Developing skills for the age of artificial intelligence

Dr Clara Neppel, Senior Director of European Business Operations

IEEE

3 December 2021

ADVANCING TECHNOLOGY FOR HUMANITY

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Best way to encourage students to study STEM: IMPACT


How AI and Neural Implants Are Delivering an Artificial Nervous System P. 28
Now: Controlling hands and fingers
Next: Restoring the sense of touch

Broad Likeness **Botto Project**

Profiling

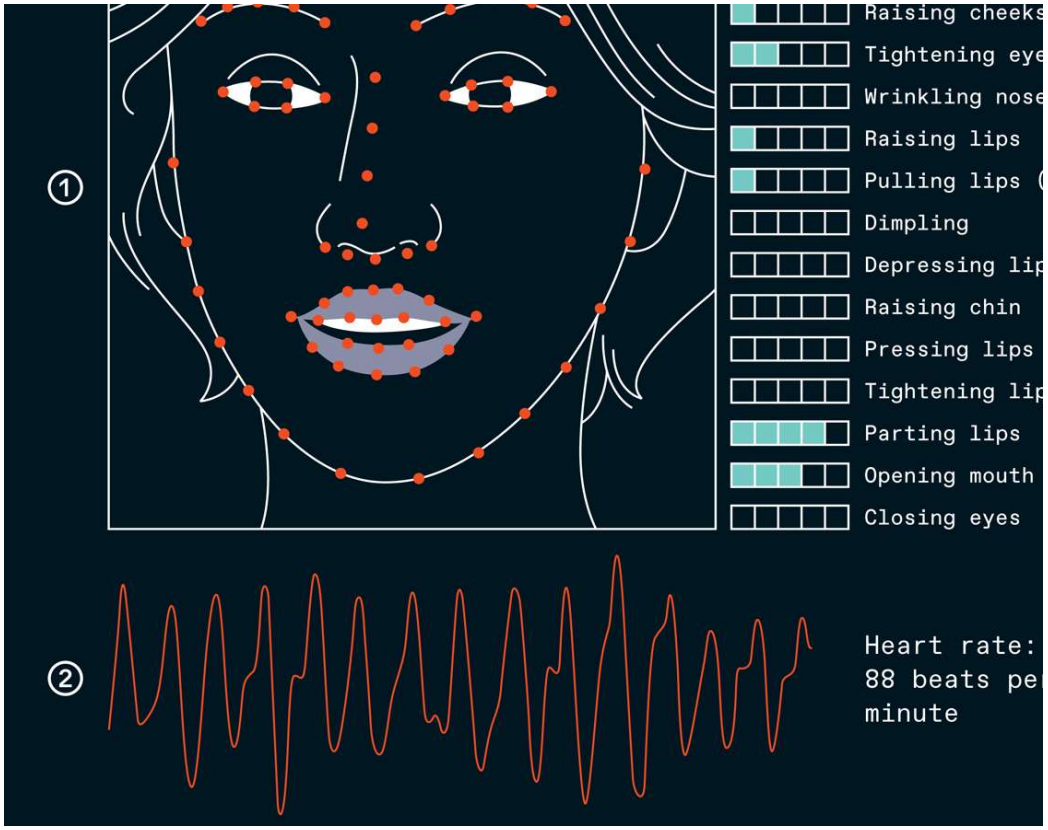
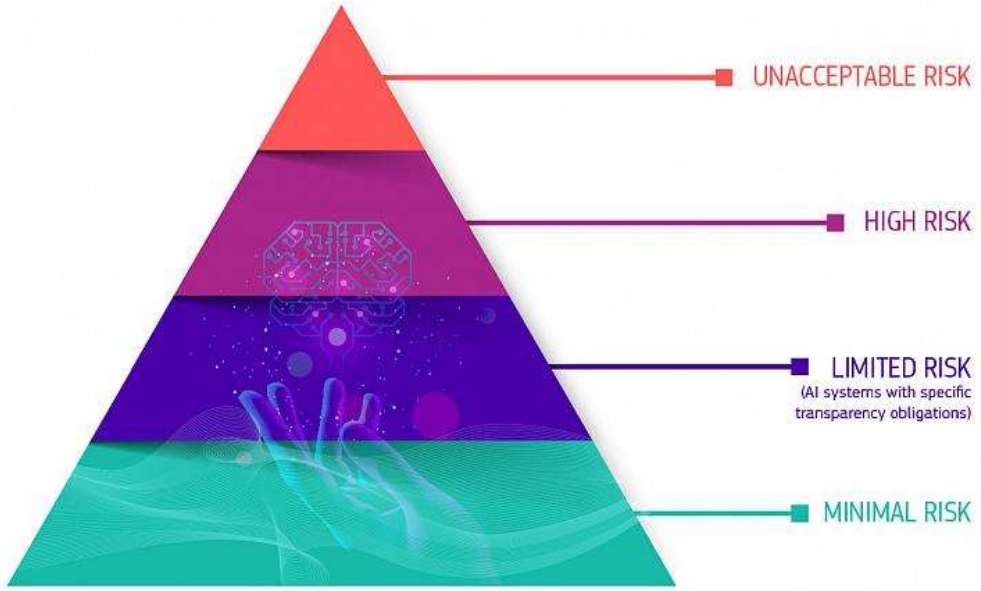


