How to Find Thesis or Graduation Project Topic?

Eszter Lukács
IEEE Client Services Manager

November 27th, 2021

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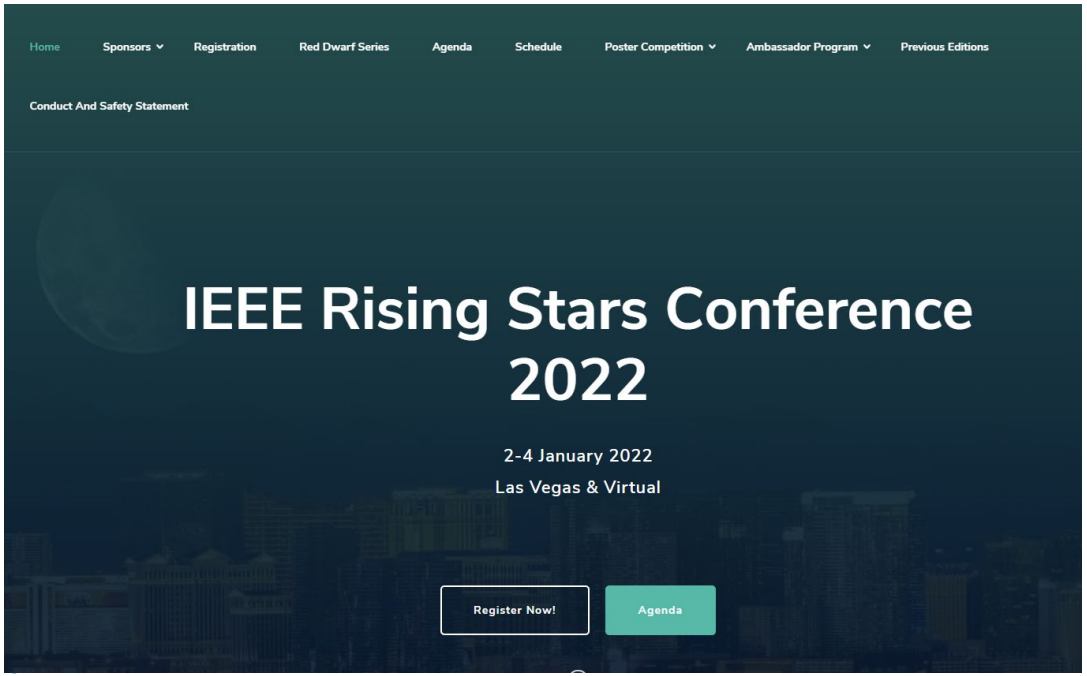

