



AKADEMIJA NAUKA I UMJETNOSTI BOSNE I HERCEGOVINE
АКАДЕМИЈА НАУКА И УМЈЕТНОСТИ БОСНЕ И ХЕРЦЕГОВИНЕ
ACADEMY OF SCIENCES AND ARTS OF BOSNIA AND HERZEGOVINA

***KOLABORATIVNA ROBOTIKA TEMELJNA TEHNOLOGIJA
ČETVRTE INDUSTRIJSKE REVOLUCIJE (INDUSTRIJE 4.0)***

***COLLABORATIVE ROBOTICS - BASIC TECHNOLOGY
OF FOURTH INDUSTRIAL REVOLUTIONS (INDUSTRY 4.0)***

Isak Karabegović

E-mail:isak1910@hotmail.com

*XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA*



UVOD

- ***Razvoj nauke (tehnološke promjene) ide velikom brzinom,***
- ***Početkom 21. vijeka da bi se znanje udvostručilo vrijeme se skratilo na svega 5 do 7 godina,***
- ***Danas se procjenjuje da se znanje u svijetu udvostruči za jednu godinu***



- *WEF – World Economic Forum (2016.godine u Davosu) nazvao je četvrtom industrijskom revolucijom, a prvi put pod nazivom „Industrija 4.0“ se pojavljuje 2011.god. na sajmu Hanoveru u Njemačkoj.*
- *Prof. Klaus Schwab objavljuje knjigu pod nazivom „The Fourth Industrial Revolution“ kod izdavača World Economic Forum, 2016.god.*
- *Ekonomija se temeljeni na inovacijama i znanju;*



*Potrebe na tržištu rada mijenjaju vrlo ubrzano,
a to pokazuju slijedeći podaci:*

- *Dva profesora sa Oksfordskog Univerziteta, **Carl Benedikt Frey i Michael A. Osborne** 2013 godine objavljuju:
Prema njihovim istraživanjima za dvadesetak godina
nestati će 47% radnih mjesta u SAD.*

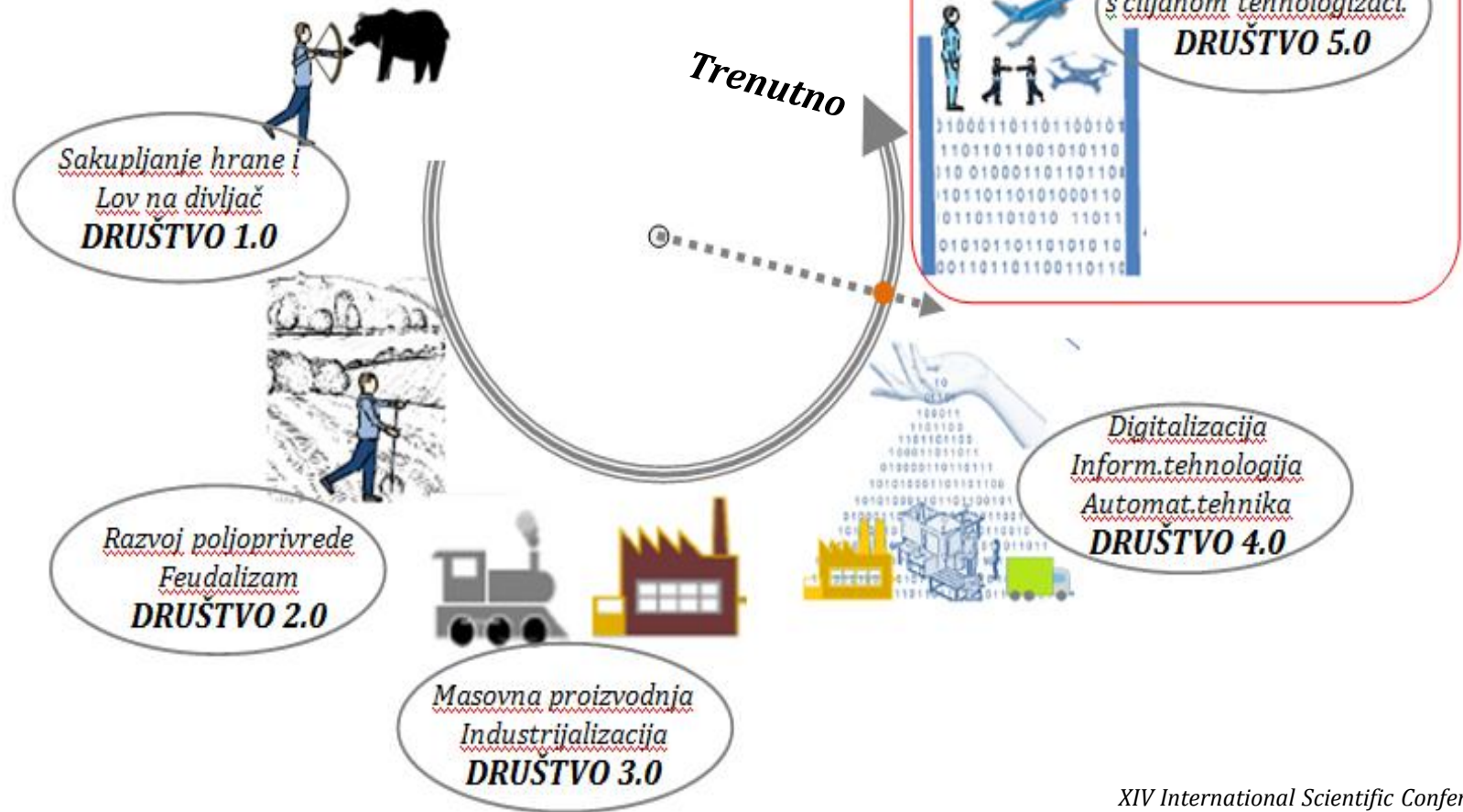


Potrebe na tržištu rada mijenjaju vrlo ubrzano, a to pokazuju slijedeći podaci:

- ***poznato je da u SAD-u deset poslova, koji se danas najviše traže, nije ni postojalo pred deset godina,***
- ***da već danas prosječan zaposlenik u razvijenim zemljama mijenja posao više od 10 puta u radnom vijeku,***



Razvoj društva



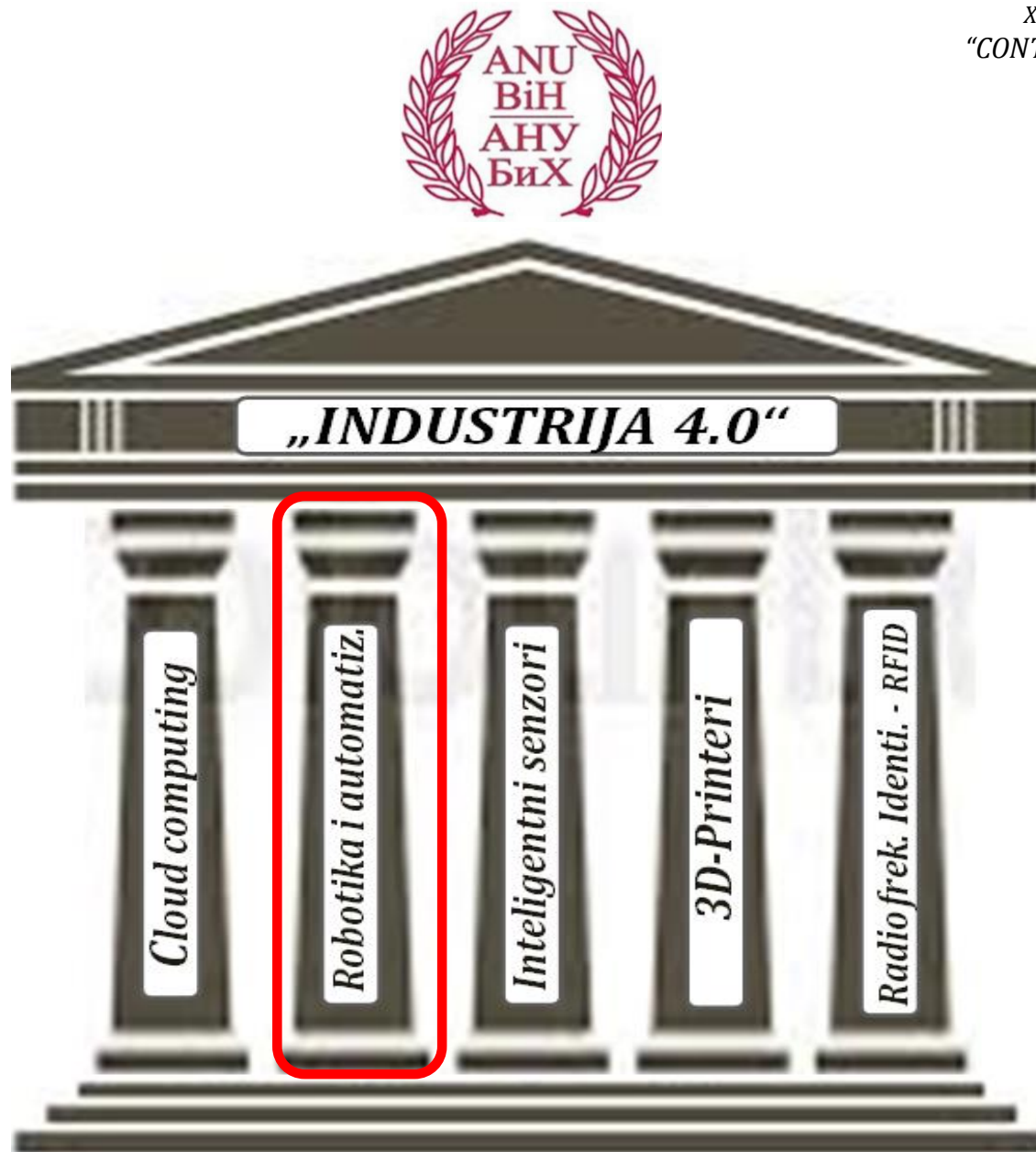


Trenutno se nalazimo ovdje



Četvrta industrijska revolucija (Idustrija 4.0)

XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA



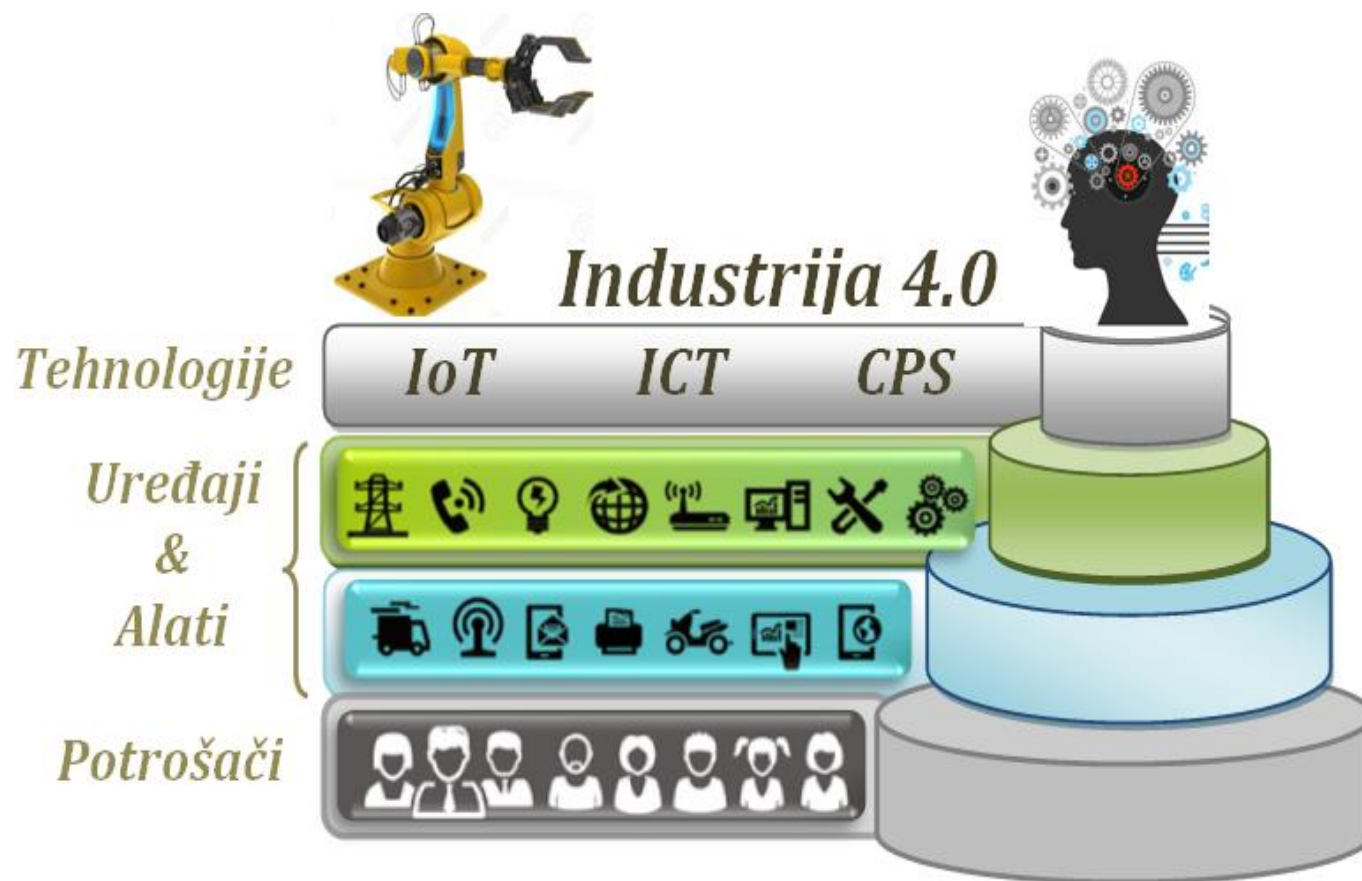
Temelji četvrte industrijske revolucije Industrija 4.0



Prof. M. Herman sa kolegama Univerziteta u Dortmundu identifikovao je principe na kojima se temelji scenarij za implementaciju „Industrije 4.0“.

Identificirano je šest projektnih principa:

- *Međusobno djelovanje,*
- *Decentralizacija,*
- *Virtualizacija,*
- *Sposobnost rada u realnom vremenu,*
- *Servisna orijentacija*
- *Modularnoat.*

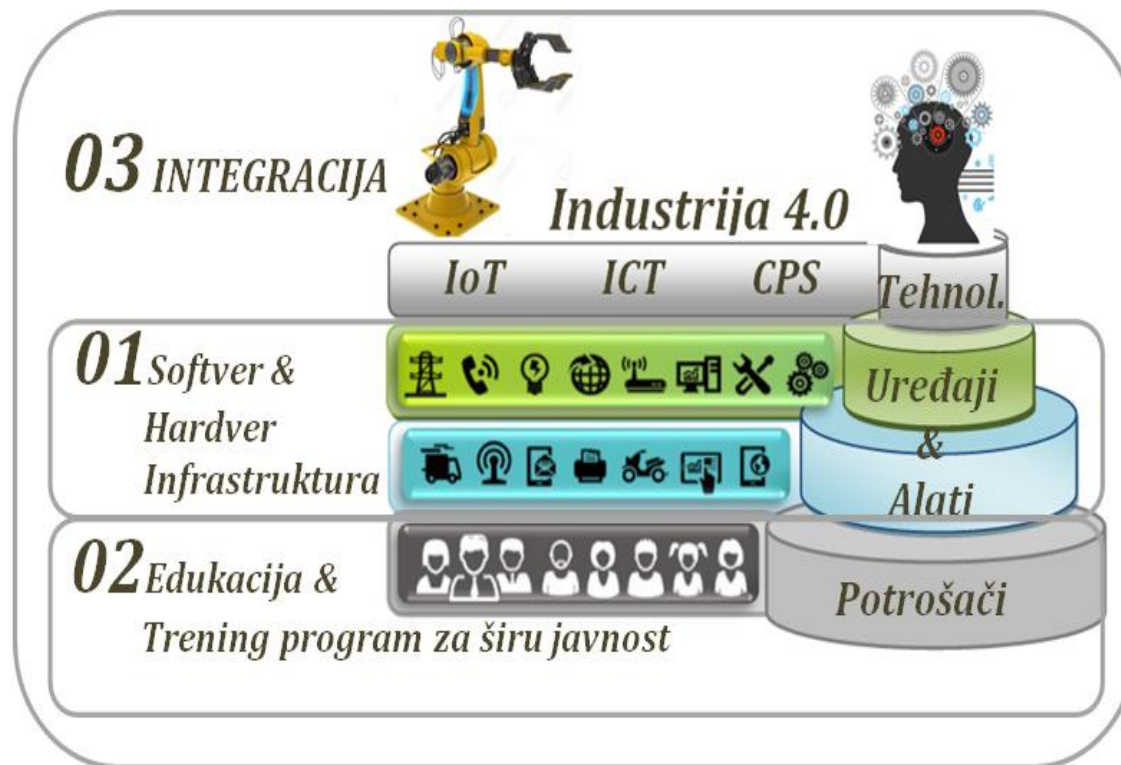


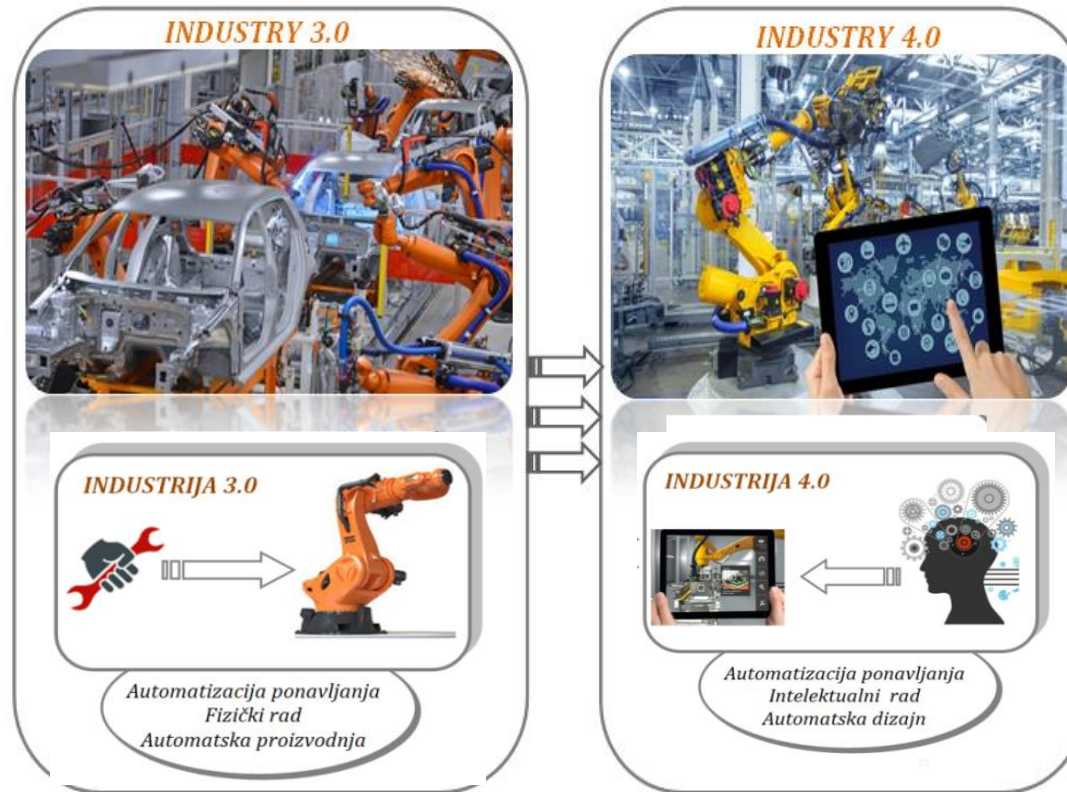
Četvrta industrijska revolucija “Industrija 4.0”

XIV International Scientific Conference
“CONTEMPORARY MATERIALS 2021”
9-10 September 2021
BANJALUKA

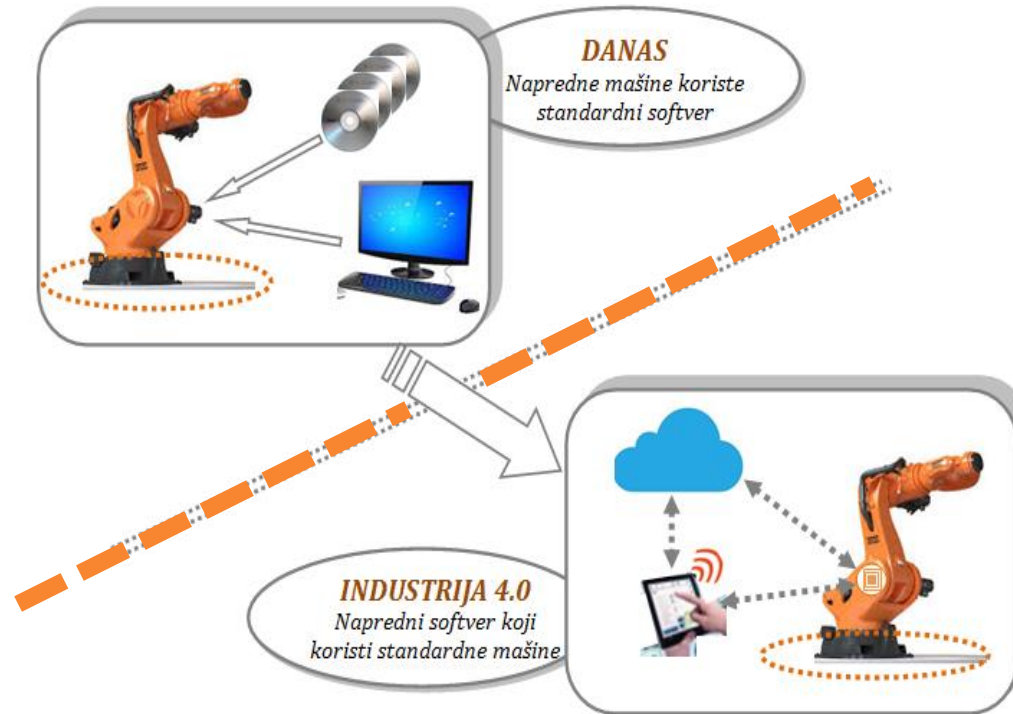


Kako je uspostavljen lanac vrijednosti “Industrije 4.0” da društvo ima koristi





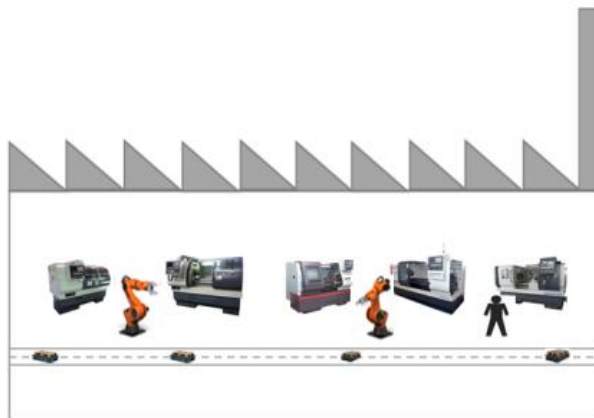
Razlika između treće i četvrte industrijske revolucije u proizvodnom procesu



