CIGRE Study Committee D2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG N° D2.49	**Name of Convenor: Siamak Hossein Khalaj** (IR) **E-mail address**: Khalaj.siamak@monencogroup.com
Technical Issues #[2]: 1,2	**Strategic Directions #[3]: 2**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[5]: 3,4	
Title of the Group: Augmented reality / Virtual reality to support Operation and Maintenance In Electric Power Utilities	

Scope, deliverables and proposed time schedule of the Group:

Background:

Augmented Reality (AR) and Virtual Reality (VR) is a trend technology with many applications for domestic consumers.

There are several technologies and tools that may help to improve significantly the maintenance sector. Condition monitoring tools, in conjunction with Computer Maintenance Management Systems (CMMS) help to prevent malfunctions and to diagnose their cause.

During an intervention a technician may be supported by checklists, technical handbooks or tools that simulate equipment on a virtual environment to avoid mistakes and showing how to proceed according to operation and maintenance procedures. However, technicians have to visualize instructions on specific media and identify target components on the real environment. With Augmented Reality (AR) and Virtual Reality (VR) instructions may be given automatically over the real scenario and the technician's focus is kept on the equipment. An AR/VR system must be also interactive, which means that the technicians can request more information about components and procedures, and fill reports through an intuitive human-machine interface that can be achieved through gestures or speech recognition. Nowadays, AR/VR is a trend on the consumer market, but for the industrial sector, mainly maintenance sector, there is a high demand and expectation, due to the requirements and failing costs on those sectors. AR/VR could provide added value for operation and maintenance personnel in high-risk situations – for example, being able to tell if a piece of equipment is under high voltage or high temperature.

Companies worldwide are facing the issue of an ageing workforce. At the same time, high voltage assets remain active in a longer time than their expected useful life. These two elements may be a dangerous combination for the reliability of the grid, if the knowledge on how to operate and maintain those assets is not transferred to a new generation of professionals. AR/VR can be of great help in that aspect, by registering those procedures in electronic devices and making them available to new technicians for simulation and training purposes.

AR/VR can be experienced directly by using an image projector that projects virtual features over the real environment or by an optical see-through head-mounted display, where virtual parts are shown on translucent screens. Alternatively, indirect methods reproduce not only the virtual features but also the real environment on screens, as is the case of tablets, smartphones, computer monitors and video see-through head-mounted displays – usually used for virtual reality.
This can be achieved by delivering text and image-based content to workers performing manual tasks and access to real-time remote assistance from experts on a wearable or handheld device.

Scope:

1. Review EPU's O&M manuals, procedures and standards in adoption to AR/VR application
2. Collecting Operator's points of view about hazardous and difficulties while training and Operation with high voltage equipment and field operations.

3. Collecting vendor's possibilities, interests, experiences and difficulties to implement AR/VR for their products.
4. Verifying positive and negative points of using AR in EPU's O&M
5. Verifying security issues to ensure reliable operation.
6. Evaluating EPU's resources and capabilities to use AR/VR for their O&M
7. Defining step by step methodology to expand the deployment of AR/VR in EPU's O&M regards to abovementioned studies

Deliverables:

☒ Technical Brochure and Executive Summary in Electra

☒ Electra Report

☒ Tutorial[6]

☒ Webinar[6]

Time Schedule: start: September 2019 **Final Report**: December 2021

Approval by Technical Committee Chairman:

Date: June 17th, 2019

Notes: [1] Working Group (WG) or Joint WG (JWG) or Collaborative WG (CWG),
[2] See attached Table 1,
[3] See attached Table 2,
[4] Delete as appropriate,
[5] See attached Table 3
[6] Presentation of the work done by the WG

Table 1: Technical Issues for creation of a new WG

1	Active Distribution Networks resulting in bidirectional power and data flows within distribution levels up to higher voltage networks
2	Digitalization of the Electric Power Units (EPU): Real-time data acquisition includes advanced metering, processing large data sets (Big Data), emerging technologies such as Internet of Things (IoT), 3D, virtual and augmented reality, secure and efficient telecommunication network
3	The growth of direct current (DC) and power electronics (PE) at all voltage levels and its impact on power quality, system control, system operation, system security, and standardisation
4	The need for the development and significant installation of energy storage systems, and electric transportation, considering the impact they can have on the power system development, operation and performance
5	New concepts for system operation, control and planning to take account of active customer interactions, and different generation types, and new technology solutions for active and reactive power flow control
6	New concepts for protection to respond to the developing grid and different generation characteristics
7	New concepts in all aspects of power systems to take into account increasing environmental constraints and to address relevant sustainable development goals
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics
9	Increase of right of way capacity through the use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network
10	An increasing need for keeping Stakeholders and Regulators aware of the technical and commercial consequences and keeping them engaged during the development of their future network

Table 2: Strategic directions of the TC

1	The electrical power system of the future
2	Making the best use of the existing systems
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business, social and economic benefits for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	Work likely to contribute to improved safety.

7	Work addressing environmental requirements and sustainable development goals.