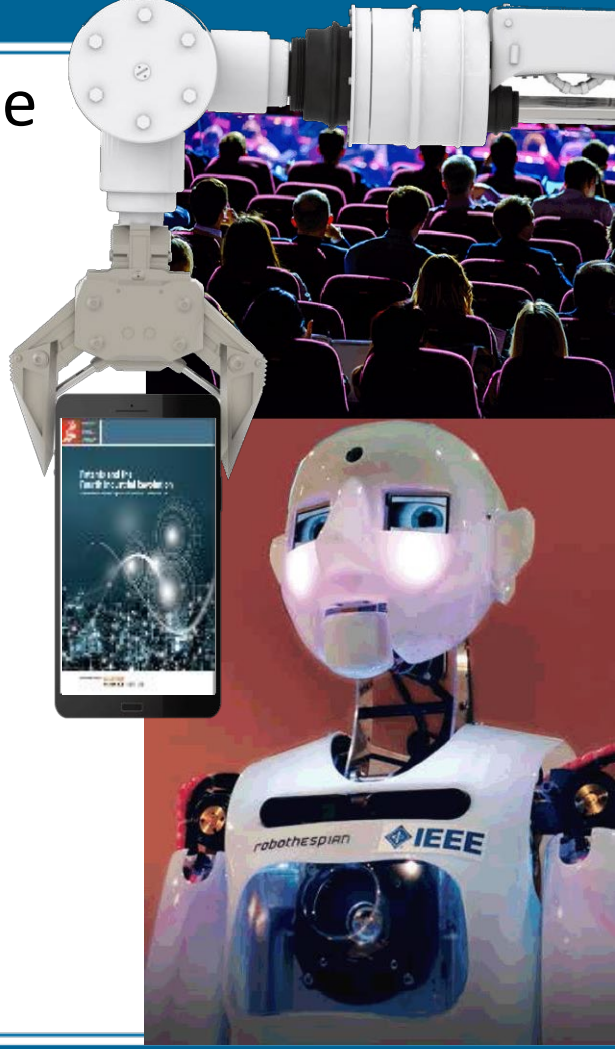

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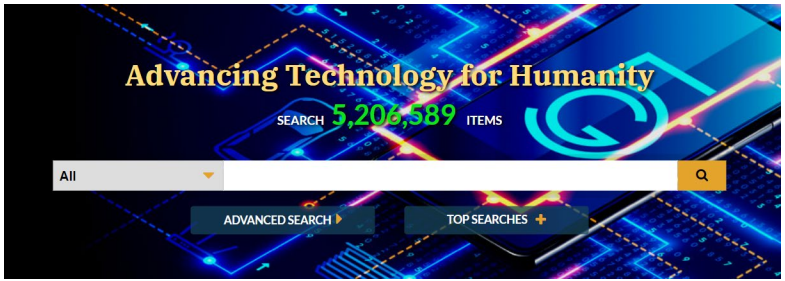
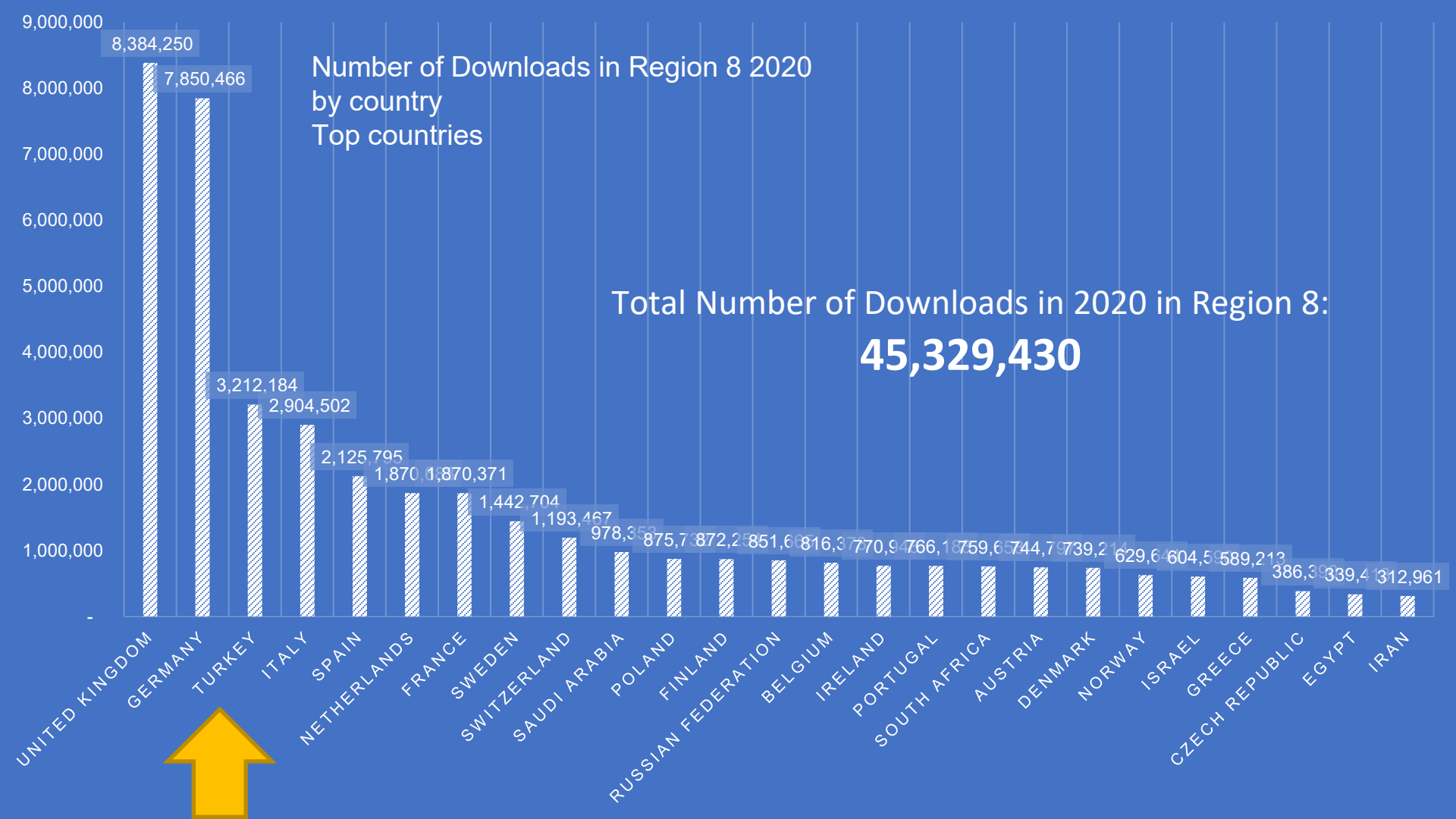


IEEE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8,384,250
7,850,466
3,212,184
2,904,502
2,125,795
1,870,371
1,442,704
1,193,467
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875,7
872,2
851,6
816,3
770,9
766,1
759,6
744,7
739,2
629,6
604,5
589,213
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Each year, the Journal Citation Reports® (JCR) from Clarivate Analytics examines the impact of scholarly journals by determining how often a journal's articles are cited by later research. are:

- 27 of the top 30 journals in EE
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- 3 of the top 5 journals in Computer Science—Cybernetics
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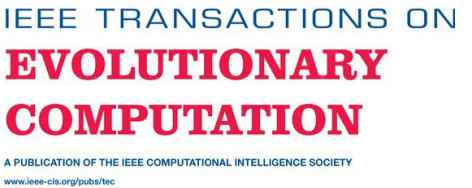
- 3 of the top 5 journals in Transportation Science & Technology



Source: 2019 Journal Citation Reports (Clarivate Analytics, 2018) Based on the 2017 study, released June 2020

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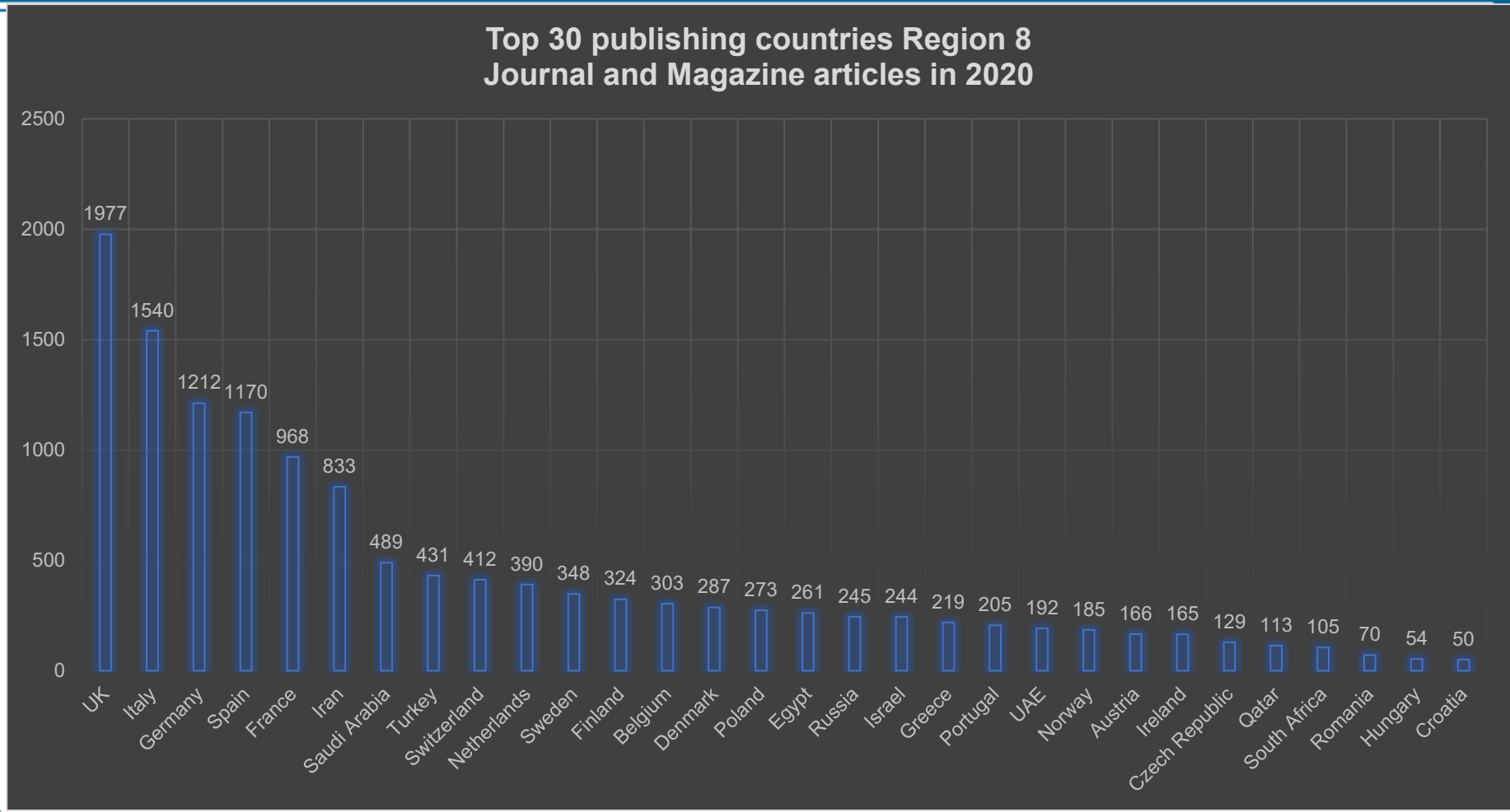
Top 30 publishing countries Region 8
Journal and Magazine articles in 2020
2500
2000
1500
1000
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1977
1540
1212
1170
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431
412
390
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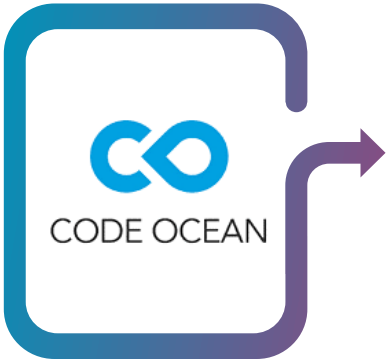

