

Intellectual Output 1

A4 Module development
MODULE CONTENT 3



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1.1 Learning Outcomes

This module mainly focuses on the IP concept of patents. Everyday we all use a large variety of products, services and objects of technology of various types. They reflect the constant advances in science, technology and engineering, and altogether they comprise our technological civilization. What is not widely known is that each of them consists of a plethora of inventions and innovative solutions which are related to a large number of patents.

After completing this module, you will be able to:

- understand what patents are and why they are an important concept of IP.
- comprehend how important they are in supporting and encouraging innovation in our technological world.
- experience yourself what a patent application is, how a real patent document looks like, how many patents exist related to our everyday life technological objects, products and services.
- combine the concept of patents with the subject of robotics and in particular of robotic arms.

Estimated seat time: about 45 minutes or equivalent of one standard classroom hour is needed to complete this module in a classroom of 20-25 students.

1.2 Main Content

1.2.1 Terms and Definitions

Patents

A formal definition of the term, its purpose and use as given by the European Patent Office and the Copyright School Project of the Hellenic Copyright Organization is the following: A

patent grants innovators protection for an invention. An invention is a solution to a specific technological problem in the form of a product or a process that makes our life easier or better. When a new solution is successful, it becomes a powerful tool in the hands of the innovator and an important competitive advantage for a company in the market. Therefore, it is very likely that competitors will want to make similar or identical products. To protect the innovator and encourage further creativity, a patent allows the innovator to prevent others from remaking, using, selling or importing a product that copies their invention.

A patent blocks a particular technology and improvements, which is why patent validity is limited in time. The maximum term of protection for a European patent is 20 years from its filing date.

In Europe, to be patentable, an invention must fulfill three requirements:

Novelty: It was not previously known to the public in any form, anywhere at anytime.

Inventive step: It must go one step beyond what was already known. It can't be a simple 'continuity' or 'variation' of what already existed.

Industrially applicable: It can be manufactured or used on an industrial scale.

Robotic arm

A concise definition of the term, its purpose and use as given in the Wikipedia – The Free Encyclopedia is the following: A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm. The arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion or translational displacement.

The typical applications of industrial robotic arms are welding, painting, assembly, pick and place of objects, packaging, labeling, palletizing, product inspection, and testing. They also have the ability to assist in material handling and/or provide interfaces to human operators.

1.2.2 Practical examples

Some representative examples of robotic arms in industrial applications and a real patent document for a medical robotic system are visualized below.



Image 1: Examples of robotic arms in industrial applications

CA 02635135 2008-06-25

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

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06101250.6 3 February 2006 (03.02.2006) EP

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(74) Agents: SCHMITT, Armand et al.; Office Ernest T. Freylinger S.A., B.P. 48, 234, route d'Arion, L-8001 Strassen (LU).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

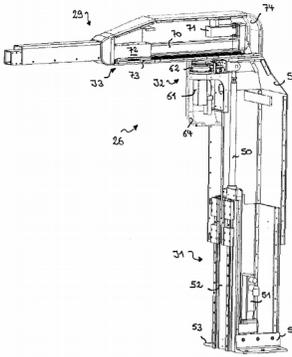
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: MEDICAL ROBOTIC SYSTEM WITH MANIPULATOR ARM OF THE CYLINDRICAL COORDINATE TYPE

WO 2007/088206 A3



(57) Abstract: A medical robotic system (10) for performing medical procedures comprises a robot manipulator (14) for robotically assisted handling of a medical instrument, in particular a laparoscopic surgery instrument (18). The robot manipulator (14) comprises a base (24); a manipulator arm (26) with an essentially vertical part (27) supported by the base and with an essentially horizontal part (29) supported by the vertical part (27); a manipulator wrist (28) supported by the manipulator arm (26); and an effector unit (30) supported by the manipulator wrist and configured for holding a medical instrument. The manipulator arm (26) has a cylindrical PRP kinematic configuration for positioning the manipulator wrist. More particularly, the PRP kinematic configuration has the following joint sequence: a prismatic (P) first joint (J1) for varying the height of the vertical part (27) by providing a translational degree of freedom along an essentially vertical axis, a revolute (R) second joint (J2) for varying the rotational angle between the vertical part (27) and the horizontal part (29) by providing a rotational degree of freedom about an essentially vertical axis, and a prismatic (P) third joint (J3) for varying the reach of the horizontal part by providing a translational degree of freedom along an essentially horizontal axis.

Image 2: Front page of a real patent document (Patent CA2635135A1: Medical robotic system with manipulator arm of the cylindrical coordinate type)