Illustration: Chris Philpot

Redefining Risk and Metrics of Success



Proposal for EU Harmonized Rules on AI

“Digital literacy” “Digital skills” or “Digital readiness”?

Examples

IEEE Std 3527.1-2020 Standard for Digital Intelligence (DQ) -- Framework for Digital Literacy, Skills and Readiness

- **Common** framework to ensure that digital literacy and competency efforts are coordinated **globally**.
- **Common set of definitions, language, and understanding of digital literacy, skills, and readiness**
- Can be adopted by all stakeholders worldwide, including national governments, education industry, technology industry, companies, and society as a whole.

P7015 Standard for Data and Artificial Intelligence (AI) Literacy, Skills, and Readiness

Skills and competencies are widely taught as a transdisciplinary competence across all subjects from three perspectives

- application-oriented
- technical-methodological
- socio-cultural

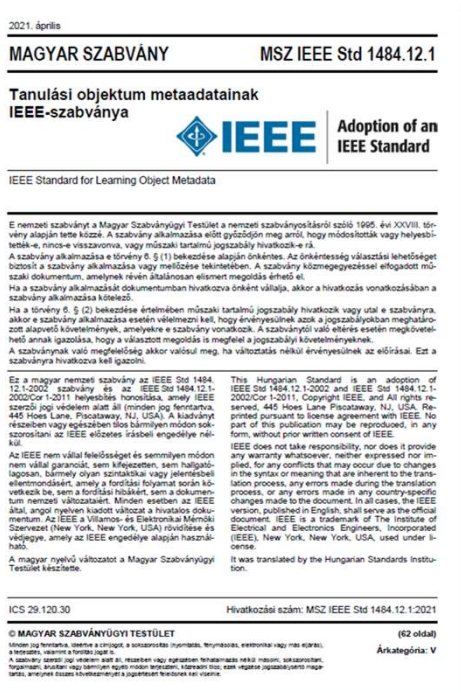
Enable every individual, and our society as a whole, to deal with data and AI in a conscious and ethically sound manner.

The first working group meeting will be 8 December.

P1484.20.2 Recommended Practices for Defining Competencies, and family of standards

Adoption of IEEE Standard 1484.12.1 in Hungary

- Standard for Learning Object Metadata was adopted by the Hungarian National Standards Body
- One example of how standards can support the ecosystem.



2021. április

MAGYAR SZABVÁNY **MSZ IEEE Std 1484.12.1**

Tanulási objektum metaadatainak IEEE-szabványa

IEEE **Adoption of an IEEE Standard**

IEEE Standard for Learning Object Metadata

E nemzeti szabványt a Magyar Szabványügyi Testület a nemzeti szabványosításról szóló 1995. évi XXVIII. törvény alapján tette közzé. A szabvány alkalmazása előtt győződjön meg arról, hogy módosították vagy helyesbítették-e, nincs-e visszavonva, vagy műszaki tartalmú jogszabály hivatkozik-e rá.

A szabvány alkalmazása e törvény 6. § (1) bekezdése alapján önkéntes. Az önkéntesség választási lehetőséget biztosít a szabvány alkalmazása vagy mellőzése tekintetében. A szabvány közmegegyezéssel elfogadott műszaki dokumentum, amelynek révén általánosan elismert megoldás érhető el.