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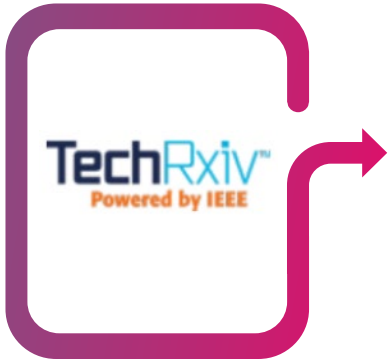

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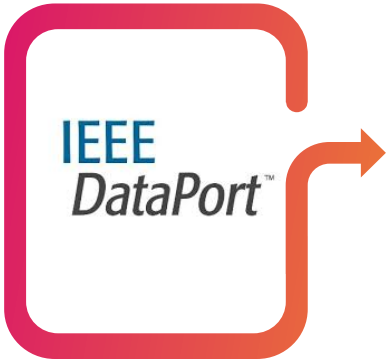

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*IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing – **FLIPPED!***
IEEE Journal of Translational Engineering in Health and Medicine
*IEEE Open Access Journal of Power and Energy – **RETITLED!***
*IEEE Open Journal of Antennas and Propagation – **NEW!***
*IEEE Open Journal of Circuits and Systems – **NEW!***
*IEEE Open Journal of Control Systems – **NEW!***
*IEEE Open Journal of Engineering in Medicine and Biology – **NEW!***
*IEEE Open Journal of Industry Applications – **NEW!***
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*IEEE Open Journal of Nanotechnology – **NEW!***
*IEEE Open Journal of Power Electronics – **NEW!***
*IEEE Open Journal of Signal Processing – **NEW!***
*IEEE Open Journal of the Communications Society – **NEW!***
*IEEE Open Journal of the Computer Society – **NEW!***
*IEEE Open Journal of the Industrial Electronics Society – **NEW!***
*IEEE Open Journal of the Solid-State Circuits Society – **NEW!***
*IEEE Open Journal of Ultrasonics, Ferroelectrics, and Frequency Control – **NEW!***
*IEEE Open Journal of Vehicular Technology – **NEW!***
IEEE Photonics Journal (flipped in 2012)
*IEEE Transactions on Neural Systems and Rehabilitation Engineering – **FLIPPED!***
*IEEE Transactions on Quantum Engineering – **NEW!***

Selecting A Research Topic

Choose An Area You Are Interested In

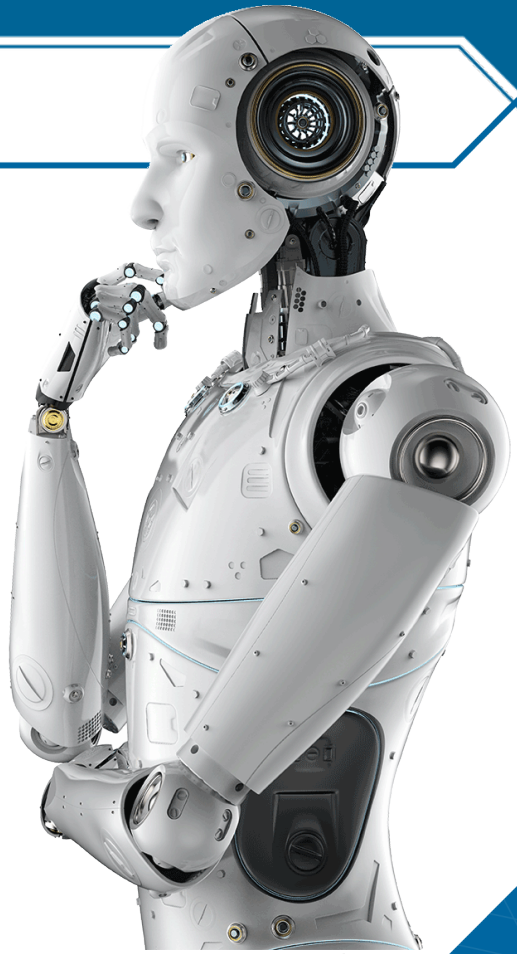
The research process is more relevant if you care about your topic.

Introduction to the Topic

Reading a **broad summary** enables you to get an **overview** of the topic and see how your idea relates to broader, narrower, and related issues.

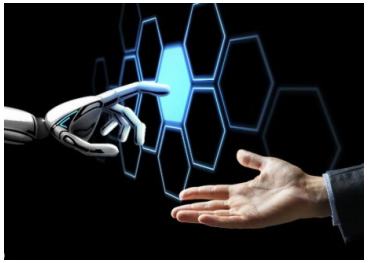
Background Study

Background reading can help you choose and **limit the scope** of your topic as well as determine if there is a **research gap**.



