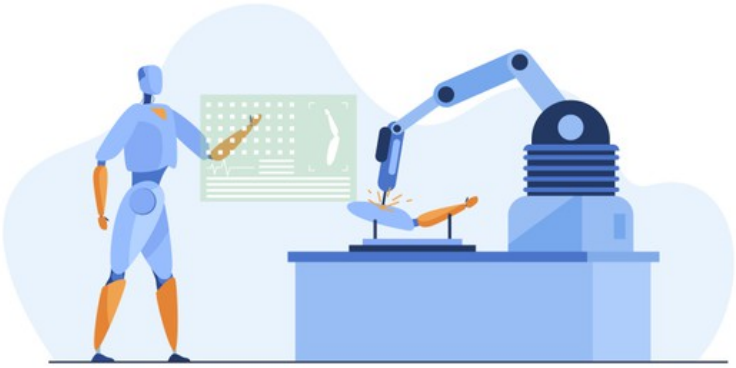
Robotics and Engineering



Robotics is an interdisciplinary research area at the interface of computer science and engineering. The goal of robotics is to design intelligent machines that can help and assist humans. Robotics draws on the fields of information engineering, computer engineering, mechanical engineering, electronic engineering, Artificial Intelligence, and others.

Source: Adapted from the Wikipedia article "Robotics" (Wikipedia contributors, 2021), which is released under the Creative Commons Attribution-Share-Alike License 3.0.

1.1 Reading: What Is Robotics?

Robotics develops machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for many purposes, but today many are used in dangerous environments (including inspection of radioactive materials, bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g. in space, underwater, in high heat, and clean up and containment of hazardous materials and radiation). Robots can take on any form but some are made to resemble humans in appearance. This is said to help in the acceptance of a robot in certain replicative behaviors usually performed by people. Such robots attempt to replicate walking, lifting, speech, cognition, or any other human activity. Many of today's robots are inspired by nature, contributing to the field of bio-inspired robotics.

The concept of creating robots that can operate autonomously dates back to classical times, but research into the functionality and potential uses of robots did not grow substantially until the 20th century. Throughout history, it has been frequently assumed by various scholars, inventors, engineers, and technicians that robots will one day be able to mimic human behavior and manage tasks in a human-like fashion. Today, robotics is a rapidly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots are built to do jobs that are hazardous to people, such as defusing bombs, finding survivors in unstable ruins, and exploring mines and shipwrecks. Robotics is also used in STEM (science, technology, engineering, and mathematics) as a teaching aid.

Robotics is a branch of engineering that involves the conception, design, manufacture, and operation of robots. This field overlaps with computer engineering, computer science (especially artificial intelligence), electronics, mechatronics, mechanical, nanotechnology and bioengineering.

Source: Adapted from the Wikipedia article "Robotics" (Wikipedia contributors, 2021), which is released under the Creative Commons Attribution-Share-Alike License 3.0.

Read the text above and match the words below with their definitions.

Words

1. robotics . . . . .
2. inventors . . . . .
3. engineers . . . . .
4. STEM . . . . .
5. artificial intelligence . . . . .
6. mechatronics . . . . .

Definitions

a. the science of making and using robots
b. the combination of mechanical engineering, computing, and electronics, as used in the design and development of new manufacturing techniques.
c. the study of how to produce computers that have some of the qualities of the human mind, such as the ability to understand language, recognize pictures, solve problems, and learn
d. someone who has invented something or whose job is to invent things
e. science, technology, engineering, and mathematics
f. a person specially trained to design and build machines, structures, and other things, including bridges, roads, vehicles, and buildings

Solution is in the footnote.[1]

[1] 1a-2d-3f-4e-5c-6b

1.2 Writing: What Can Robotics Do?

Write a paragraph about what robotics can do for a better world. An example is shown below.

