

# PRESS RELEASE

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## **Data and the smart machine revolution**

**How can manufacturing efficiency be improved? Any significant optimization of production lines is getting increasingly difficult to achieve. Bringing smarter automation into the workplace offers an innovative solution, but it all starts with data. Immense amounts of data.**

**Omron Industrial, Johannesburg. South Africa.**

Take a look at Forpheus, Omron's table tennis playing robot. It symbolizes the company's 3-i philosophy for machines – integrated, interactive, intelligent. How can a machine like Forpheus play a sport? While Forpheus combines several technologies to create a robot with human-machine interaction, the fundamental element to making any machine 'smarter' is data. Data collection, data-driven modeling, applying the models, and finally, the machine using and evaluating models to automatically adjust its own behavior, i.e. machine learning.

The first step is collecting data, from individual machines or preferably from an entire production line. This can result in tremendous amounts of data. Analyzing all this data can be handled effectively and cheaply using today's processing power and cloud storage. Clean data is essential to enable more efficient processing and the best results. Simply by displaying this collected information on a screen, in an easy-to-understand way, can help operators identify and respond to anomalies in the process.

### **Data analysis helps operators**

Displaying process operation data in this way can already deliver 20%-30% efficiency increases. However, as the amount of data increases, humans are less capable to interpret it or perceive patterns. By incorporating large data analysis software, computers offer a more accurate and tireless tool to support humans in the task of analyzing the big data. These tools can identify irregularities in performance data and flag potential issues to the operator.

With more data and more advanced or 'smarter' analysis, the insights and results become more comprehensive and accurate. For example, instead of just identifying an issue, the system can locate exactly where the problem is in the line and what needs to be done to fix it. The operator's job is made easier and line efficiency is further optimized.

As the amount of data increases, data management also becomes important. Collected data is often taken offline for advanced processing and pattern recognition. The resulting patterns are transferred back to the factory to be implemented in real-time by the machine.

### **Using data to increase automation**

Automation can be taken a step further. Smart systems could identify an issue or potential issue, flag it, and then automatically adapt parts of the production line to compensate for any shortfall whilst the problem was being fixed. All within safe operating parameters. This results in even better production efficiency.

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Let us consider this at the level of an individual machine. Smart machines, equipped with data analysis capabilities, can optimize their behavior for any given situation because they 'know' how they are supposed to work normally. They monitor their own performance, ensuring it matches expected behavior. If a defect or divergence from a standard pattern occurs, the machine reports the issue to the entire system and if possible compensates for the issue by amending its operation. From a system viewpoint, any alterations must be balanced throughout the line to ensure consistent operation between machines.

## **Real smart factory automation**

The complexity of the data is one of the items that makes moving to a smart factory a major challenge.

That is why Omron is implementing these smarter systems into its own processes, allowing the company to investigate requirements and develop best practices. And there is plenty to learn. At first when they start looking at their own processes two years ago, the very first data scientist spent 80% of his time just cleaning up the data.

Today they are applying what they have learned to their systems and products to bring the benefits of smart automation to their customers. Together, with several selected customers, they are now carrying out experiments in smart automation, learning where any bottlenecks occur. In the end, only by performing this research in real factories, can the real value be uncovered.

## **Human-machine interaction**

Building on data collection and analysis, smart automation can be extended into the realm of human-machine interaction. Returning to Omron's budding ping-pong champion, Forpheus has the capability to observe the motion of the opponent facing it on the other side of the table, along with cameras that watch the ball's movement. Analyzing the data from the sensors it can calculate movement very precisely and quickly, so it can anticipate how the opponent will hit the ball and its trajectory. Forpheus then moves its paddle to intercept the ball and hit it back across the table.

How difficult or easy it returns the ball gives a clue as to one way this smart machine can be used to general advantage. By being able to assess how its opponent plays, it can determine their skill level. Forpheus can modify its own playing level to get the best from its opponent. If it plays at a slightly better level, the opponent will have a challenging game without becoming frustrated. Hence, smart machines can also be used to train people.

## **On-the-job training**

This training aspect can be applied to all kinds of machine applications and is ideal for the manufacturing industry. Smart robots can assess the operator's level of expertise when interacting either with the robots themselves or with the systems being assisted by the robots – such as heavy lifting where the robot takes the weight of the object, but the operator makes fine adjustments for placement. In this case, the robot uses its appraisal of the operator's ability to help train them or make the task easier by giving them more guidance.

Besides the rewards in improved efficiency, smart automation can make it more fun to work. Not just with robots but with all machines. They can recognize who is at the assembly line and provide personalized interactions like giving meaningful hints and tips on how to do the job.

Without traditional engineering, there would be no integrated and interactive machines today. To make them intelligent, we just need to add a touch of data science engineering.

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## About Omron

Omron Electronics is the South African subsidiary of Omron Corporation, a global leader in the field of automation based on its core technology of "Sensing & Control + Think." Established in 1933, Omron has about 36,000 employees worldwide, working to provide products and services in more than 110 countries and regions. The company's business fields cover a broad spectrum, ranging from industrial automation and electronic components to automotive electronics, social infrastructure systems, healthcare, and environmental solutions. In the field of industrial automation, Omron supports manufacturing innovation by providing advanced automation technology and products, as well as through extensive customer support, in order to help create a better society. For more information, visit Omron's website: <http://www.industrial.omron.co.za>

### For enquiries about Omron Industrial Automation please contact:

Omron Electronics (Pty) Ltd

Tel: 011 579 2600

Direct Email: [info.sa@eu.omron.com](mailto:info.sa@eu.omron.com)

Website: [www.industrial.omron.co.za](http://www.industrial.omron.co.za)

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