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Nota di contenuto	Pedagogy in the context of Online Laboratories and Virtual Experimentation -- A hitchhikers guide to remote learning on supply chains using MINIS as a learning environment.-Use of remote laboratories for the development of critical thinking in engineering students -- Online Laboratories in Modern Engineering Education: A Systematic Literature Review -- Facilitating supervision of student groups in a remote laboratory system design -- Critical analysis of a hybrid teaching approach using remote laboratories at University -- Hands-on Online Experimentation -- Remote (Controlled) Laboratories -- Building a remote laboratory using a practical example from undergraduate engineering practice -- Development of an E-learning FPGA Platform Following the IEEE SA Std. 1876 - 2019 Standard for Networked Smart Learning Objects for Online Laboratories.-STANDARDS AND TECHNOLOGIES FOR REMOTE LABORATORIES --

Advancing Embedded Systems Education Through Remote Laboratory Integration in the Teaching Module Microprocessor Technology -- Development of a Virtual Industrial Robot Laboratory with a Real-Time Operating Capabilities using Digital Twin Technology -- Equity Aspects from the Adoption of Online Laboratories in Engineering Education -- Lego-Based Online Laboratories: case-study of Industrial Robotics -- Simulated and Virtualized Laboratories.-Immersive airfoil student laboratory: Augmented reality application with real-time measurement data access -- Remote test-bench experiments for teaching laboratories based on LabVIEW, Python and Java -- Virtual Laboratories in STEM Education: A Focus on Onlabs, a 3D Virtual Reality Biology Laboratory -- Comparative study of two ultra-concurrent laboratories of acid-base titration -- Online Simulation of Oscillators: A New Approach to Analog ElectronicsEducation -- Online Serial Laboratories -- Augmented, Mixed, and Virtual Reality Laboratories -- Enhancing spatial understanding for interdisciplinary tasks -- Effectiveness study of an AR App as a preparation tool for electrical engineering lab courses -- Chemical Education in the Era of Chemistry 4.0 – Development Methodology for Virtual Laboratory Courses in Organic Chemistry -- Students' Perceived Usefulness of Virtual Reality Laboratories -- Commercial Online Laboratories -- The Role of LabsLand in the Remote Laboratory Ecosystem -- Multi-user remote access hardware labs for Wireless and Electronics Undergraduate courses -- Setting up international certification to support Industry 4.0 -- International and Cross-institutional Collaboration in Online Laboratories -- Remote educational IoT labs: The experience from the DTAM project's IoT Hub -- World Pendulum Alliance -- The Project OnLabEdu – Online Laboratories for Schools -- Cross-institutional collaboration in Argentina within the collaborative network of remote laboratories R-Lab -- International collaborations and standards are needed to scale online laboratories -- Lessons Learned for Online Laboratory Instruction in the time COVID -- Simulations and Online Laboratory Experiments for courses of Communication Systems developed due to the COVID-19 pandemic and subsequent utilization -- An Extensive Exploration into the Pedagogical Shifts: Remote Labs Experiences and Their Multifaceted Implications in the Educational Landscape During the COVID-19 Pandemic Scenario -- Research approaches and methodologies to investigate online laboratory instruction in the time of COVID-19.

Sommario/riassunto

This comprehensive book, divided into seven sections, showcases groundbreaking research findings that blend new experiences from the COVID-19 pandemic with long-term research on online laboratories and virtual experimentation. Providing an adequate learning experience in the laboratory has long been a major challenge in science, engineering, and technology education. Recent years have further revealed the complexities of offering distance or remotely accessible educational settings, particularly for laboratory-based courses. In response, many academic institutions have innovated by transitioning their laboratory classes into online laboratories or providing laboratory kits for at-home use. This unprecedented situation has sparked numerous new developments, approaches, and activities, revolutionizing the field. With contributions from leading researchers and practitioners across diverse disciplines, this book delves into current trends, addresses critical challenges, and uncovers future opportunities for laboratory-based education in the context of online learning. Whether readers are educators seeking innovative teaching strategies, researchers exploring the latest advancements, or academic leaders looking to enhance remote learning experiences, this book

provides valuable insights and practical solutions. It explores how online laboratories are transforming education and discovers the potential they hold for the future.