

## Joint Symposium of eMDC-2019 & ISSM-2019

### Invited Talk:

## AI based Predictive Maintenance technology and workflows



### Rajesh Berigei

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#### About the Speaker

Rajesh Berigei is the Worldwide Semiconductor Manager at MathWorks, where he is the technical evangelist for the Communications, Electronics and Semiconductor industry on Analog Mixed-Signal, SerDes, SoC, FPGA, ASIC and Machine Learning workflows for the last two years. Prior to joining MathWorks, Rajesh headed the Worldwide System Design and EDA organization at Texas Instruments™ and before TI, was Director of System Design Technology at National Semiconductor. Rajesh has an MS in Electrical and Computer Engineering from UT-Austin and is working toward an MBA at UNC-Chapel Hill. Rajesh has more than 20 years of experience in semiconductor EDA, low power IC design, pre-silicon verification, post silicon validation and IC-package-board SI/PI analysis.

#### Abstract

Manufacturing is getting more and more sophisticated – be it for automobiles, electronics, energy harvesting, oil exploration, semiconductors or anything else. Investments in developing a manufacturing facility can run into billions of dollars. It would behoove a manufacturing company to try to maximize the value of their investment. Maximizing the manufacturing investment can come in different forms. It could be an ability to understand if the machinery is operating normally or understand why a specific machine is behaving abnormally. Getting to this level of condition monitoring of the machinery can also lead to the next level to answer the question as to how much longer can I operate my machine. As a corollary, would it be possible to operate my machinery at perhaps a reduced loading to extend its remaining useful life. MathWorks has powerful toolboxes to work with data. This data could potentially be streaming real time from sensors attached to the machinery in a manufacturing setting. Such streaming data could rapidly become very large, multi-dimensional and unstructured – thus representing Big Data. In order to become smart about predictive maintenance of manufacturing equipment, an infrastructure would need to be set up to acquire data, preprocess data, train an AI or machine learning model with the data, as well as deploy this AI based Big Data infrastructure into the manufacturing environment. MathWorks has been traditionally very strong in control systems based

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algorithm implementation, which can now work with innovative AI based techniques such as reinforcement learning to enable factory automation engineers to create very powerful Digital Twin models of their physical assets running on the manufacturing floor. MathWorks provides powerful code generation capabilities to deploy models to embedded hardware based upon GPU or FPGA to enable fast training as well as inferencing of data. Apart from the core MathWorks technology, this talk will also walk through how various industries are solving their predictive maintenance challenges such as root causes for anomalous behavior, modeling of failure modes and remaining useful life estimation.