Ha a szabvány alkalmazását dokumentumban hivatkozva önként vállalja, akkor a hivatkozás vonatkozásában a szabvány alkalmazása kötelező.

Ha a törvény 6. § (2) bekezdése értelmében műszaki tartalmú jogszabály hivatkozik vagy utal e szabványra, akkor e szabvány alkalmazása esetén vélelmezni kell, hogy érvényesülnek azok a jogszabályokban meghatározott alapvető követelmények, amelyekre e szabvány vonatkozik. A szabványtól való eltérés esetén megkövetelhető annak igazolása, hogy a választott megoldás is megfelel a jogszabályi követelményeknek.

A szabványnak való megfelelőség akkor valósul meg, ha változtatás nélkül érvényesülnek az előírásai. Ezt a szabványra hivatkozva kell igazolni.

Ez a magyar nemzeti szabvány az IEEE Std 1484.12.1-2002 szabvány és az IEEE Std 1484.12.1-2002/Cor 1-2011 helyesbítés honosítása, amely IEEE szerzői jogi védelem alatt áll (minden jog fenntartva, 445 Hoes Lane, Piscataway, NJ, USA). A kiadványt részeiben vagy egészében tilos bármilyen módon sokszorosítani az IEEE előzetes írásbeli engedélye nélkül.

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A magyar nyelvű változatot a Magyar Szabványügyi Testület készítette.

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ICS 29.120.30 Hivatkozási szám: MSZ IEEE Std 1484.12.1:2021

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Minden jog fenntartva, ideértve a címjegyzet, a sokszorosítás (nyomtatás, fénymásolás, elektronikai vagy más eljárás), a terjesztés, valamint a fordítás jogát is.
A szabvány szerzői jogi védelem alatt áll, részében vagy egészében felhatalmazás nélkül másolni, sokszorosítani, forgalmazni, áruházi vagy bármilyen egyéb módon terjeszteni, közreadni tilos, ezek végzése jogszabálysértő magatartás, amelynek összes következményeit a jogsértésért felelősnek kell viselnie.

Árkategória: V

IEEE is Helping Students Learn, Wherever They Are

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- Resources for teachers, professors, and students
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- Digital instruction on challenging topics
- Self-contained, asynchronous instruction
- Global perspectives on technology

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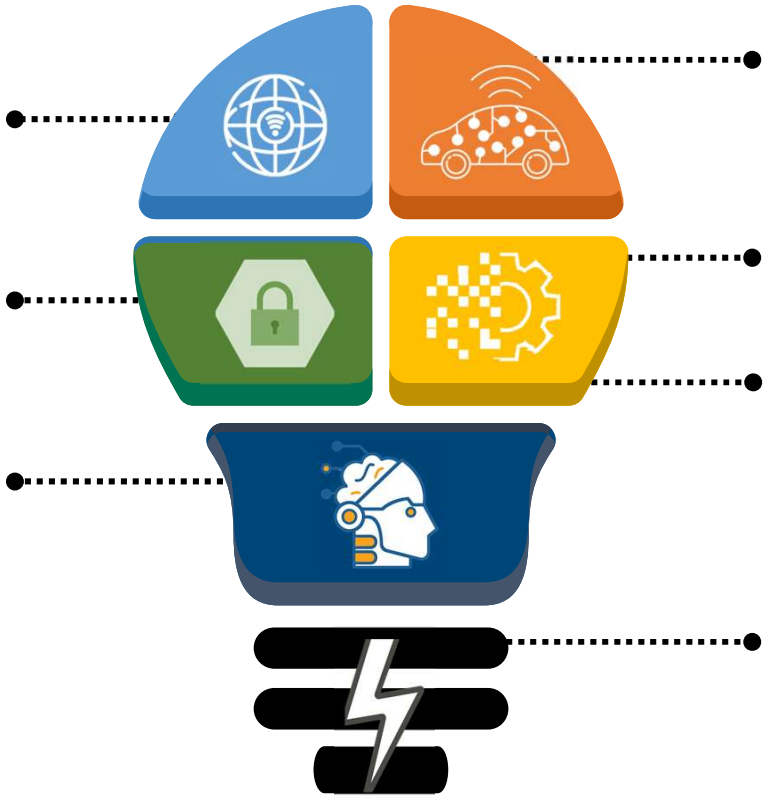
5G Networks |Bridging the 4G/5G Gap