A Good Research Question Should Be:

- Clear and focused
- Not too broad
- Not too narrow
- Not too easy to answer
- Not too difficult to answer
- Researchable
- Analytical rather than descriptive
- Relevant to your field of study



Source: https://www.monash.edu/rlo/research-writing-assignments/understanding-the-assignment/developing-research-questions

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Choose An Area You Are Interested In

IEEE Resources to help select a research area

- New Technology Connections: IEEE Future Directions
  https://www.ieee.org/about/technologies.html
- IEEE Spectrum Magazine
  https://spectrum.ieee.org/
- Trending Content on IEEE *Xplore* Digital Library
  https://ieeexplore.ieee.org/

IEEE Future Directions' New Initiatives

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- August (PDF, 976 KB)
- May (PDF, 650 KB)
- March (PDF, 617 KB)
- January (PDF, 810 KB)

2020

- November
- September
- July (PDF, 2 MB)
- May (PDF, 1 MB)
- March (PDF, 2 MB)
- January (PDF, 2 MB)

2019

- July (PDF, 673 KB)
- May (PDF, 403 KB)
- March (PDF, 302 KB)
- January (PDF, 285 KB)

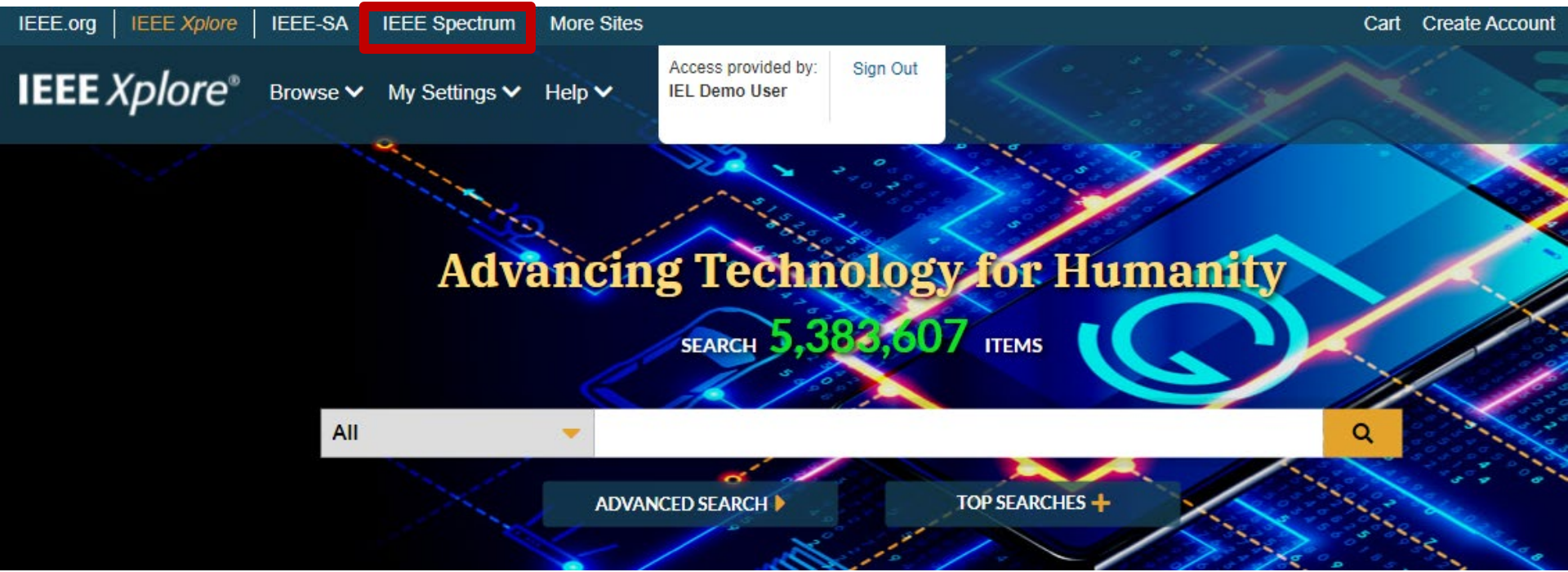
IEEE Future Directions podcasts

IEEE Future Directions interviews top subject-matter experts in the field through its
series.

https://www.ieee.org/about/technologies.html#ieee-future-directions-newsletter

IEEE Spectrum Magazine Website

A good source of inspiration



NEWS | TRANSPORTATION

The World's Most Popular EVs Aren't Cars, Trucks, or Motorcycles

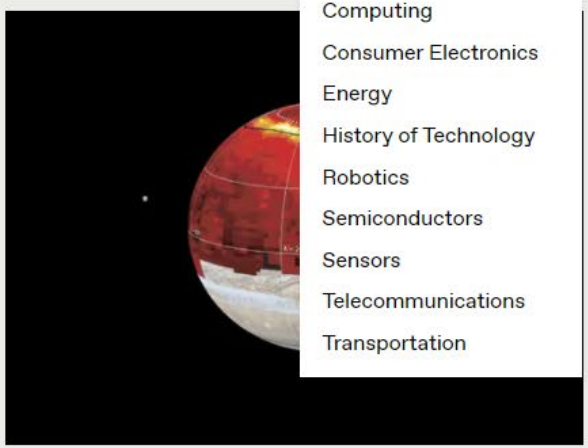
The pandemic has helped transform the e-bike into a juggernaut

25 NOV 2021 | 6 MIN READ |

NEWS | AEROSPACE

Revealed: Jupiter's Se

24 NOV 2021 | 4 MIN READ |



ARTICLE | TRANSPORTATION

The Hyperloop Is Hyper Old

18 HOURS AGO | 3 MIN READ |

TOPICS

- Aerospace
- Artificial Intelligence
- Biomedical
- Computing
- Consumer Electronics
- Energy
- History of Technology
- Robotics
- Semiconductors
- Sensors
- Telecommunications
- Transportation

IEEE Spectrum Magazine: Annual Top Tech Issue

Look Out for Apple's AR Glasses

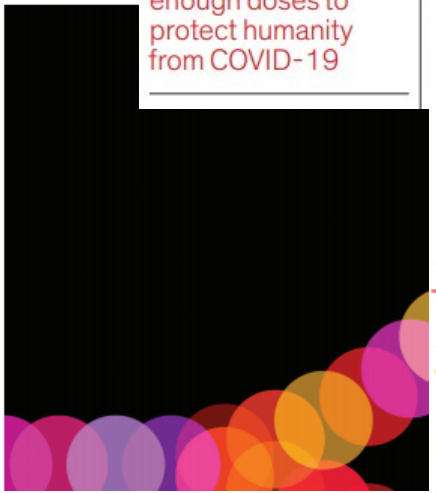
With head-up displays, cameras, inertial sensors, and lidar on board, Apple's augmented-reality glasses could redefine wearables