Komparacija u automatizaciji proizvodnih procesa danas i u „Industriji 4.0“

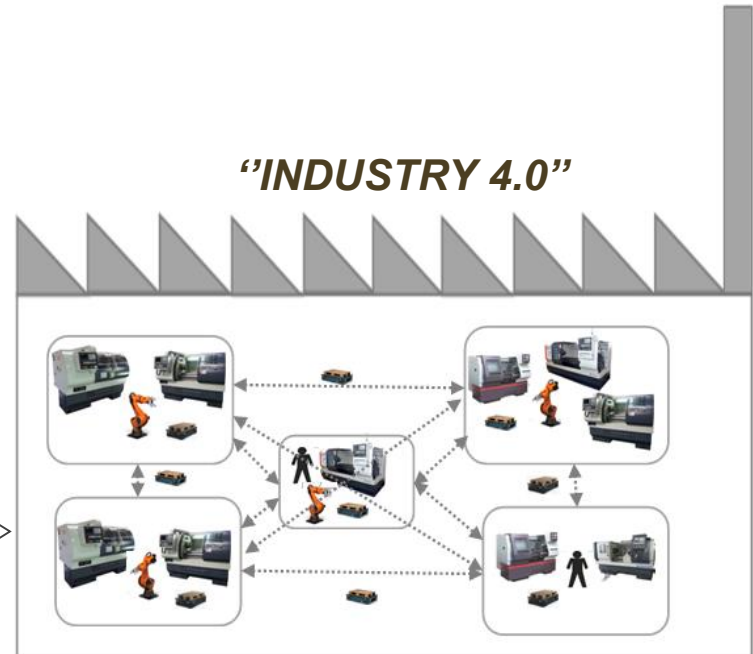


“DANAS”

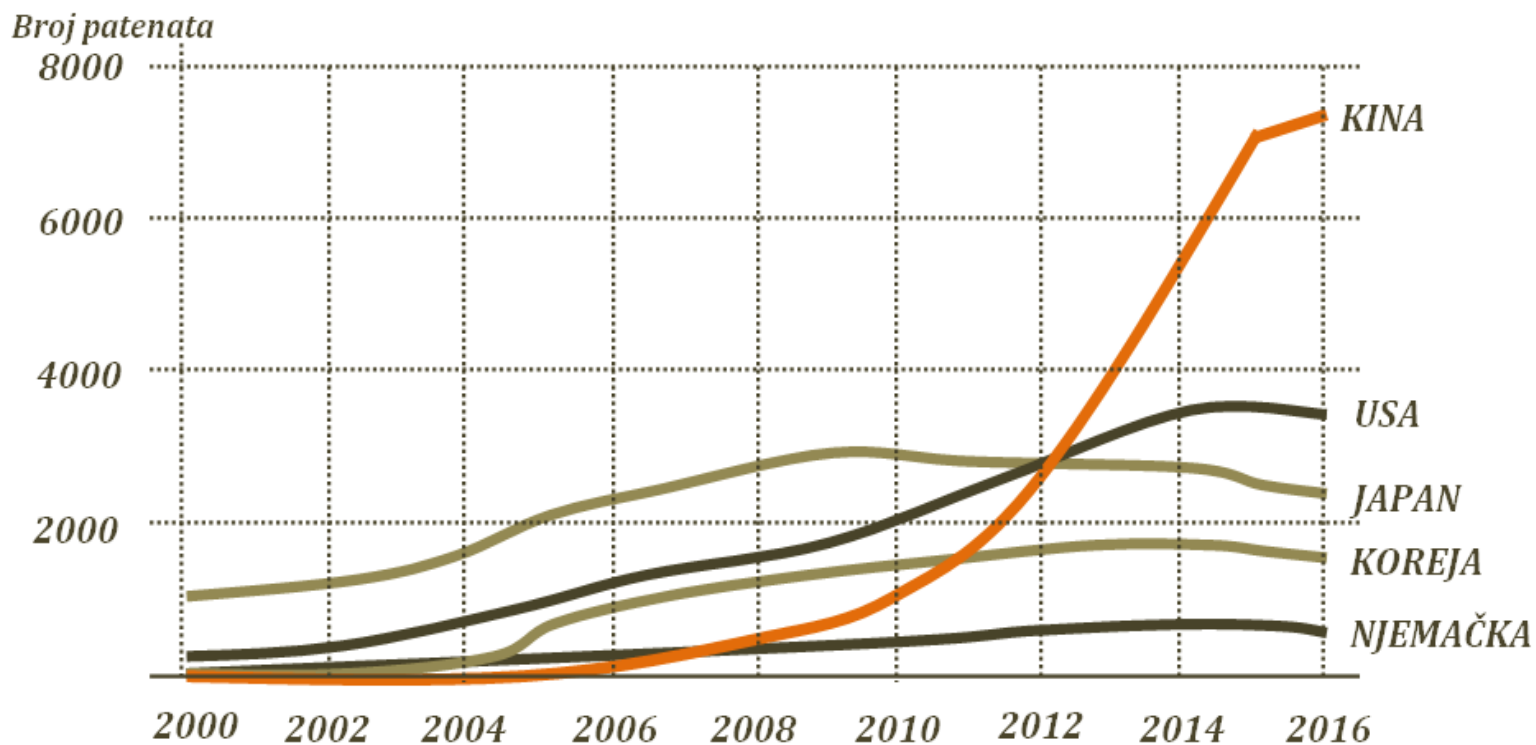


a – Danas klas. proiz. proces

“INDUSTRY 4.0”



b- Proizvodni proces u “Industry 4.0”



Trend broja inovacija u tehnologijama koje čine temelj „Industija 4.0“ u zemljama: Kina, USA, Japan, Koreja i Njemačka



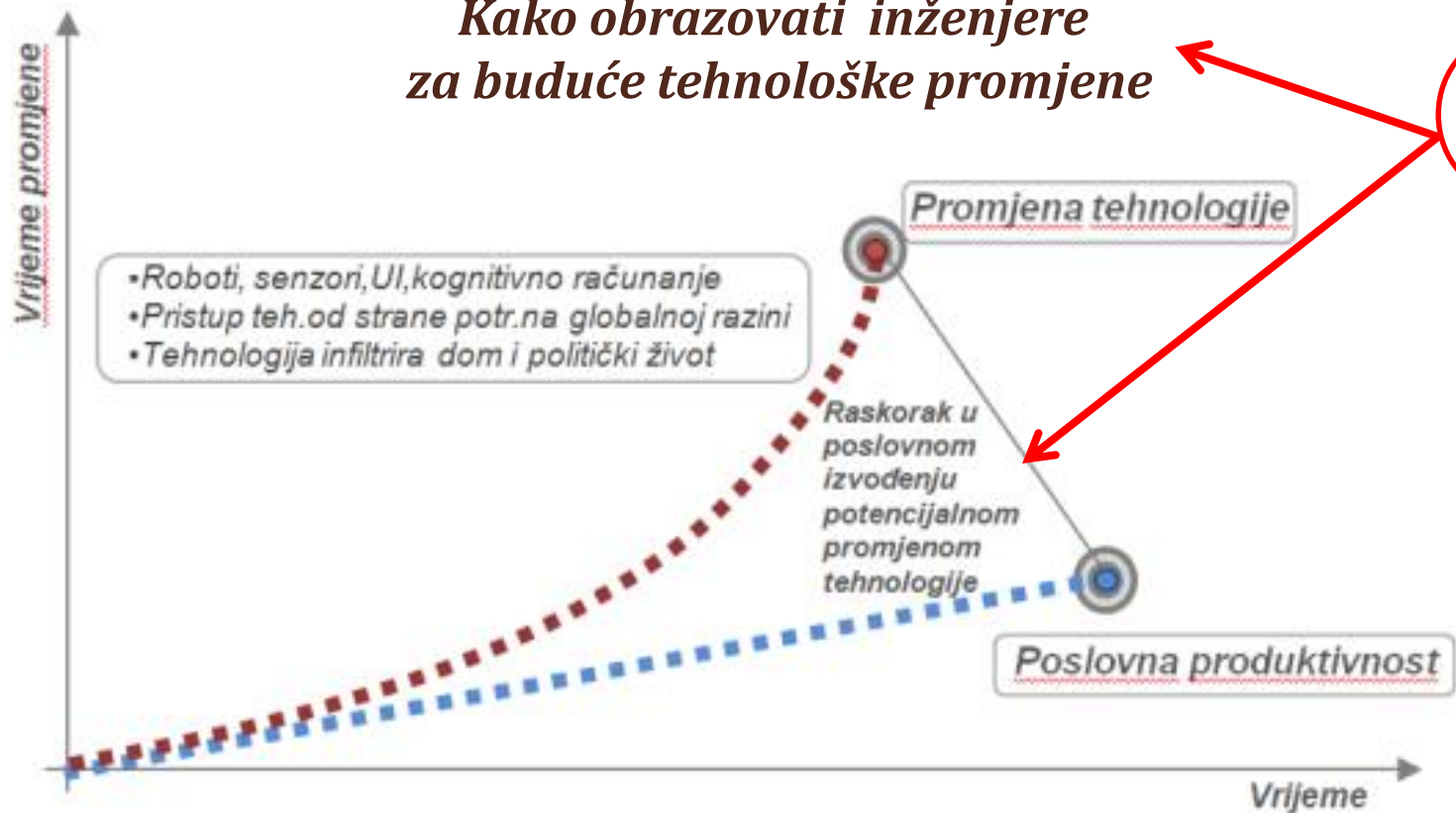
Broj patenata temeljih tehnologija Industrije 4.0

	<i>KINA</i>	<i>USA</i>	<i>JAPAN</i>	<i>KOREJA</i>	<i>NJEMAČKA</i>
					<i>A</i>
<i>Cloud computing</i>	<i>1.144</i>	<i>1.559</i>	<i>132</i>	<i>314</i>	<i>70</i>
<i>Robotika</i>	<i>2.709</i>	<i>164</i>	<i>638</i>	<i>142</i>	<i>349</i>
<i>Senzori</i>	<i>2.586</i>	<i>126</i>	<i>83</i>	<i>88</i>	<i>132</i>
<i>3D Printer</i>	<i>504</i>	<i>536</i>	<i>307</i>	<i>52</i>	<i>0</i>
<i>RFID</i>	<i>384</i>	<i>1.055</i>	<i>1.243</i>	<i>1.039</i>	<i>98</i>
<i>UKUPNO</i>	<i>7.327</i>	<i>3.440</i>	<i>2.403</i>	<i>1.635</i>	<i>649</i>