Cyber Security

Automotive Cyber Security | ISACA CSX | Cybersecurity for Today's Environment | Ethical Hacking

AI/Machine Learning

AI Standards: Roadmap for Ethical and Responsible Digital Environments | Machine Learning: Predictive Analysis for Business Decisions | Artificial Intelligence and Ethics in Design (parts 1 and 2)



Vehicular Technology

IEEE Guide to Autonomous Vehicle Technology | Automotive Cyber Security

Digital Transformation

Digital Transformation: Moving Towards a Digital Society | Enterprise Blockchain

Internet of Things

Introduction to Edge Computing | IEEE Guide to the Internet of Things | Enterprise Blockchain

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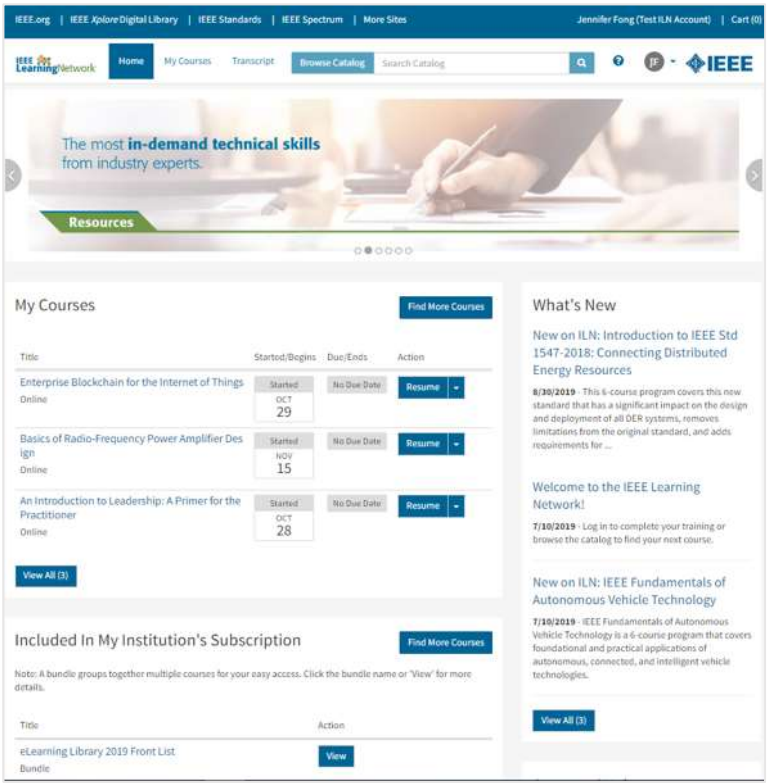

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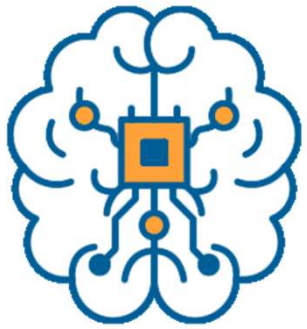
Visit the **IEEE Learning Network** at **iln.ieee.org**

AI Standards: Roadmap for Ethical and Responsible Digital Environments



As artificial intelligence (AI) continues to spread across various industries—including healthcare, manufacturing, transportation, and finance among others—rigorous best practices focusing on equality, security, and privacy are vital to keep in mind when implementing ethically-aligned digital ecosystems.

This 5-course program:

- helps organizations responsibly integrate AI within their products and operations, and
- provides instructions for implementing a comprehensive approach to creating ethical digital ecosystems.

Course titles include:

- *AI Standards: Organizational Transparency*
- *AI Standards: Best Practices for Ethical Systems*
- *AI Standards: A Comprehensive Approach to Digital Ecosystems*
- *AI Standards: System Design Considerations for Data Privacy*
- *AI Standards: Configuring Systems for Privacy*

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- Responsible Innovation in the Age of AI
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- Values by Design in the Algorithmic Era
- The Nature of Nudging
- Ensuring Data Protection and Safety

Part 2 Titles:

- From Growth to Great
- The Basis for No Bias
- Transparency and Accountability for Robots and AI Systems
- Human Emotion in Devices and Technology
- Legal and Implementation Issues of Enterprise AI