This Is How to Vaccinate the World

We can manufacture and distribute enough doses to protect humanity from COVID-19

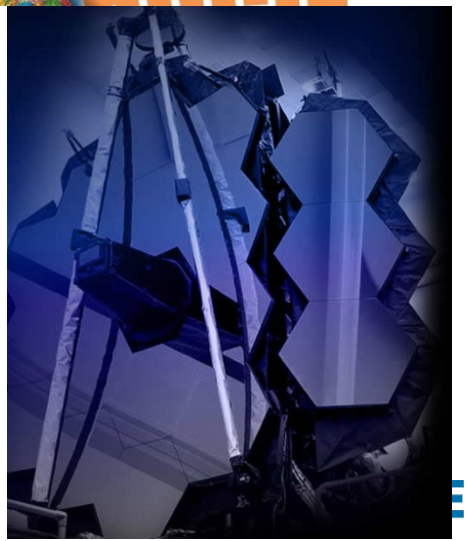
Deep Learning at the Speed of Light

Lightmatter bets that optical computing can solve AI's efficiency problem



Where No One Has Seen Before

The James Webb Space Telescope will let us see back almost to the big bang



Additional Tips for Selecting a Research Area

- Review the **topic selection guidelines** outlined in your assignment
- **Ask your professor** or teaching assistant for suggestions
- Hold a **brainstorming** session with your classmates

DEEP LEARNING

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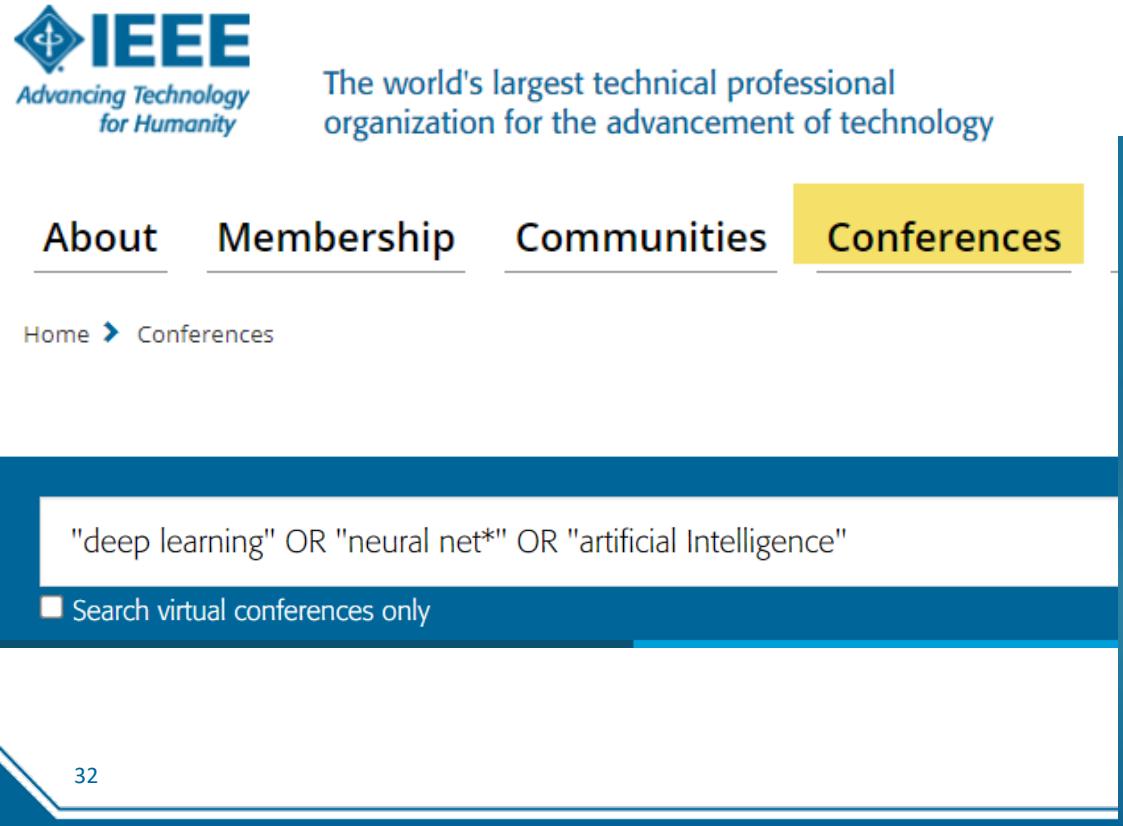
https://www.ieee.org/conferences/



TOPICS OF INTEREST

- Syntactic and semantic aspects of knowledge
- Knowledge management
- Distributed knowledge and processing
- Real-time knowledge and processing
- Hardware and software of knowledge systems
- Knowledge understanding and modelling
- Knowledge discovery
- Query and optimization
- Integrity, security, and fault tolerance
- Machine and deep learning of knowledge
- Knowledge integration
- "Big Knowledge" and reduction
- Performance evaluation
- Communicating knowledge and agents
- Multi-modal interactions
- Applications

Select All on Page

Sort By: Relevance

The Future of Deep Learning Is Photonic: Reducing the energy needs of neural networks might require computing with light

Ryan Hamerly

IEEE Spectrum

Year: 2021 | Volume: 58, Issue: 7 | Magazine Article | Publisher: IEEE

Abstract HTML

Deep-Learning Methods for Parallel Magnetic Resonance Imaging Reconstruction: A Survey of the Current Approaches, Trends, and Issues

Florian Knoll; Kerstin Hammernik; Chi Zhang; Steen Moeller; Thomas Pock; Daniel K. Sodickson; Mehmet Akcakaya

IEEE Signal Processing Magazine

Year: 2020 | Volume: 37, Issue: 1 | Magazine Article | Publisher: IEEE

Cited by: Papers (55)

Introduction to the Topic

The Difference Between a Magazine and a Journal

Magazines are different than journals in significant ways:

- **Feature articles are shorter**, with a broader appeal and fewer equations and references.
- Articles are **more tutorial** in nature. Articles are written to **appeal to non-experts as well as experts in the field.**
- Magazines look different, with visually appealing covers and photographs throughout the issue.

Search IEEE *Xplore* for “deep learning”

Search within results

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[ ] **Runway Detection and Localization in Aerial Images using Deep Learning**

Javeria Akbar; Muhammad Shahzad; Muhammad Imran Malik; Adnan Ul-Hasan; Fasial Shafait

2019 Digital Image Computing: Techniques and Applications (DICTA)

Year: 2019 | Conference Paper | Publisher: IEEE

Cited by: Papers (1)

▸ Abstract HTML

[ ] **Evaluation of Deep Learning Techniques in Sentiment Analysis from Twitter Data**

Dionysis Goularas; Sani Kamis

2019 International Conference on Deep Learning and Machine Learning in Emerging Applications (Deep-ML)

Year: 2019 | Conference Paper | Publisher: IEEE

Cited by: Papers (13)

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Showing **1-25** of **539** for **"deep learning"** ×

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- [ ] Early Access Articles (2,233)
- [ ] Books (166)
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- ✓ Most Popular
- Publication Title A-Z
- Publication Title Z-A

