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IoT and Machine learning for in-situ process control using Laser Based Additive Manufacturing (LBAM) case study

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Abstract

Additive manufacturing (AM) is emerging within many industrial applications due to inherent advantages such as rapid prototyping and production. However, the correlation of process parameters across modules and their impacts on product quality are not yet fully understood. This article presents a system built out of Internet of Things (IoT) and edge computing technologies to collect and analyze AM process in-situ. An IoT thermal camera platform was developed, and integrated within an Laser Based Additive Manufacturing (LBAM) system to collect information that could be used to characterize the thermal distribution surrounding the melt pool. Machine learning techniques were utilised to identify the occurrence of defects using the collected low-resolution thermal images.

Keywords: IoT; Image Processing; Machine Learning; Thermal Imaging