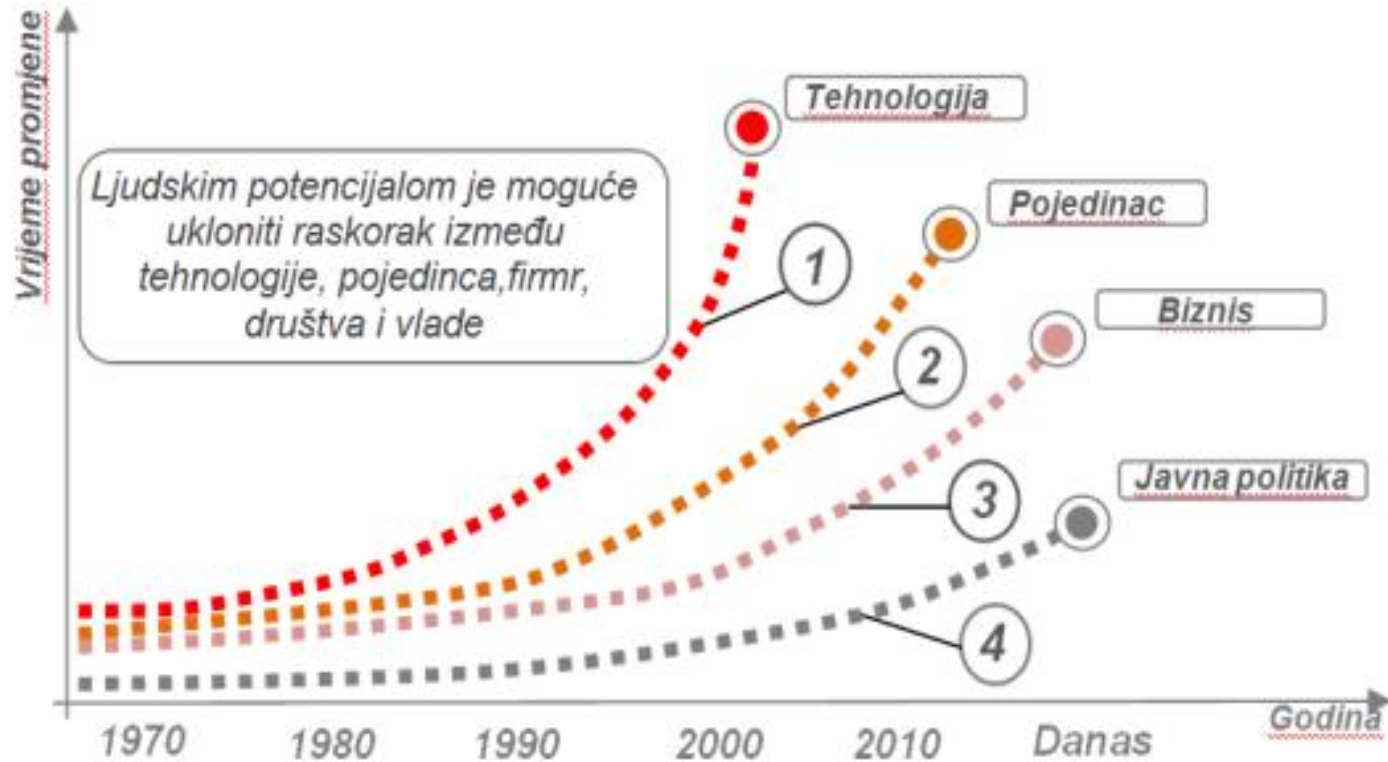
Patenti u 2016 godini



Kako obrazovati inženjere za buduće tehnološke promjene



Raskorak između tehnoloških promjena i poslovne produktivnosti

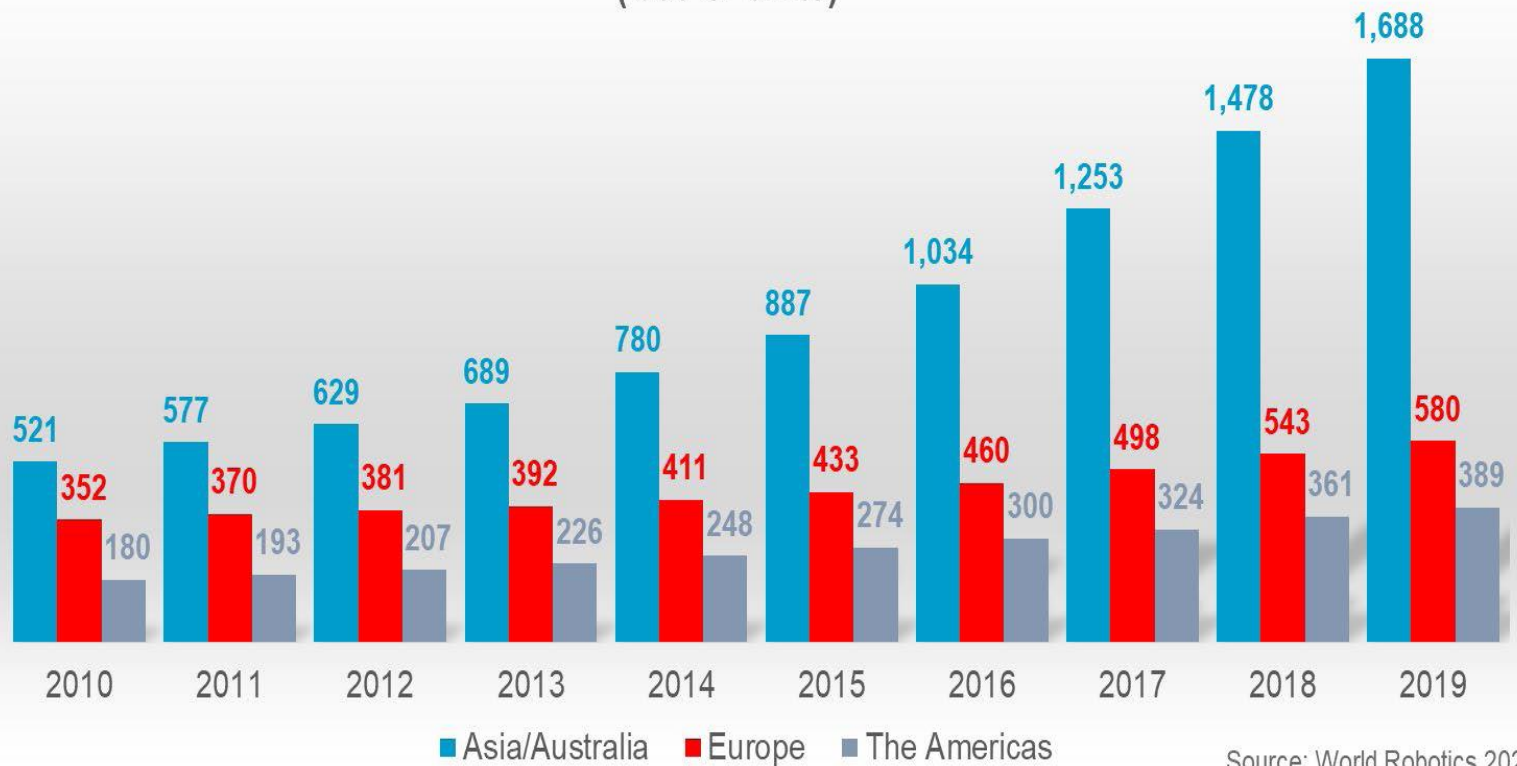


***Raskorak između tehnološki promjen, pojedinaca,
kompanija i javne politike***



Robot u svijetu

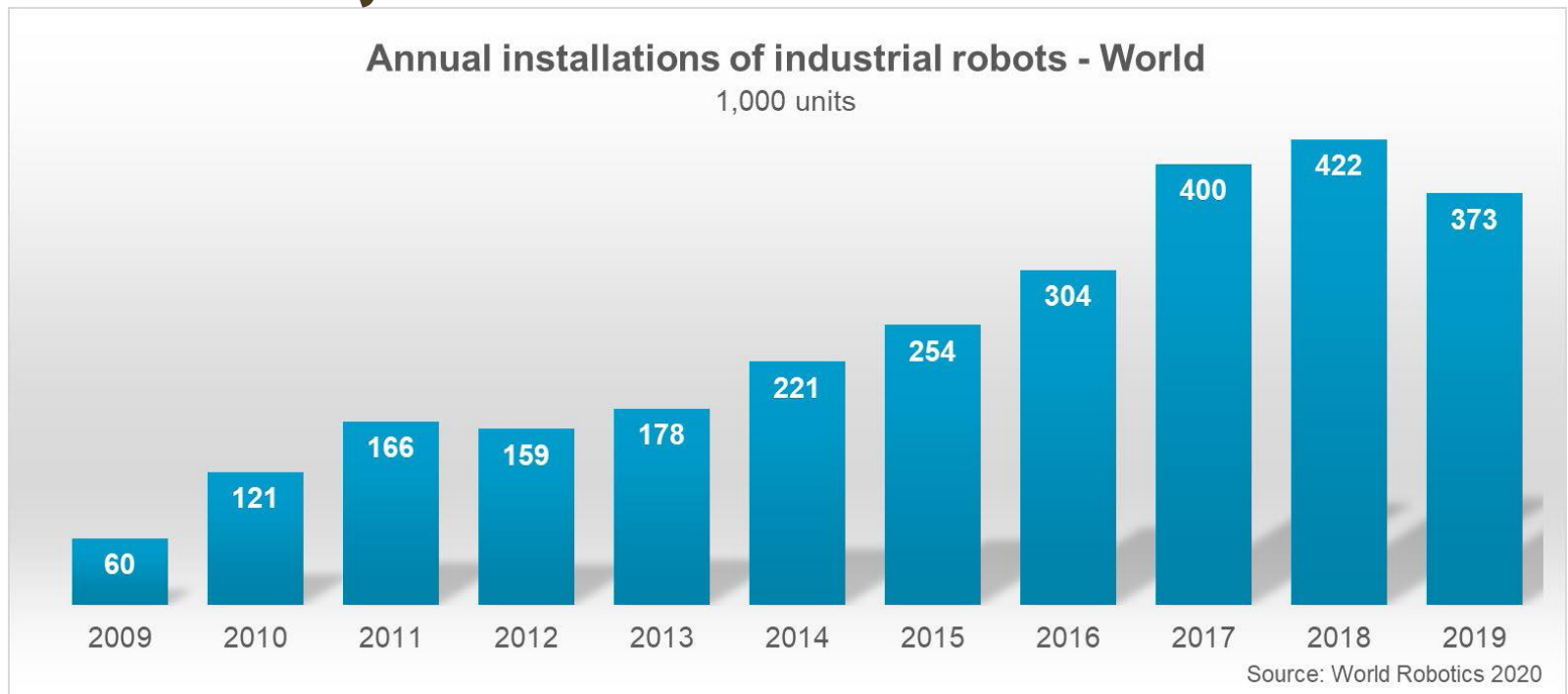
Operational stock of industrial robots
(^{'000} of units)