[ ] **Learning IoT in Edge: Deep Learning for the Internet of Things with E**

He Li; Kaoru Ota; Mianxiong Dong

IEEE Network

Year: 2018 | Volume: 32, Issue: 1 | Magazine Article | Publisher: IEEE

Cited by: Papers (324)

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Learning IoT in Edge: Deep Learning for the Internet of Things with Edge Computing
He Li; Kaoru Ota; Mianxiong Dong
IEEE Network
Year: 2018 | Volume: 32, Issue: 1 | Magazine Article | Publisher: IEEE
Cited by: Papers (324)

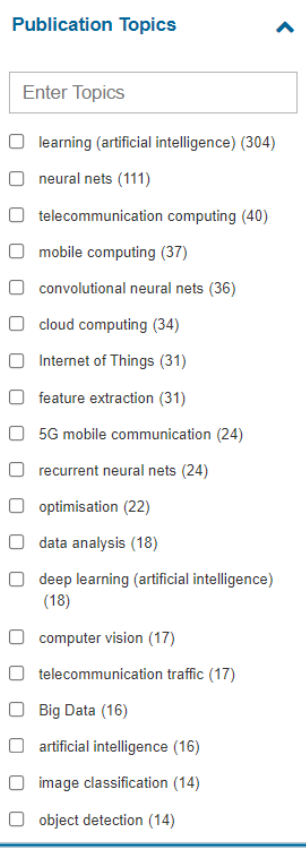
Deep Learning in Remote Sensing: A Comprehensive Review and List of Resources
Xiao Xiang Zhu; Devis Tuia; Lichao Mou; Gui-Song Xia; Liangpei Zhang; Feng Xu; Friedrich Fraundorfer
IEEE Geoscience and Remote Sensing Magazine
Year: 2017 | Volume: 5, Issue: 4 | Magazine Article | Publisher: IEEE
Cited by: Papers (283)

Deep Learning for Physical-Layer 5G Wireless Techniques: Opportunities, Challenges and Solutions
Hongji Huang; Song Guo; Guan Gui; Zhen Yang; Jianhua Zhang; Hikmet Sari; Fumiyuki Adachi
IEEE Wireless Communications
Year: 2020 | Volume: 27, Issue: 1 | Magazine Article | Publisher: IEEE
Cited by: Papers (75)

The Future of Deep Learning Is Photonic: Reducing the energy needs of neural networks might require computing with light
Ryan Hamerly
IEEE Spectrum
Year: 2021 | Volume: 58, Issue: 7 | Magazine Article | Publisher: IEEE

Topics:
Internet of Things
Edge Computing
Remote Sensing
5G
Photonics

Review the Publications Topic facet on the search results page



Related Terms:
Artificial Intelligence
Neural Nets

Related Technologies:
Internet of Things
Cloud Computing
Big Data
5G

IEEE

Read the Introduction from a couple of magazine articles

The technique that has empowered these stunning developments is called deep learning, a term that refers to mathematical models known as artificial neural networks. Deep learning is a subfield of machine learning, a branch of computer science based on fitting complex models to data.

Deep learning, which is to say artificial neural networks with many hidden layers, is regularly stunning us with solutions to realworld problems. And it is doing that in more and more realms, including natural-language processing, fraud detection, image recognition, and autonomous driving. Indeed, these neural networks are getting better by the day.

Broader Terms:
Machine Learning
Artificial Intelligence

Related Term:
Artificial Neural Networks

Applications:
Natural Language Processing
Fraud Detection
Image Recognition
Autonomous Driving

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Abstract

Document Sections

I. Introduction

II. Microgrid Control

III. Integration Issue of Distributed Energy Resources

IV. Strengths and Weaknesses of the Renewable Energy Sector

V. Environmental and Socioeconomic Impacts of Renewable Energy

VI. Grid-Connected PV Array

VII. Conclusion and Future Scopes

Abstract:
The importance of Microgrid has increased appreciably by the increasing demand of efficient green energy, clean, secure and sustainable electricity. Microgrid is a transformative architecture for the normal generation, adaptive and self-healing of electricity network. This article contributes a comprehensive review of the latest research in the area of advance control techniques and integration issue of distributed energy resources (DER) in the Microgrid. The distributed generators resources such as solar, wind, photovoltaic etc. has high penetration and its connection to the grid network through advance power electronics converters with energy storage devices, communication technologies and controllable loads, open new horizons for the successful development of Microgrid applications incorporated into power frameworks.

Published in: 2019 International Conference on Innovative Trends and Advances in Engineering and Technology (ICITAET)

Date of Conference: 27-28 Dec. 2019

INSPEC Accession Number: 19892561

Date Added to IEEE *Xplore*: 18 August 2020

DOI: 10.1109/ICITAET47105.2019.9170223

ISBN Information:

Publisher: IEEE

Conference Location: Shegoaon, India

I. Introduction

SECTION VII.

Conclusion and Future Scopes

Microgrid is usually composed of distributed energy resources, energy management system based controller, communication system, electric vehicle and demand response. This paper contributes a comprehensive and review of the recent control and integration issues of distributed energy resources with Microgrid. Microgrid may be connected islanded mode or on-grid mode for sustainable development and deals with economical, technical and environmental issues. The operation of Microgrid is to provide the optimal power flow in the distribution network. This paper addresses the different control technologies and different integration challenges such as power quality, reliability, resiliency of renewable energy resources with high Microgrid penetration and also explores current approaches used in Grid network. For the future scopes are, accelerated deployment of renewable energy technologies, cost reduction using incubating technologies with future potential, easier implementation and effective monitoring and maintenance, regular improvements in regulatory and policy initiative to promote renewable energy, subsidy support for government, developing and deploying financial instruments and strong monitoring and evaluation frameworks.