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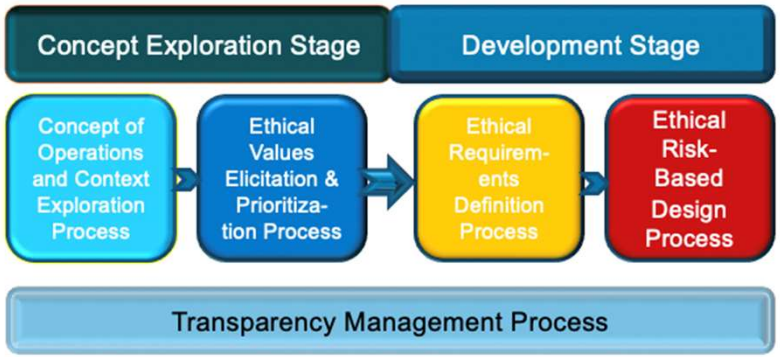
IEEE 7000-2021

IEEE 7000™- 2021

Addressing Ethical Concerns During System Design



First global standard of its kind that:

- Provides activities and tasks for a human-centric and ethically founded value elicitation (going beyond lists of principles)
- Provides the processes for engineers to translate stakeholder ethical expectations (principles) into system requirements and design (practices)
- Provides a systematic and transparent approach to address regulatory and socio-technical best practice in the design of autonomous intelligent systems

https://standards.ieee.org/initiatives/artificial-intelligence-systems

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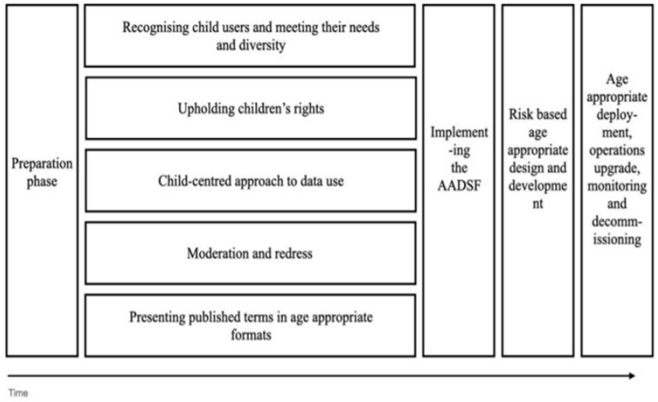
IEEE 2089

IEEE 2089: Age-Appropriate Digital Services Framework

- The standard establishes a **set of processes by which organizations seek to make their services Age Appropriate**. [Definition of **age appropriate:** something that is suitable or appropriate for a person of a particular age.
- It takes the approach of **child-centered design:** A design approach that prioritizes children's rights and needs in service design and governance, bearing children's best interests at the heart of any design process.

For use by:

- **Organizations** making products & services for children
- **Governments** who set rules around children
- **Families** who want age-appropriate products and services
- **Education sector** that increasingly uses digital technologies
- **Children** who will benefit from digital services that respect their rights, dignity, and different needs as they grow up.



IEEE 2089-2021
Relationship of processes and stages in the standard

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IEEE CertifAIEd

IEEE CertifAIEd

The Mark of **AI E**thics

- Mark designed to inspire trust and responsible innovation in AI systems.
- Offers a risk-based framework with a suite of AI ethical criteria that can be contextualized to fit organizations' needs.
- Affirms an organization's commitment to upholding human values, dignity, and well-being, and to respecting, protecting and preserving fundamental human rights.
- Conveys an organization's capability to fulfill applicable transparency, accountability, reduction of algorithmic bias and privacy requirements stipulated in the appropriate criteria to foster trust and facilitate the adoption and use of AI products and services.
- Enhances confidence in public and private enterprises that wish to realize the benefits of AI ethics certification in the absence of or as a complement to broadly accepted and enforced regulations for AI, while mitigating risks, liabilities and adverse impacts on their reputation and market share.