Source: World Robotics 2020



Robot u svijetu

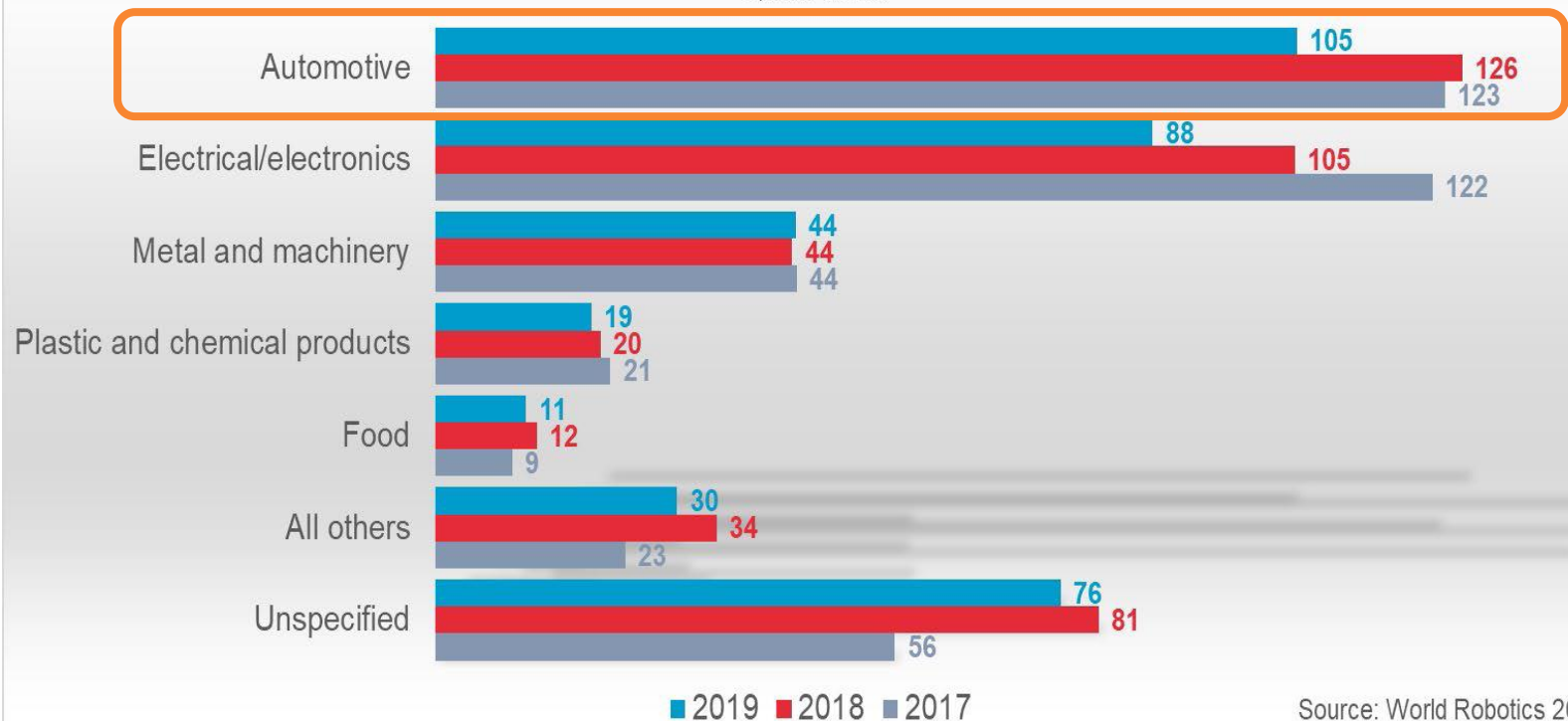




Robot u industriji u svijetu

Annual installations of industrial robots by customer industry - World

1,000 units

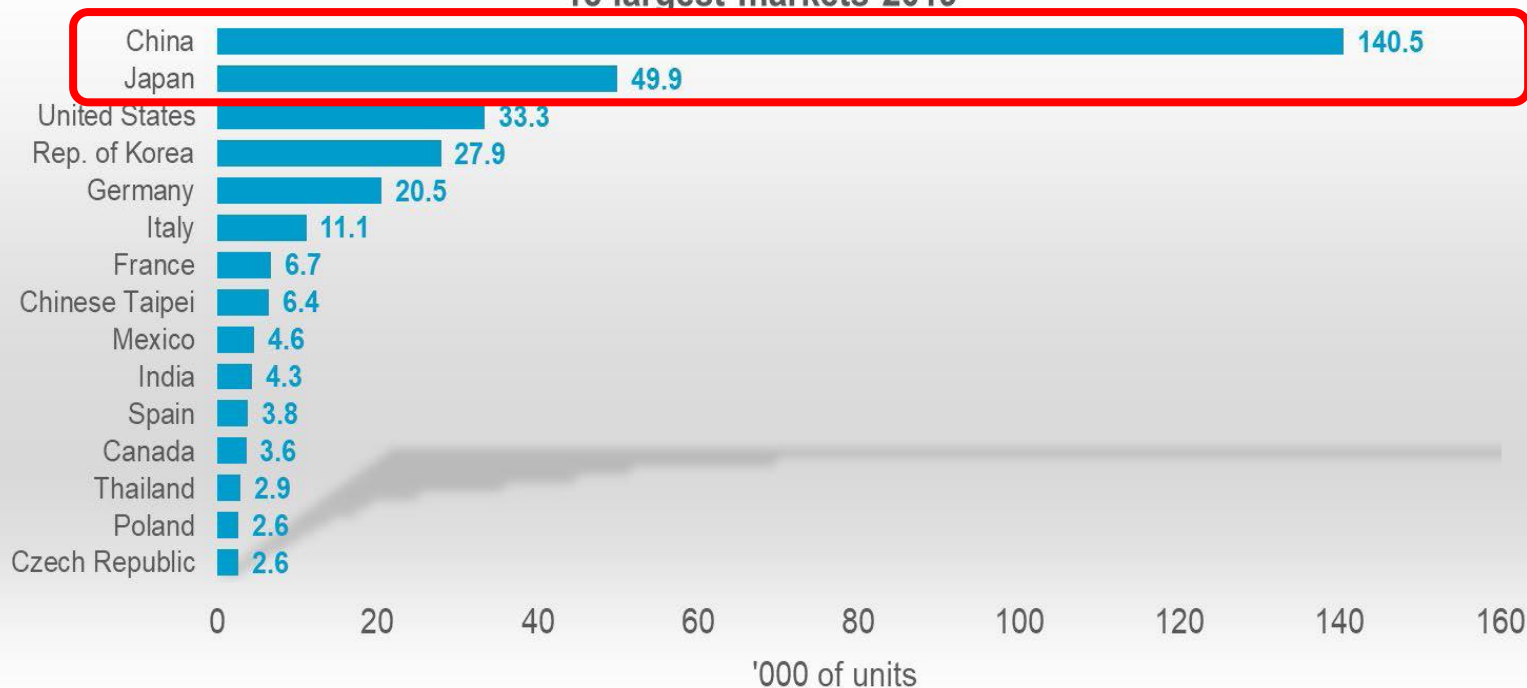


Source: World Robotics 2020



Robot u industriji u svijetu

Annual installations of industrial robots
15 largest markets 2019

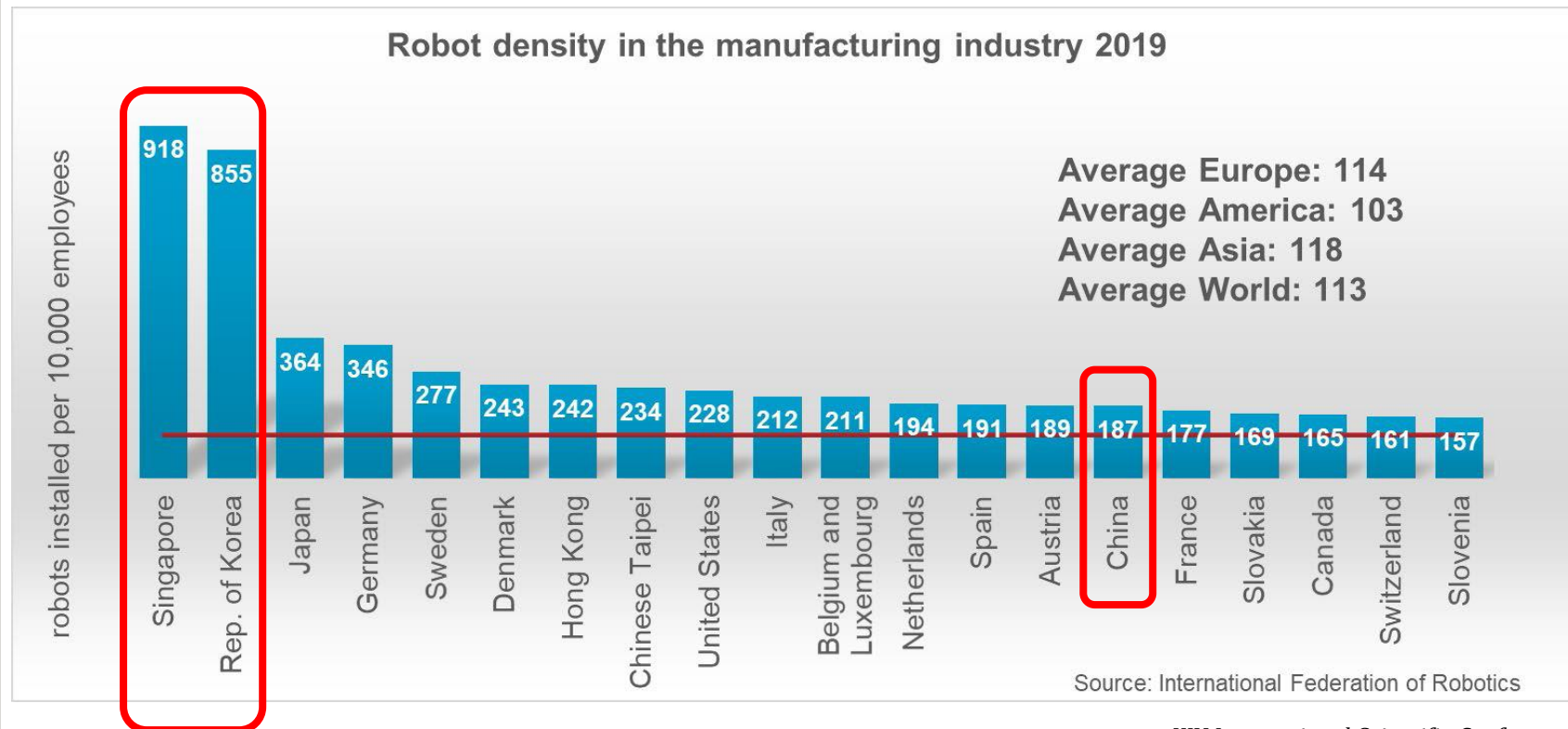


Source: World Robotics 2020



Robot u industriji u svijetu

Singapur i Republika Koreja s visokim postotkom gustoće



Kolaborativni roboti