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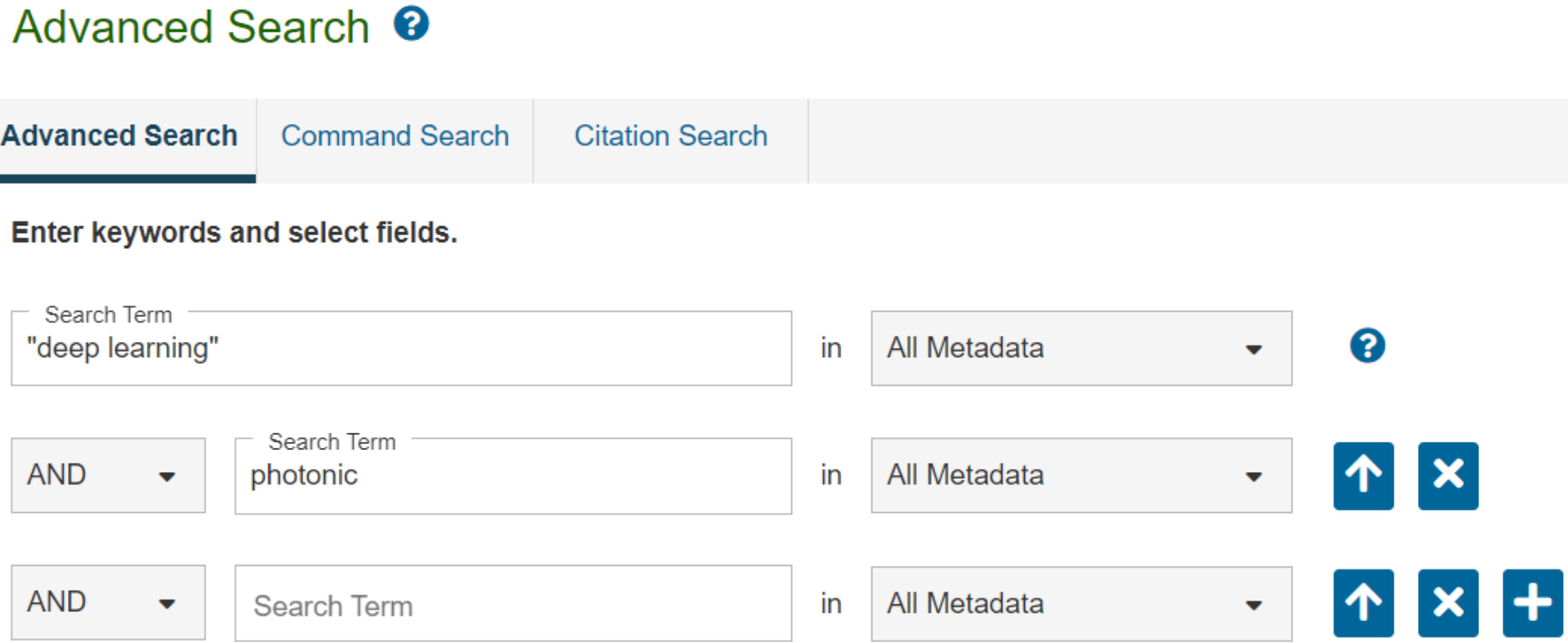
Background Study

Search IEEE *Xplore* for “deep learning” AND photonic



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Year

Author

Affiliation

Publication Title

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☐ **Silicon Photonic Neural Networks and Applications**
B. J. Shastri; B. A. Marquez; A. N. Tait; T. Ferreira de Lima; H. -T. Peng; C. Huang; P. R. Prucnal
2020 Photonics North (PN)
Year: 2020 | Conference Paper | Publisher: IEEE

▸ Abstract **HTML**

☐ **Data-driven Modeling Technique for Optical Communications Based on Deep Learning**
Danshi Wang; Yuchen Song; Min Zhang
2020 Asia Communications and Photonics Conference (ACP) and International Conference on Information Photonics and Optical Communications (IPOC)
Year: 2020 | Conference Paper | Publisher: IEEE

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Sort your results to find new or highly-cited papers:

Most Cited – by Papers or Patents

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ChestX-Ray8: Hospital-Scale Chest X-Ray Database and Benchmarks on Weakly-Supervised Classification and Localization of Common Thorax Diseases

Xiaosong Wang; Yifan Peng; Le Lu; Zhiyong Lu; Mohammadhadi Bagheri; Ronald M. Summers

2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)

Year: 2017 | Conference Paper | Publisher: IEEE

Cited by: Papers (201) | Patents (2)

Abstract ((html)) PDF (1238 Kb) ©

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Author

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- [x] Lei Zhang (15)
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Automated IT system failure prediction: A deep learning approach

Ke Zhang; Jianwu Xu; Martin Renqiang Min; Guofei Jiang; Konstantinos Pelechrinis; Hui Zhang

2016 IEEE International Conference on Big Data (Big Data)

Year: 2016 | Conference Paper | Publisher: IEEE

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Automatic Road Detection and Centerline Extraction via Cascaded End-to-End Convolutional Neural Network

Guangliang Cheng; Ying Wang; Shibiao Xu; Hongzhen Wang; Shiming Xiang; Chunhong Pan

IEEE Transactions on Geoscience and Remote Sensing

Year: 2017 | Volume: 55, Issue: 6 | Journal Article | Publisher: IEEE

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Sonja Grgic (Member, IEEE) received the B.S., M.S., and Ph.D. degrees in electrical engineering from the Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia, in 1989, 1992, and 1996, respectively. She is currently a Professor in multimedia technologies and communication systems with the Faculty of Electrical Engineering and Computing, University of Zagreb. Her research interests include image processing and machine learning, picture quality evaluation, video communication technologies, and image forensics. *(Based on document published on 12 August 2021).*

Aggregated Professor in computer science and engineering from UBI, the Habilitation in computer