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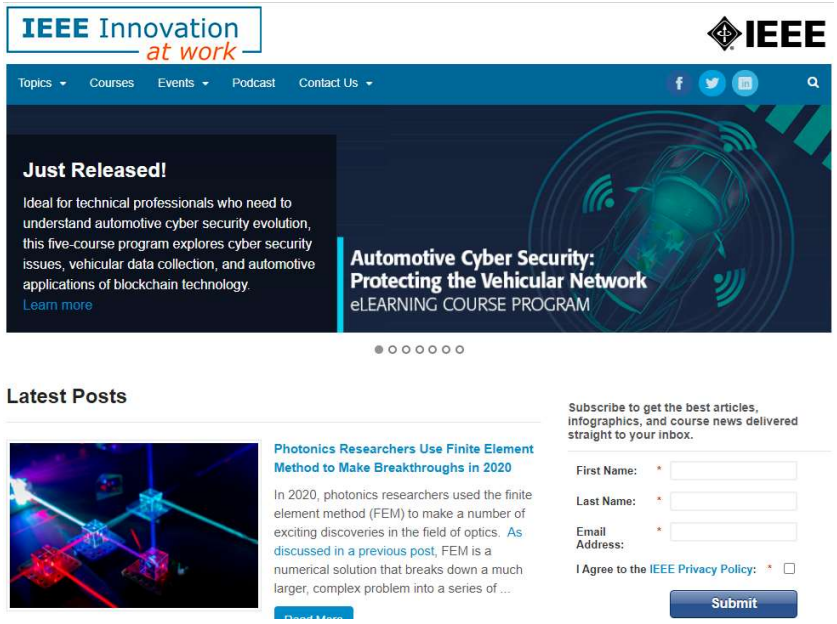

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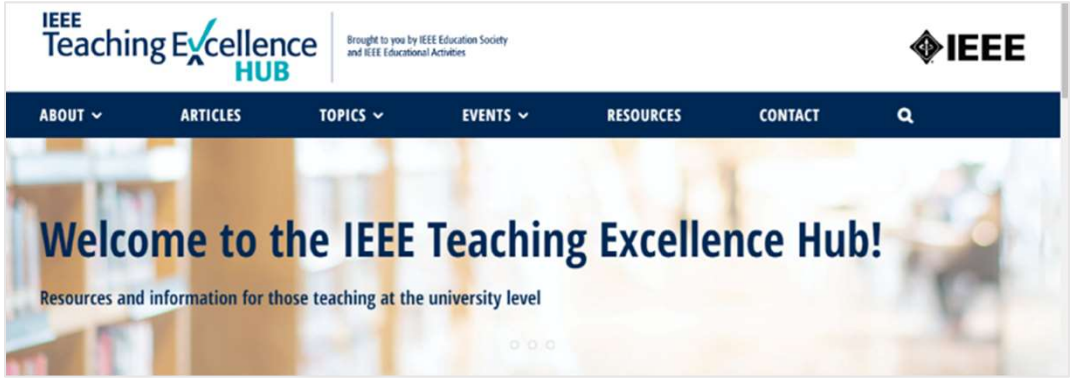
IEEE Teaching Excellence HUB

- Designed to provide professional development resources for those teaching at the university level
- A collaboration between IEEE Educational Activities and the IEEE Education Society
- Content (blogs, articles, events) developed by experts from IEEE Education Society and Educational Activities Faculty Resources Committee



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Equity, Diversity, & Inclusion	Educational Research
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Remote Instruction	...and more!

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IEEE History Center Program provides teachers and students with education resources that explore technology and engineering's complex relationship with society through the lens of history.

Under the MoU between IEEE and UNESCO & with assistance from the IEEE Africa Council

New Pilot Program in Uganda

- Adapted to Uganda curriculum standards and delivered to students (predominately girls) both in the classroom, and by way of a traveling classroom trailer reaching under-served rural communities
- Partnered with local NGOs to present the program to 40 teachers from 8 school districts at a UNESCO STEM mentorship workshop
- Upon completion, more than 70 teachers and approximately 1,000 students impacted. Local assessment found significant student impact and that REACH provides a new STEM education pathway.
- UNESCO and the Uganda Ministry of Education are exploring program expansion.

"REACH is not just history, it's inspiration!"…Video testimonial from Maryanne Karamagi, CEO of Silver Bolt https://vimeo.com/ieeereach/testimonial

SKILLS FOR HUMAN-CENTRIC DIGITAL INNOVATION

- Impact oriented
- Multidisciplinary
- Continuous
- Technical skills combined with transdisciplinary competence
  - application-oriented
  - technical-methodological
  - socio-cultural
  - creativity

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