> Industrial robots are mechanical devices which, to a certain degree, replicate human motions. They are used whenever there is a need to reduce the danger to a human, provide more strength or accuracy than a human, or when continuous operation is required. Most robots are stationary, but some move throughout the workplace delivering materials and supplies.
>
> — "Industrial Robot". (encyclopedia.com, 2020)

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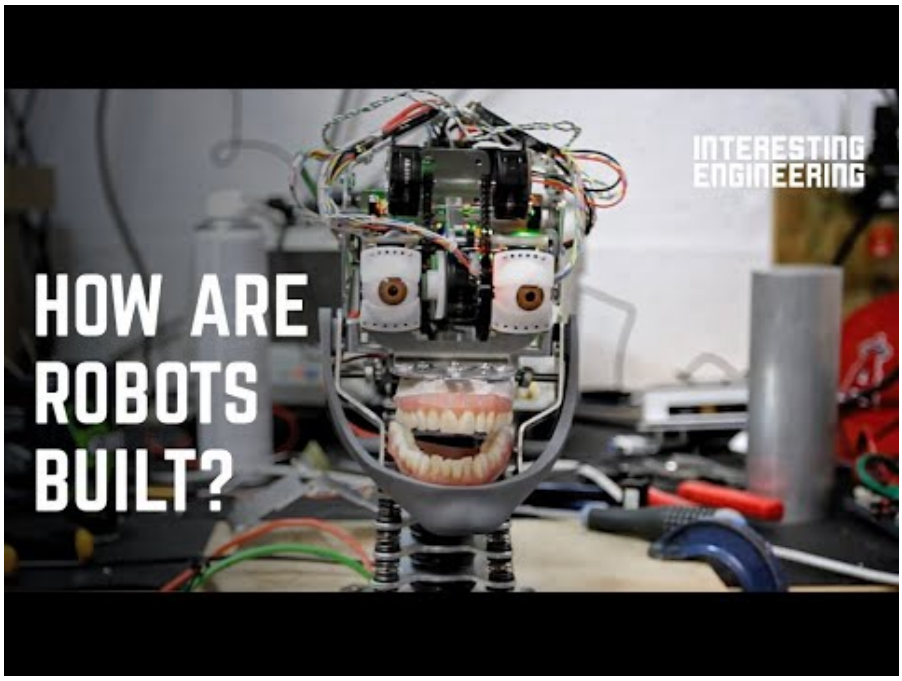
1.3 Speaking: Robots Help People

Dicuss with your classmates about how robotics can help people.

1.4 Listening: How Are Robots Built?



Source: "How are robots built?". Youtube. https://www.youtube.com/watch?v=oHKCwyUa2r (Interesting Engineering, 2020).

Listen to the video and fill in the blanks

Robots have jumped from the screen and ..... pages into our reality disrupting almost every modern industry.

Agriculture, space, travel, medicine, and ..... are just a couple of places robots have begun to appear.

You could argue that they have already started to take over our world.

Just in the past few decades, robots have reached new heights.

The continual and rapid progress of ..... paired with

readily available large datasets, lower prices for . . . . . , and a steady demand for efficiency has created the perfect storm for engineered . . . . . .

Yet you should not be intimidated by robots.

Though robots are certainly complicated pieces of machinery, they are also delightfully simple to understand.

In a lot of cases, robots are based on us humans.

You can even build your own simple robot at home.

Solution is in the footnote.[2]

1.5 My Glossary

Translate these terms into your language.

robotics . . . . . .

artificial intelligence . . . . . .

mechatronics . . . . . .

engineer . . . . . .

manufacturing . . . . . .

technology . . . . . .

innovation . . . . . .

electronics . . . . . .

sensors . . . . . .

motors . . . . . .

[2] science fiction; manufacturing; artificial intelligence; sensors and electronics; innovation.

Bibliography

Allaire, J., Xie, Y., McPherson, J., Luraschi, J., Ushey, K., Atkins, A., Wickham, H., Cheng, J., Chang, W., and Iannone, R. (2020). *rmarkdown: Dynamic Documents for R*. R package version 2.6.

encyclopedia.com (2020). Industrial robot. [Online; accessed 05-January-2021].

Interesting Engineering (2020). How are robots built? — Youtube. [Online; accessed 05-January-2021].

RStudio Team (2018). *RStudio: Integrated Development Environment for R*. RStudio, Inc., Boston, MA.

Wikipedia contributors (2021). Robotics — Wikipedia, the free encyclopedia. [Online; accessed 05-January-2021].

Xie, Y. (2020). *bookdown: Authoring Books and Technical Documents with R Markdown*. R package version 0.21.