

Intellectual Output 1

A4 Module development
LESSON PLAN 3



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1.1.1 Brief description

This lesson plan is focusing on the IP concept of patents. In our everyday life we all use technological products and objects of various types, small or large, simple or complex, like cars, phones, home electrical appliances, tv's, laptops and pc's, airplanes, trains etc, the list is unlimited. Altogether they comprise our technological civilization and reflect the constant advances in science, technology and engineering. What is not widely known is that these inventions and innovative solutions consist of a large number of patents. To get more familiar with this IP concept and its significance in the following the educational activity as described below, we first understand what a patent is and why it is an important concept of IP. We combine this lesson plan with the subject of educational robotics as this subject is generally popular among school students. We can take for instance as starting point the study of a usual component like the robotic arm.

1.1.2 Learning objectives and IP topics

The learning objectives of this lesson plan are:

- To acquire understanding of what patents are.
- To comprehend how important they are in supporting and encouraging innovation in our technological world.
- To experience ourselves 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.

1.1.3 Links to curriculum

This lesson plan can be linked to the following curriculum domains:

- Information technology and computer science
- Robotics and applications
- Entrepreneurship
- History of science and technology

1.1.4 Duration

About 45 minutes or equivalent of one standard classroom hour is needed to complete this lesson plan in a classroom of 20-25 students. This lesson plan or part of it can also be implemented as homework assignment.

1.1.5 Extra materials required

Laptops or PCs with network connection. About 1 or 2 students per laptop or PC.

1.2 Step-by-step instructions

The lesson plan is divided in four inquiry phases, namely introduction, preparation, investigation and conclusion. The latter one consists of presentation and discussion subphases.

1.2.1 Introduction

In this phase the general topic to be studied or investigated is presented briefly and interest about it is stimulated and raised. The focus of this lesson plan is on one hand the abstract concept of patents and on the other the subject of robotic arms and applications with which will be linked. As the latter may be more engaging for students the teacher can start for example by asking students what they know about the topic of robotic arms and if they can think of any applications. He/she may also show some relevant photos like the one shown here. Students may be also asked to quickly search the web for some minutes and find examples of robotic arms and their possible commercial and industrial applications.



Image 1: Examples of robotic arms in industrial applications

Once this is done then the focus is directed to the IP concept of patents. As this may be less known to students the teacher can give 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:

What is a patent? 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 fulfil 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.

Then the teacher can ask students to discuss whether they think that patents are an important concept of IP or if they play a significant role in our everyday life. Students are encouraged to express their views and thinking freely and to discuss their arguments about opposing opinions.