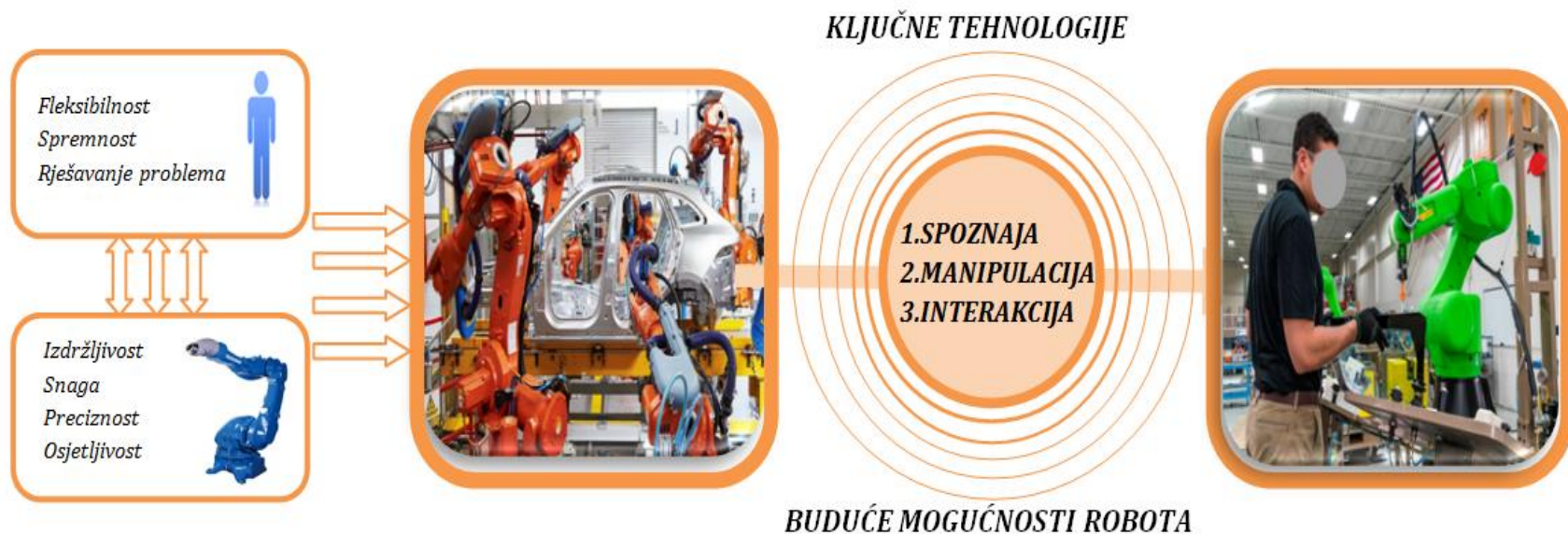
Ideje za kolaborativne robota (robote za suradnju)



1967 - Unimate robot on display at the Biltmore Hotel in Los Angeles

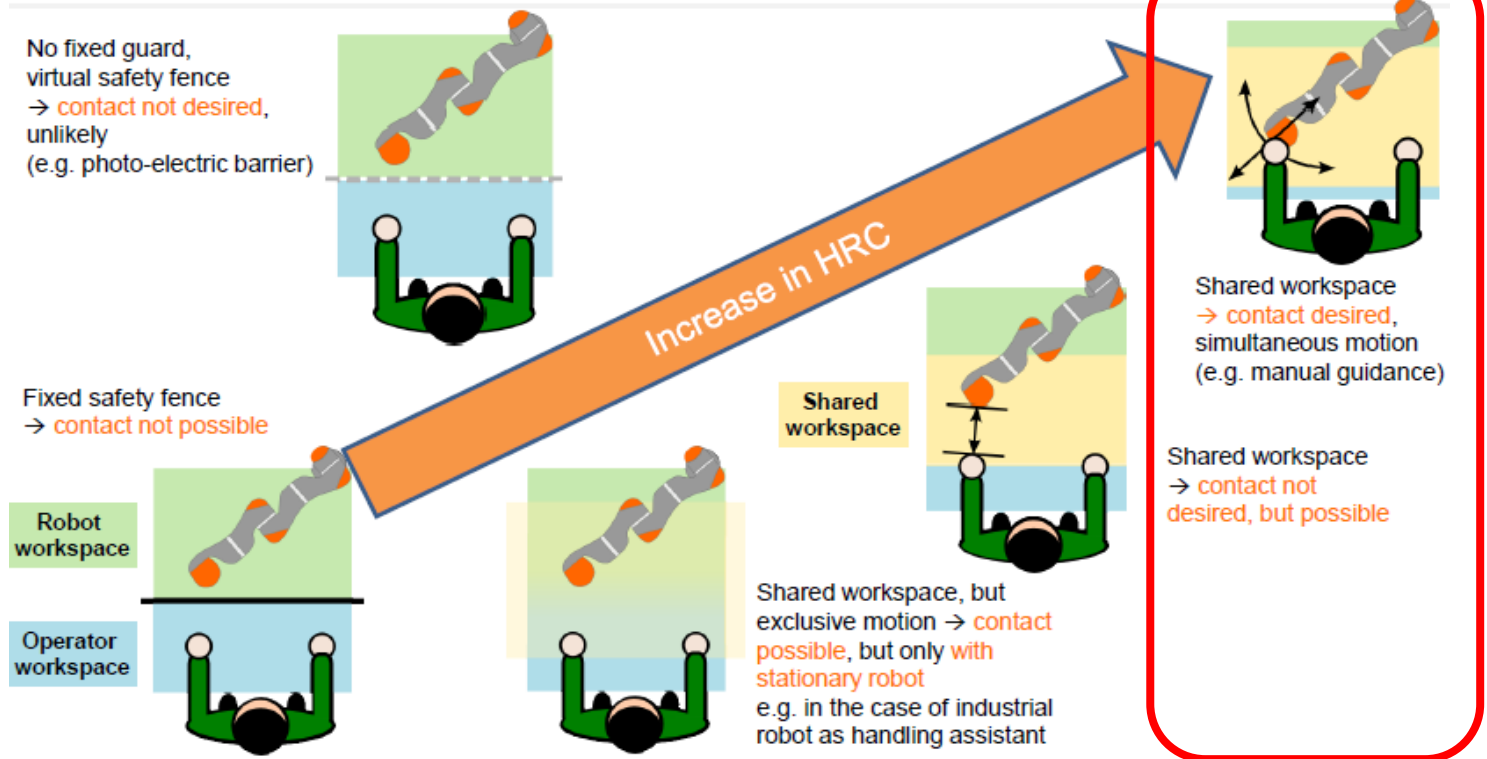
Kolaborativni roboti

Prednosti u oblikovanju sposobnosti kolaborativni robota u odnosu na industrijske robote prve generacije



Kolaborativni roboti

Oblici saradnje čovjek-robot (razvoj)



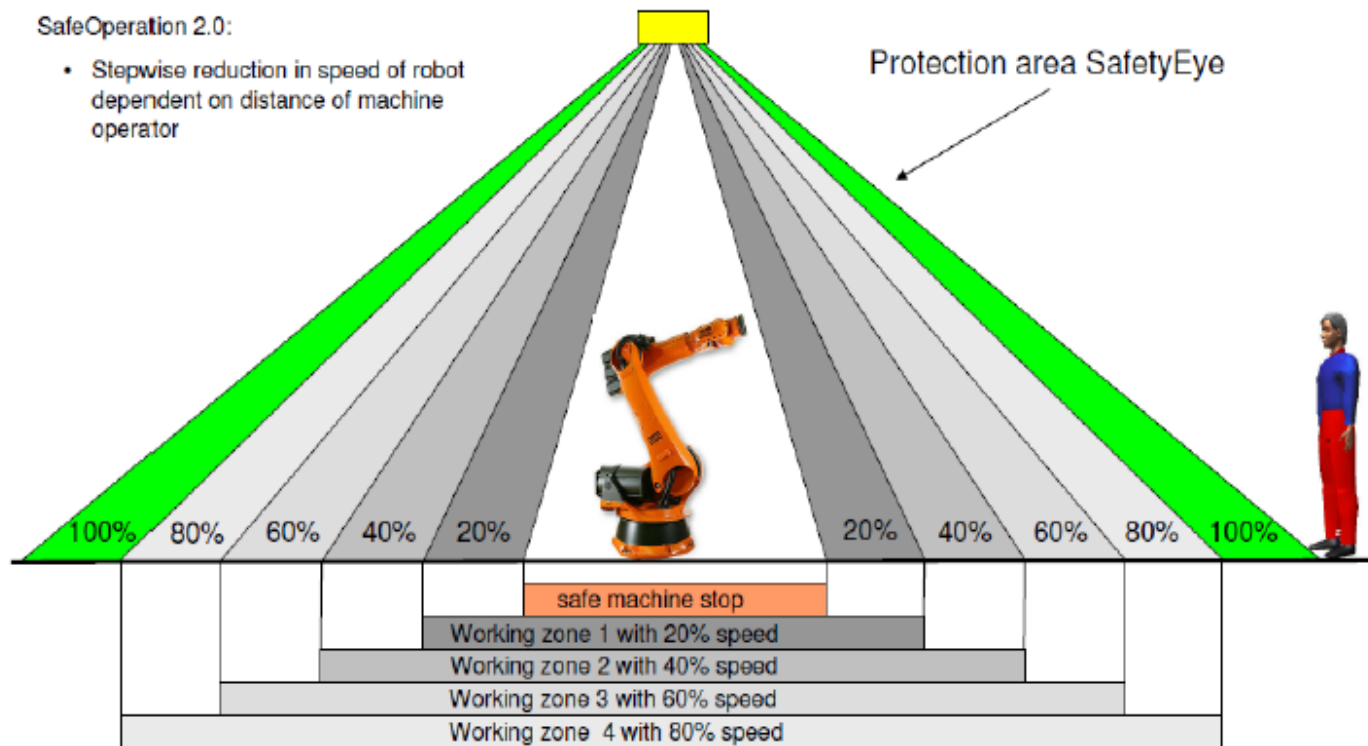
Kolaborativni roboti

Zone sigurne zaštite

Jedna metoda za praćenje brzine i odvajanja

SafeOperation 2.0:

- Stepwise reduction in speed of robot dependent on distance of machine operator



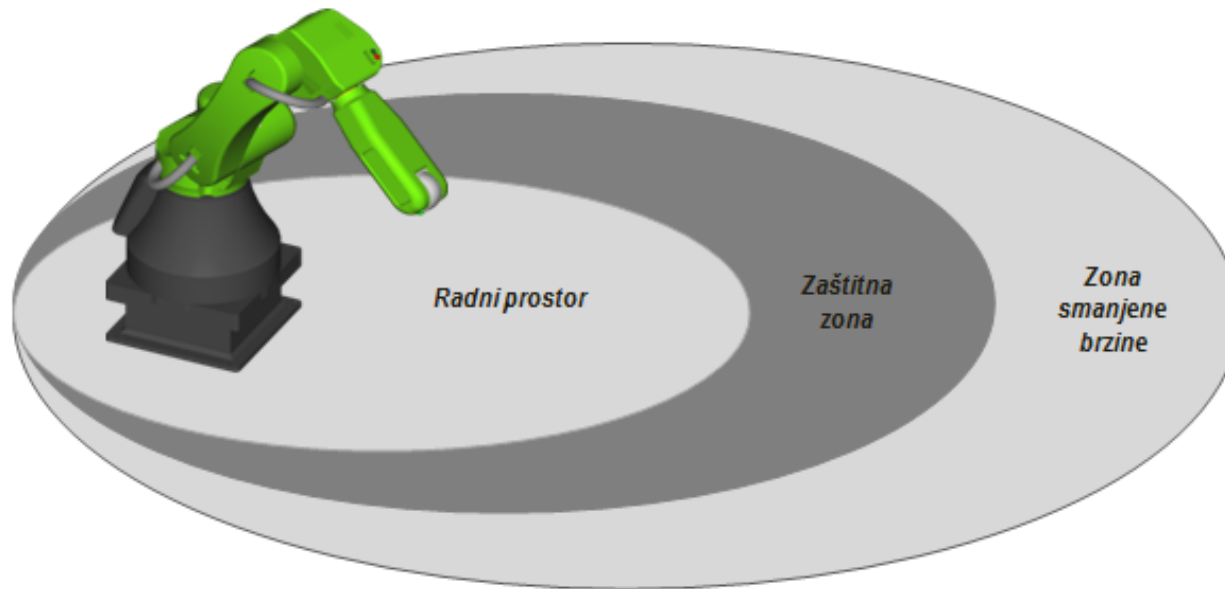
Protection area SafeOperation



Kolaborativni roboti

Zone sigurne zaštite

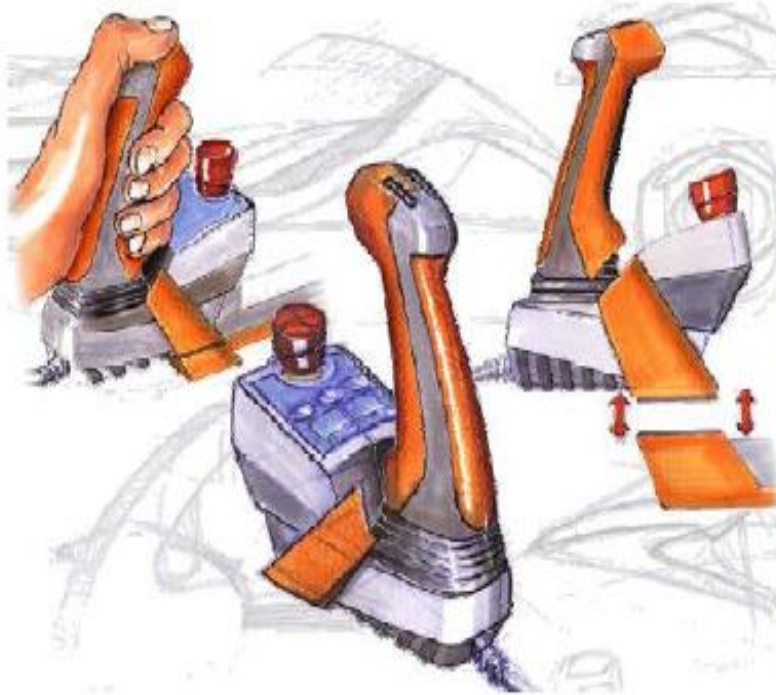
Jedna metoda za praćenje brzine i odvajanja



Kolaborativni roboti

Intelligentni manipulatori

Robot se koristi kao inteligentan i siguran manipulator



Kolaborativni roboti



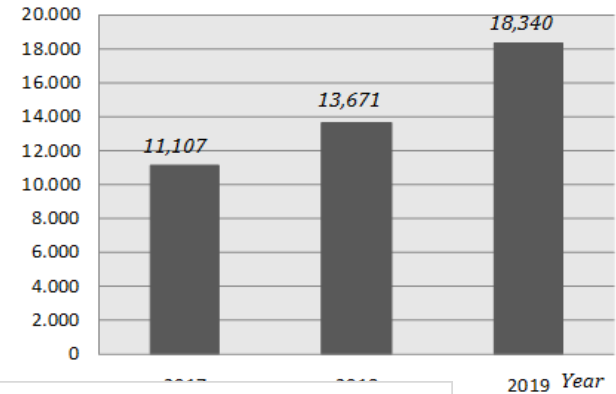
- Manji prostor robotske čelije
- Kraće vrijeme za instalaciju
- Brzo prilagođavanje



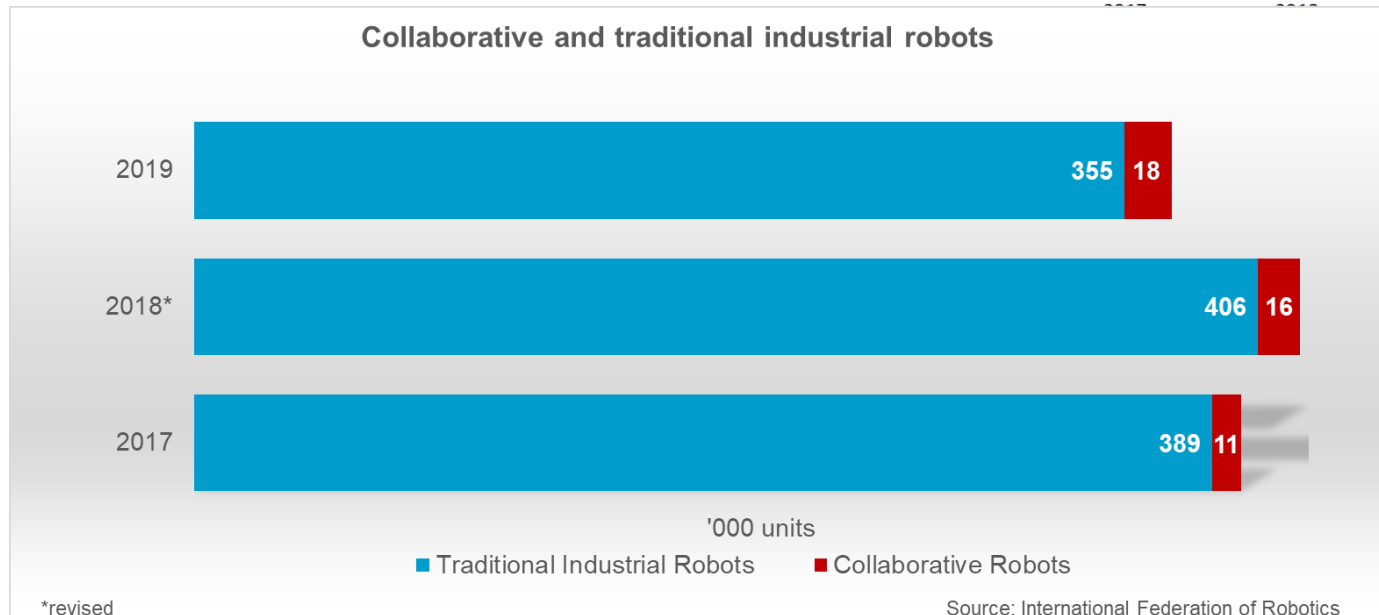
Kolaborativni roboti

Implementacija industrijski kolabor.robota

Number of units



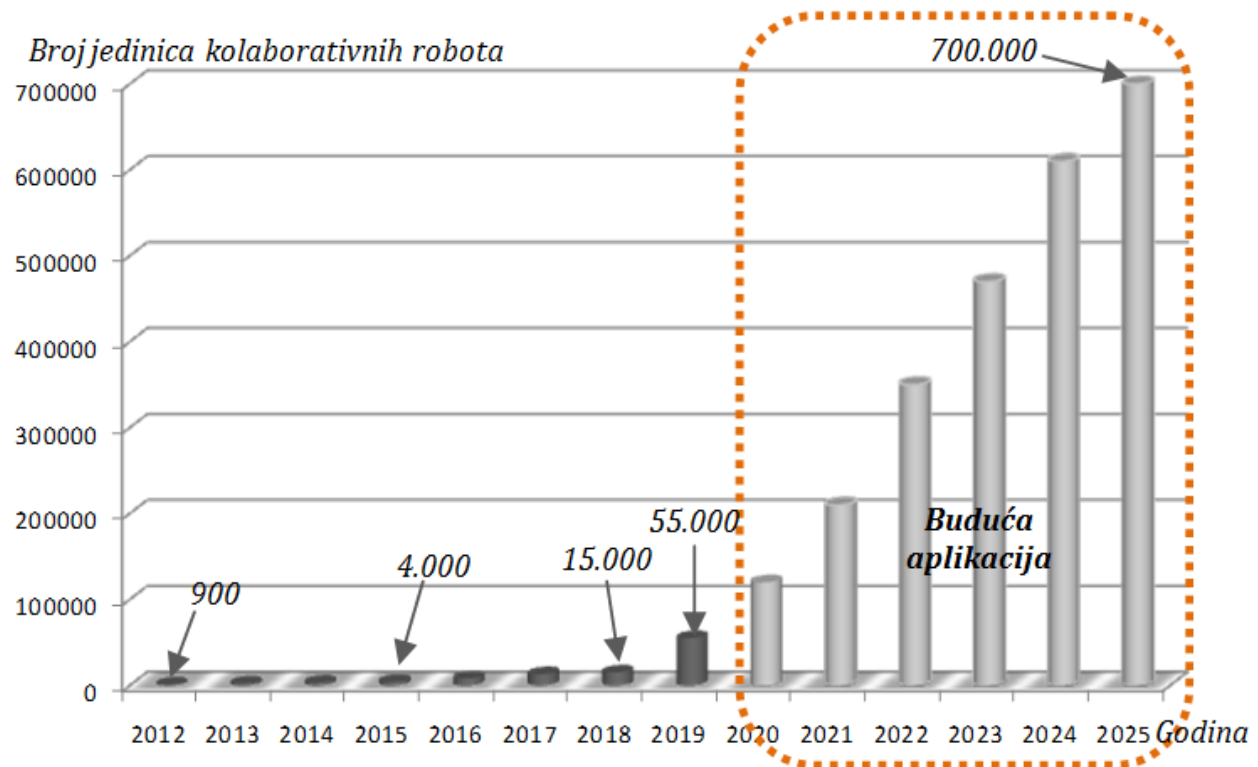
Collaborative and traditional industrial robots





Kolaborativni roboti

Trend Implementacija kolaborativnih robota





Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Terapija česticama



Proton Therapy Treatment Room – Heidelberg, Germany



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Sistemi za zabavu

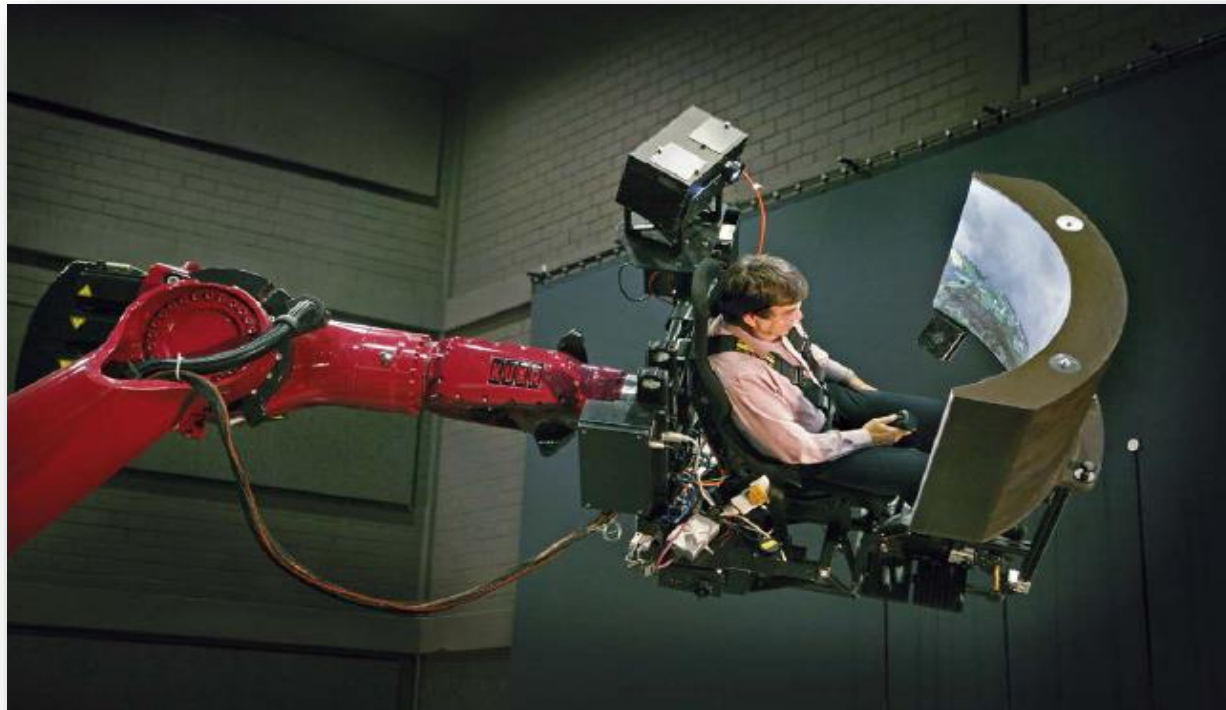


*XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA*



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Biološka kibernetička istraživanja