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Publications by Year

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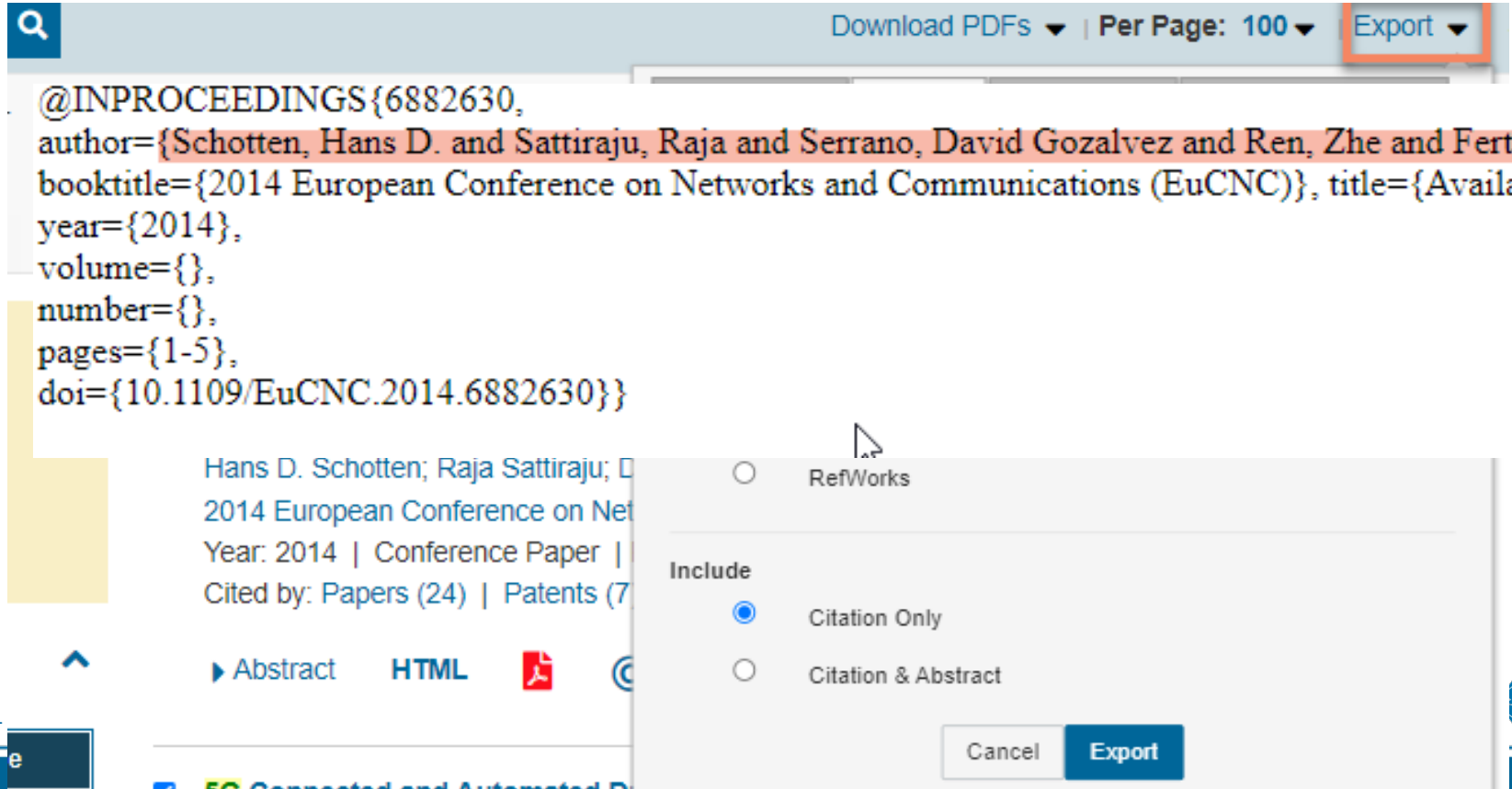
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booktitle={2014 European Conference on Networks and Communications (EuCNC)}, title={Availability indic
year={2014},
volume={},
number={},
pages={1-5},
doi={10.1109/EuCNC.2014.6882630}}
Hans D. Schotten; Raja Sattiraju; D
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Abstract

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- Optical Data Communication is Faster and Uses Less Power. Optical Computing Promises the Same Advantages
- Theoretically, Photonics Has the Potential to Accelerate Deep Learning by Several Orders of Magnitude

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Think of the many tasks to which computers
human intuition. Computers routinely identify
languages, diagnose medical conditions, pla

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Page(s): 30 - 47

Date of Publication: 05 July 2021

ISSN Information:

Think of the many tasks to which compute
past required human intuition. Computers
speech, translate between languages, diagr
and drive cars.

My Research Projects

Deep Learning and Photonics

Challenges outlined in paper:
- Accuracy & dynamic range of analog optical calculations

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optical neural networks Enter

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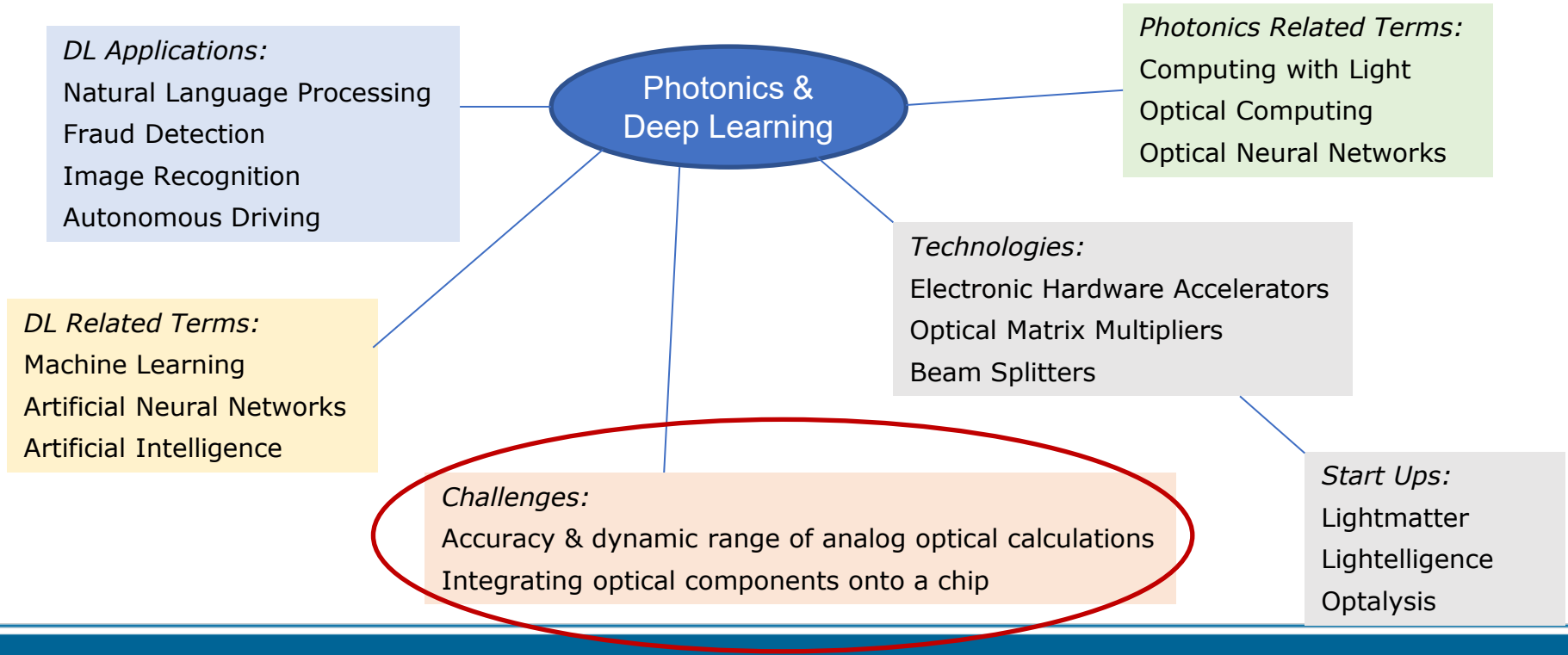

Photonics & Deep Learning: Challenges

- Accuracy & dynamic range of analog optical calculations
  - Optical processors suffer from various sources of noise
  - The digital-to-analog and analog-to-digital converters used to get the data in and out are of limited accuracy
- Industry demands higher precision for neural-network training
  - Google's TPU is an example of 8-bit electronic deep-learning hardware
- Integrating optical components onto a chip

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Questions?
Please contact

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