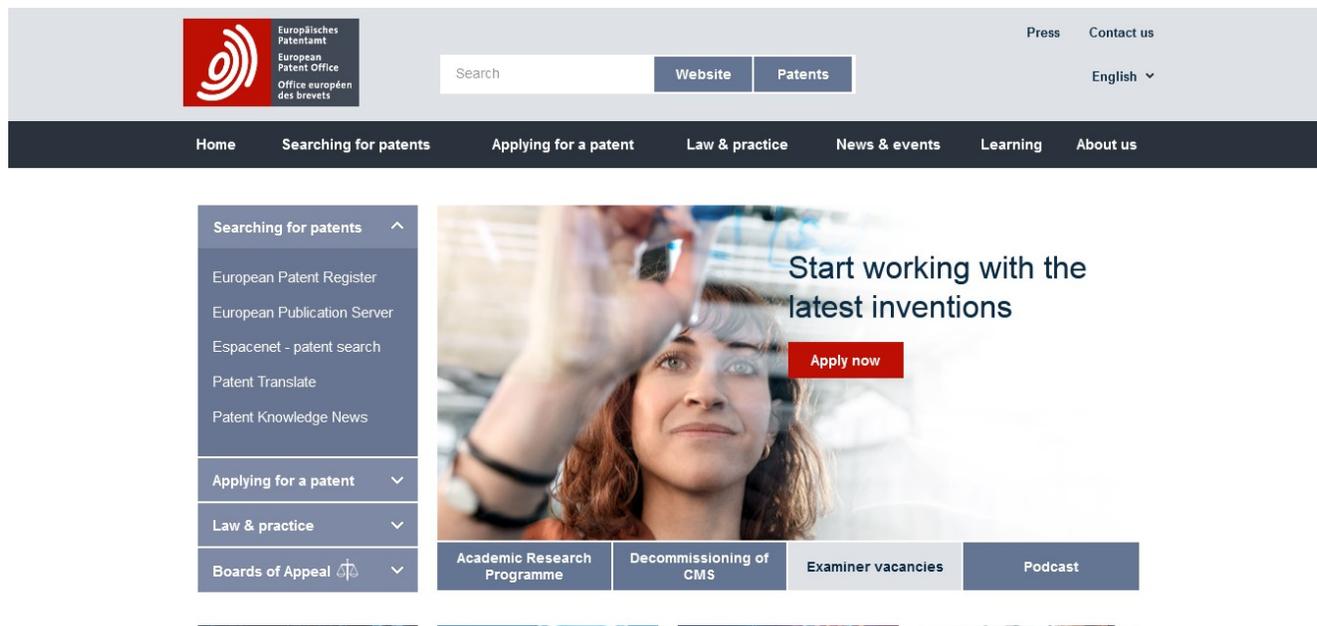


Image 2: Entry webpage of the European Patent Office (<https://www.epo.org/>)
Source: European Patent Office (<https://www.epo.org/>)

1.2.2 Preparation

In this phase the teacher describes the tasks that students have to work on during the investigation phase. The objective is students to experience first hand how a real patent looks like. Students can first be divided in small groups of 2 to 3 persons so that they work collaboratively in one laptop or PC per group.

The task that students have to complete is as follows:

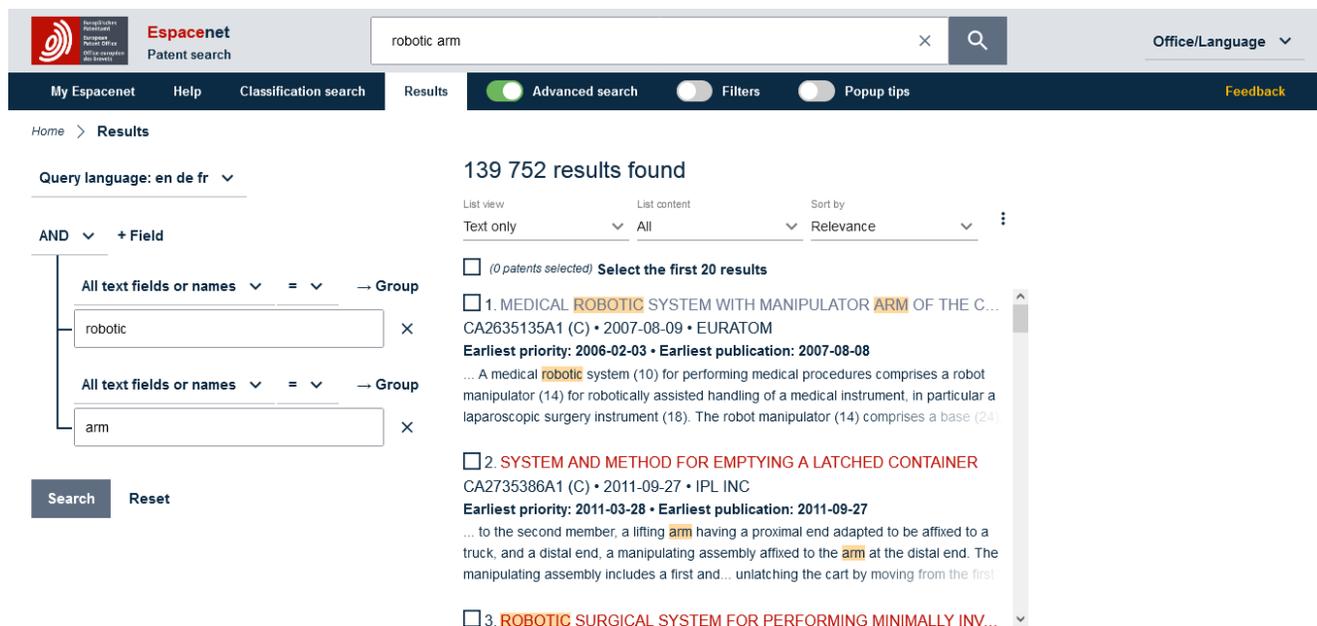
Go to the official website of the European Patent Office (<https://www.epo.org/>) and then visit its patents search engine (<https://worldwide.espacenet.com/patent/search>) Search for patents related to the subject of “robotic arm”.