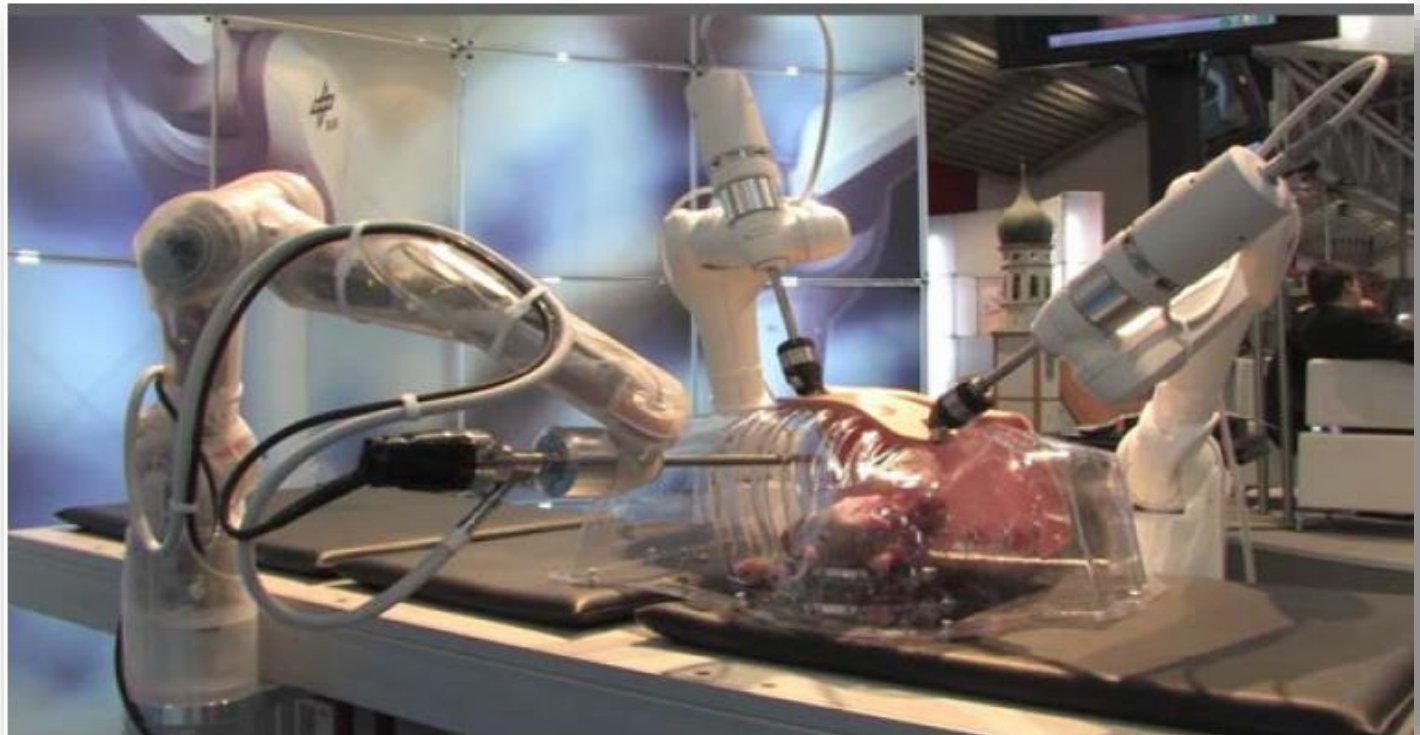


*XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA*



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Minimalno invazivna kirurgija

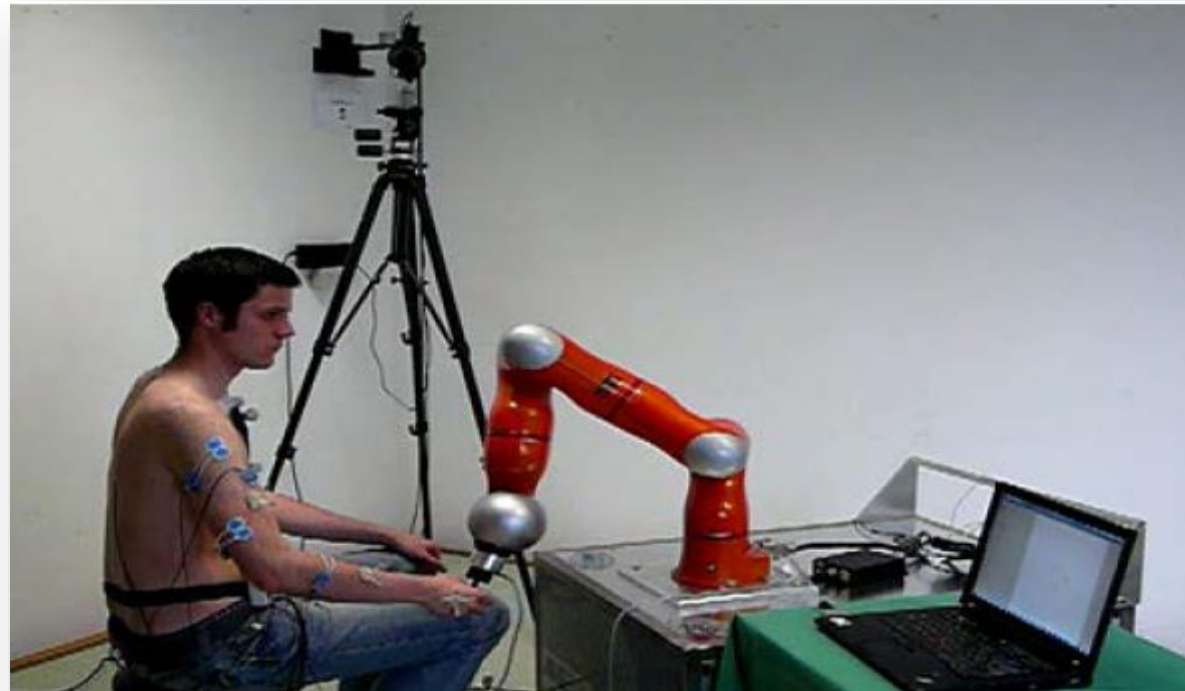


*XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA*



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Fizička rehabilitacija



*XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA*



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Humanoidni roboti (DLR “Jason”)



*XIV International Scientific Conference
“CONTEMPORARY MATERIALS 2021”
9-10 September 2021
BANJALUKA*

Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Nosiva robotika- Exoskelet





Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Mobilne vojne aplikacije



Kolaborativni robot

Napredak u aplikacijama sigurnih robota
Mobilne platforme



Edukacija





ZAKLJUČAK

❑ Osnov implementacija “Industrije 4.0” je robotska tehnologija, odnosno implenentacija kolaborativnih robota u proizvodne procese.

❑ Prednosti primjene kolaborativnih robota su ogromne nabrojimo samo neke:

- Siguran rad radnika u radnom prostoru robota
- Manji prostor - bez ograda
- Kraće vrijeme instalacije
- Brzo prilagođavanje
- Mogućnost raznih nivoa automatizacije

❑ Povećanje primjene kolaborativnih robota implementacijom Industrije 4.0



ZAKLJUČAK

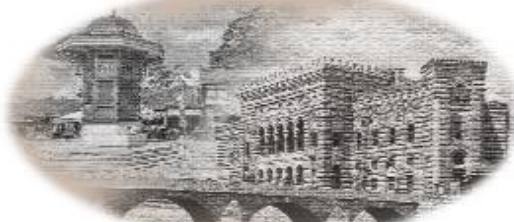
- ☐ ***Nijedna aplikacija za suradnju čovjek-robot ne smije se implementirati bez dovršetka procjene rizika.***
- ☐ ***Uvijek se mora uzeti u obzir cjelokupna primjena i sistem, a ne samo robot***
- ☐ ***Uvijek na umu imati : Procjena rizika = Sigurnost!***



are organizing

8th International Conference "New Technologies, Development and Application" **NT-2022**

CALL FOR PAPERS



Sarajevo, 23th- 25th, June 2022
ACADEMY OF SCIENCES AND ARTS
OF BOSNIA AND HERZEGOVINA

www.icnt.ba
<https://easychair.org/conferences/?conf=nt2022>

8th International Conference "NEW TECHNOLOGIES, DEVELOPMENT AND APPLICATION" NT-2022

Sarajevo, 23th-25th June 2022
ACADEMY OF SCIENCES AND ARTS
OF BOSNIA AND HERZEGOVINA

Dear Colleagues,

It is my pleasure to invite you to attend 8th International Conference "New Technologies , Development and Application NT-2022". Conference hosts are Academy of Sciences and Arts of Bosnia and Herzegovina, Society for Robotics of Bosnia and Herzegovina, University "Džemal Bijedić" of Mostar, University of Tuzla, University of Zenica , University of Sarajevo, International University of Sarajevo, Sarajevo School of Science and Technology, International Burch University of Sarajevo, International association for Technological, Development and Innovations Ukraina and Technology park INTERA Mostar. **Conference will be held in Sarajevo from 23th to 25th June 2022.** Conference will gather scientists and entrepreneurs to exchange knowledge and to implement new technologies in practice. All information about conference, including topics, deadlines, manuscript templates, et could be found at conference webpage: www.icnt.ba
<https://easychair.org/conferences/?conf=nt2022>

Submitted paper should be written in four to eight (4 - 8) pages.
For further questions contact us by e-mail.
icnewtech@gmail.com
Sincerely !

Contact person: **Isak Karabegović**, Academy of Sciences and Arts of Bosnia and Herzegovina
E-mail: isak1910@hotmail.com
PS: Send papers by 30 December 2021



All papers from the 8th International Conference "New Technologies, Development and Application" NT-2022, will be published by "SPRINGER" Deutschland.

Springer

(Web page: <https://www.springer.com/us/book/9783319908922>)



All original and research papers from the 8th International Conference "New Technologies, Development and Application NT-2022", which successfully pass the review process, will be published in the journal SN Applied Sciences (ISSN 2523-3971)

SPRINGER NATURE

(Web page: <https://www.springer.com/snappli/sciences>)

XIV International Scientific Conference
"CONTEMPORARY MATERIALS 2021"
9-10 September 2021
BANJALUKA



BANJALUKA