The Internet of Manufacturing Things

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The last few years has seen an explosion of interest in the Internet of Things (IoT). The Internet of Things refers to the interconnection of sensors, devices, and other “things” as opposed to the classical interconnection of people and computers. This talk focuses on a slice of the larger IoT space, the space pertaining to the manufacturing shop-floor – the Internet of Manufacturing Things (IoMT). Buzz words aside, manufacturing has a rich history of shop-floor communication – communication protocols and standards have been critical in enabling automation in the shop-floor, and most modern manufacturing systems have highly complex networks, although they tend to be local and isolated within a single facility. Similarly, sensors and actuators also have a long history in the manufacturing shop-floor, and modern manufacturing equipment can be thought of as a collection sensors and actuators operating in concert to make a part.

So while we can argue that the Internet of Manufacturing Things is an old concept, recent advances in data analytics gives us new tools to interrogate the factory internet and find new ways of solving the *classical* manufacturing shop-floor problem: how do we reduce the conversion cost from raw materials to finished goods? To do this we can leverage existing advances in material science, metallurgy, controls, and industrial engineering (to name a few) and apply the new capabilities the Internet of Manufacturing Things brings us. Chief among this is the emphasis on collecting and persisting data from the shop-floor. While data has always been used to make decisions in complex manufacturing systems, it has been applied either in the aggregate form, or under transient conditions. This also calls for a new set of algorithms that can apply rich data sets to improve the capabilities of classical solutions to various manufacturing problems.

This talk will discuss the state-of-the art in the Internet of Manufacturing Things and its potential in solving classical problems in manufacturing. The talk will emphasize the potential of shop-floor data to do this, and how shop-floor data can be collected, managed, and stored. The talk will also present two of the *grand challenges* in manufacturing, namely part genealogy and the design-to-manufacturing pipeline, and how they can be solved using the evolving capabilities of data analytics.