Go through the list of results and select one or more patents that attract your interest. Download the patent documents in pdf so that you can easily go through their texts and drawings.

**Now you have at your hands a real patent for an invention of a real inventor!
Imagine that you may be one in the future!**

Each group of students is instructed to put on a ppt slide to present later the titles and some representative descriptions or/and drawings from the patents they selected.

When done with this task they are free to search for patents related to any object of their everyday life that interests them or can think of, e.g. smartphone, gaming console, joystick, car, vehicle, battery etc.



The screenshot shows the Espacenet patent search interface. The search query is "robotic arm". The results page displays 139,752 results found. The search criteria are set to "AND" with two fields: "robotic" and "arm". The results are sorted by "Relevance". The first three results are visible:

- 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>)

1.2.3 Investigation

In this phase students work individually or collaboratively in small groups. From time to time and depending on progress, the teacher reminds students that this activity is related to the general concept of IP which in additions to patents addresses additional concepts like copyrights, designs and trademarks. In this context he/she also reminds that patents' purpose is to "grant innovators protection for an invention and that 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". And so patents are at the heart of innovation and technological progress.

Once finished with the main task then students may continue with the follow-up one i.e. search of patents for any object they can think of or is in their interest. This may be also a homework assignment to make a ppt presentation summarizing their findings.

CA 02635135 2008-06-25

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International Bureau



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

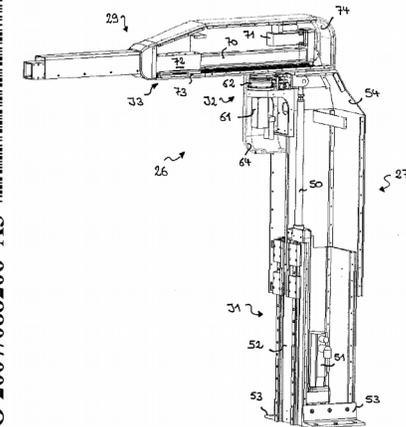
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, 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.

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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



(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 4: 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>)

1.2.4 Conclusion

In the conclusion phase each student team presents its slide of selected patents and discusses it briefly. When all teams finish their presentations then an around-the-classroom concluding discussion can start. The discussion points can be coordinated by the teacher and may be touches upon the following:

- How many patents do you find in total when searched for a term related to “robotic arm”?
- How many patents do you find in total when searched for a term related to e.g. “smartphone” or other objects of your interest?
- Can a registered patent be freely used by a company/individual/organization other than the inventor?
- Is this legitimate action? Is this violation of IP rights?
- How this illegitimate action can be avoided or IP be protected?
- Can a patent or set of patents be sold or bought by a company?
- For how long a patent is protected?
- Are patents play a significant role in our everyday life?

Through this overall discussion students understand better the importance of patents in our technological world and in general of IP. At the end the lesson plan can be completed with a short wrap-up of its main topics addressed, steps or tasks and objectives, and final conclusions drawn.

1.3 Key questions for knowledge testing

The lesson plan can be accompanied by a short quiz of key questions that 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]

1.4 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>