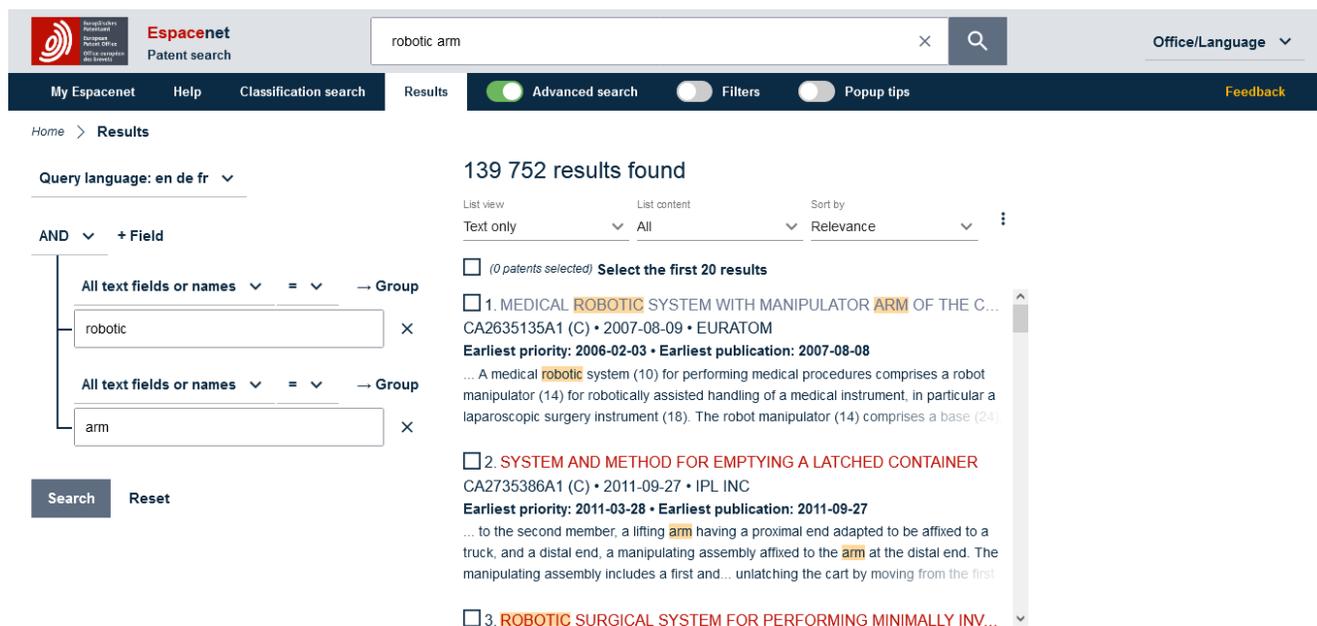
Source: Espacenet European Patent Office (<https://worldwide.espacenet.com/patent/search>)

1.2.3 Case studies

In the lesson plan that accompanies this module the main case that students study is to search for patents related to robotic arms. They are instructed to access the European Patent Office (<https://www.epo.org/>) and visit its patents search engine Espacenet at (<https://worldwide.espacenet.com/patent/search>) from where they can download patent documents they found interesting.

Another case study could have more quantitative scope. In that students are free to choose various search terms or for particular applications. Then they have to find how many patents exist per decade or multiple years, note them down and make a graph using a spreadsheet. In this way they can get a feeling or understand how technology evolves and progresses in certain fields.

A third one is proposed to be a follow up to the previous ones. Namely, students are asked to imagine an invention of robotics and automation that solves a problem that intrigues them, describe it in an essay as if it is an abstract for patent application and sketch it in a drawing. This case also may be a homework assignment so that students have ample time to work on it thoroughly.



The screenshot shows the Espacenet patent search interface. The search term 'robotic arm' is entered in the search bar. The results page displays 139,752 results found. The search criteria are 'robotic' AND 'arm'. The results are sorted by relevance. The first three results are:

- 1. MEDICAL ROBOTIC SYSTEM WITH MANIPULATOR ARM OF THE C...**
CA2635135A1 (C) • 2007-08-09 • EURATOM
Earliest priority: 2006-02-03 • Earliest publication: 2007-08-08
... A medical **robotic** system (10) for performing medical procedures comprises a robot manipulator (14) for robotically assisted handling of a medical instrument, in particular a laparoscopic surgery instrument (18). The robot manipulator (14) comprises a base (24)
- 2. SYSTEM AND METHOD FOR EMPTYING A LATCHED CONTAINER**
CA2735386A1 (C) • 2011-09-27 • IPL INC
Earliest priority: 2011-03-28 • Earliest publication: 2011-09-27
... to the second member, a lifting **arm** having a proximal end adapted to be affixed to a truck, and a distal end, a manipulating assembly affixed to the **arm** at the distal end. The manipulating assembly includes a first and... unlatching the cart by moving from the first
- 3. ROBOTIC SURGICAL SYSTEM FOR PERFORMING MINIMALLY INV...**

Image 3: Espacenet patent search database of the European Patent Office
(<https://worldwide.espacenet.com/patent/search>)

Source: European Patent Office (<https://worldwide.espacenet.com/patent/search>)

1.3 Knowledge Assessment

The following list of questions can be used to check the learners' knowledge acquisition. Correct answers are marked in bold.

Question 1:

Patents are types of IP [False] **[True]**

Question 2:

Registered patents are protected by European law for 20 years [False] **[True]**

Question 3:

A patent grants innovators protection for an invention **[True]** [False]

Question 4:

A patent cannot be sold or bought by a company/inventor [True] **[False]**

Question 5:

An invention is a solution to a specific technological problem in the form of a product or a process that makes our life easier or better **[True]** [False]

Question 6:

A patent never expires [True] **[False]**

Question 7: In Europe, an invention must fulfill the following requirements to be granted a patent:

[Novelty] [Inventive step] [Industrially applicable] **[All of the above]**

Question 8: A registered patent can be freely used by a company/individual/organization other than the inventor [True] **[False]**

Question 9:

Patents do not play a significant role in technological progress [True] **[False]**

Question 10:

Only a few patents exist for inventions related to robotic arms applications [True] **[False]**

1.4 Skills Assessment

An exercise assignment that promotes problem solving and critical thinking related to the concept of patents and in general to intellectual property was proposed above as a follow up case study. Namely, the assignment is students to imagine an invention of robotics and automation that solves a problem that intrigues them or they consider important for themselves, their community or for the society in general. They have to describe it in an essay as if it is an abstract for patent application and sketch it in a drawing.

1.5 References or additional resources

World Intellectual Property Organization

<https://www.wipo.int/about-ip/en/>

European Patent Office

<https://www.epo.org/>

Espacenet

<https://worldwide.espacenet.com/patent/search>

Greek Copyright School Project of the Hellenic Copyright Organization (HCO)

<https://copyrightschool.gr/index.php/en/teachers>