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# Can the Industrial Internet of Things Help Improve Worker Safety?

An interesting technical paper was published recently in *IEEE Access* that begins to connect the Internet of Things (IoT) with industrial safety. A simple definition of the IoT is “an interconnected system of smart devices and programs that connect equipment, people, and data to improve efficiency.” Perhaps the definition could be amended to “to improve safety.” Many resources are available to learn how the IoT is being applied in industry. The referenced paper, “Industrial Internet of Things for Safety Management Applications: A Survey,” by Misra et al. [1], was published in July 2022 and is available for free in *IEEE Xplore*.

In this paper, the authors review risks, and the mitigation of those risks, for several industries, including manufacturing and mining. They discuss future research directions on utilizing the Industrial IoT (IIoT) for safety management. There is little discussion of electrical safety, but the concepts in the paper are applicable to electrical hazards, and there is room for further development of the topic of electrical safety improvements through use of the IIoT. This is a long paper, at 25 pages, with a

lot of information, and it includes a very thorough and helpful bibliography listing over 150 papers on the IoT, IIoT applications, and safety management for industry. Based on this paper, the answer to the question is, Yes, the IIoT can help improve worker safety.

While searching in *IEEE Access*, several other papers on electrical safety topics were identified that were published in 2022. “A New Short-Circuit Hybrid Device for the Protection of Low-Voltage Networks From the Effects of an Arc Fault,” by Nowak et al. [2], discusses the use of a specially designed short-circuiting switch to quickly eliminate the arc during an arc fault. The authors also measured the reduction in noise generated during the fault and the reduction in the erosion (damage) of busbars during the shortened fault.

“Detection and Identification Technique for Series and Parallel DC Arc Faults,” by Kim and Kwak [3],

discusses a method to detect dc arc fault types by using the frequency information in the load current and load voltage. This is initial research, and the authors are planning to study the method for higher voltage and current values. “Identifying DC Series and Parallel Arcs Based on Deep Learning Algorithms,” by Dang et al. [4], discusses the determination of dc arc fault types based on different methods and algorithms. A detailed bibliography is provided. A related paper by the same authors, “Parallel DC Arc Failure Detecting Methods Based on Artificial Intelligent Techniques” [5], was published earlier in the year.

“Research on Purging and Ventilation Progress of Positive-Pressure Explosion-Proof Motor,” by Liu et al. [6], discusses simulating the purging process for a large motor to ensure safe operation. Using finite element analysis, the authors

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Canadian Standards Association (CSA) Z462 Workplace Electrical Safety Standard Technical Committee and currently a voting member and working group leader for clause 4.1 and the annexes. Becker is also a voting member on the CSA Z463 Maintenance of Electrical Systems Standard and a voting member of IEEE 1584 Guide for Performing Arc-Flash Hazard Calculations.

### Speaker 2: John Knoll, PEC

John Knoll is a master electrician and a professional electrical contractor (PEC) with the Electrical Contractors Association of Alberta and

**Industry needs to place more focus on the electric shock hazard for all workers.**

resides in Edmonton, AL, Canada.

*Sequela* is defined as “a morbid condition following or occurring as a consequence of another condition or event” [1] or as follows: “A sequela. Any condition or state that follows a disease, disorder, or injury, especially one that is a consequence of it. A complication. The term most often used is the plural form, sequelae” [2]. There are long-term consequences from an initial electric shock hazard exposure, where electrical current flowed into the human body, that workers have not been made aware of in the workplace and in the electrical safety training received. These are electrical shock sequelae.

Knoll is suffering from sequelae related to receiving multiple low-voltage electrical shocks while working as an apprentice and journeyman electrician, and, unfortunately, he is currently not working in the trade. Electrical workers need to be made aware that they may be suffering from sequelae due to electric shock exposure, and industry needs to place more focus on the electric shock hazard for all workers.

### References

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showed that modifications to the layout of the air inlet can increase purging efficiency and can allow a faster motor start-up.

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