Machine Vision for Industrial Inspection: Bridging Datasets, Algorithms, and Solutions

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ABSTRACT

Machine vision is transforming industrial inspection by enabling automated, data-driven evaluation of assets across manufacturing and infrastructure sectors. This talk explores the innovation pipeline—from compiling meaningful datasets and developing robust algorithms to deploying interoperable, real-world solutions. Emphasis will be placed on how inspection results can inform industrial asset life cycle management when integrated with standardized frameworks, cloud computing, and Industrial IoT platforms. This talk will also discuss how machine vision data feeds into digital twins for real-time monitoring, predictive maintenance, and system optimization. Case studies and current research will be used to highlight practical challenges and opportunities in building intelligent, connected inspection solutions witnessing the evolution of machine vision techniques from isolated tools into core components of intelligent, connected industrial ecosystems.

BIOGRAPHY

Dr. Zheng Liu is a full professor in the School of Engineering at the University of British Columbia, Okanagan campus, Canada. He was with the Nanyang Technological University (Singapore), the National Research Council of Canada (Ottawa, ON, Canada), and the Toyota Technological Institute (Nagoya, Japan) as a research fellow, research officer, and professor, respectively, from 2001 to 2015. He received a Ph.D. from Kyoto University in 2000. His research interests include machine/computer vision, data analytics, sensor and measurement, non-destructive evaluation, and digital twin. Dr. Liu is a fellow of SPIE and the Engineering Institute of Canada. He has professional engineer licenses in both Ontario and British Columbia.