

IMEKO 2024 World Congress Conference Guide



Web-based remote electronics laboratory design and implementation

TUE

X

Munich

14:15 - 14:30

Save

Károly Árpád Kis

Parent Event

Contribution

The growing deployment of mechatronics systems need a significant number of qualified engineers with a better knowledge of all theoretical and practical elements of Electronics and Electrotechnics. Building experimental laboratories at universities is costly and restricted to only students who are physically present at the campus. Setting up remote experiments is a contemporary strategy to increase access to laboratories, especially in years where on-site teaching was impossible due to the impact of the pandemic. With an ever-changing educational landscape, educators are always looking for new ways to improve their online learning process.

Teaching mode and learning style have altered dramatically in the internet era. Web-based laboratories has impacted the content of courses, simplify laboratory tasks and provide open access (from anyplace and within anytime). The modern remote education has brought one of the most significant transformations which is changing from focusing on teacher and classroom into student-focused. Autonomic learning in students has become a central idea in the internet learning era. Conventional content-oriented teaching methods are giving way to student-centered ones. Students can

preview experimental contents, learn the method and witness potential experimental phenomena by remote experience, using state-of-the-art Rohde & Schwarz equipments without the risk of harming real instruments. As a result, learners are the main who control the experimental class and the workload of lecturer or laboratory staff can be decreased.

Going with the advancement of Industry 4.0 and the enhancement of Internet of Things (IoT) is the efficient establishment of remote virtual electrotechnics laboratories. This paper first analyze the development and necessary of remote laboratory, then explain the design tools which is LabVIEW and present the full designed and implementation of the electronics remote laboratory. All the tool kits, instruments, program structures, embedded HTML webpages and testing. The aim of this project is to build a full laboratory library that can be used immediately at the Department of Electrical Engineering and Mechatronics in the University of Debrecen and can be expanded easier without any extra cost. Within this paper, an overview of implementation of the tasks as well as the knowledge about hardware and software in used will be presented. Besides, the future challenge of the

increasing in both terms in the century of Industry 4.0 are included.