SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

13 August – 2 October 2020

TOPICAL REPORT

ADVANCED MANUFACTURING

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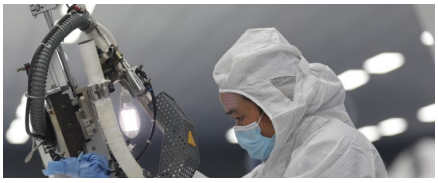
SMART MANUFACTURING



DES Case Study: Tencent Cloud helps make manufacturing smart

"The Tencent Global Digital Ecosystem Summit was held online for the first time from September 9 to 11, 2020. Tencent unveiled its new strategies and solutions for the cloud and smart industries and shared best practices with the audience at the event. We have selected two customer success case studies that illustrate what is possible when businesses upgrade to embrace the digital economy. This is the first article in the series."
Source: Tencent

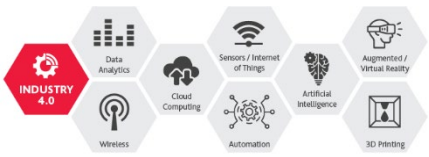
Why the rest of the supply chain needs to catch up with smart manufacturing

"The smart manufacturing sector is primed for huge growth over the next few years, as industries adopt new technologies in the never-ending hunt for maximum efficiency. The global market stood at $204.95 billion in 2019, and it's projected to reach $506.33 billion by 2027."
Source: IoTNews

The rise of digital platforms in manufacturing

"As technology redefines the manufacturing industry, it has become essential to use digital manufacturing platforms to maximise operational efficiency and

INDUSTRY 4.0



Industry 4.0: examples of the use of the robotic arm for digital manufacturing processes

"The purpose is to demonstrate how a robot arm can be used by applying the concepts of industry 4.0, 3D printing techniques, milling and other tools, with the aim to verify the impact of these transformations and uses for engineering and industry in general."
Source: International Journal on Interactive Design and Manufacturing (IJIDeM)

Use of laboratory scenarios as a strategy to develop smart factories for Industry 4.0

"The need to link academic knowledge with Industry led us in our research project to create a methodology for the development and implementation of virtual and hybrid scenarios by using highly integrated, digital manufacturing tools as a teaching platform to explain topics like the automation of programmable logic controllers, robotics, manufacturing, and 3D virtual commissioning."
Source: International Journal on Interactive Design and Manufacturing (IJIDeM)

Industry 4.0 and its impact in plastics industry: A literature review

"This study used bibliometric analysis to investigate trends and knowledge in Industry 4.0 research. Overall

MANUFACTURING

Smart Manufacturing

"Oracle's Smart Manufacturing solution helps manufacturing companies better predict and resolve maintenance requirements, correlate quality issues to machine and environmental factors, reduce downtime, and improve quality."
Source: Oracle

Factory Innovation Post COVID-19: 5 Best Practices for Manufacturing Operations Leaders

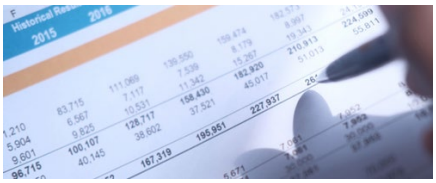
"The COVID-19 crisis did not slow smart manufacturing investments: By 2024, half of factory work will be done remotely, impacting job families and shift schedules.
But manufacturing operations leaders struggle in an era of continuous disruption to identify, pilot and scale digital technologies and new ways of working.
Gartner has identified 5 best practices of manufacturing operations leaders who have successfully delivered innovations across factories."
Source: Gartner

5G and Industrial Manufacturing in a post-COVID-19 world

"Download this paper to understand how 5G networking can bring major operational benefits to the factory floor and how concerns about the

accelerate Industry 4.0. But how are some of the leading manufacturers in the industry implementing digital platforms into operations?"
Source: Manufacturing Global

SMART FACTORIES



Deloitte Insights: Smart factories leading to greater value

"Research conducted by Deloitte Insights has found that 86 percent of manufacturers in the US believe that smart factories will be the main driver of competition by 2025; furthermore, 83 precent believe that smart factories will transform the way products are made."
Source: Manufacturing Global

Chinese manufacturers embrace hi-tech factories

"The nation's development of 5G networks is playing a crucial role to revamp automated factories and warehouses, as well as logistics services. 5G has increased internet speeds and memory that pave the path for introducing amazing breakthroughs in AI, self-driving vehicles, smart technologies and so much more."
Source: CCTV

Making factories smarter today

"Overall, the value-added output manufacturing sector has been declining over the past couple of decades. While it experienced growth in the early parts of 2019, the global purchasing manager's index (PMI) dropped later in the year due to the pervasive issue of filling critical jobs."
Source: FutureIoT

Taiwan's smart machines key to 'smart factories' of the future

"Today's factories "face the challenge of frequently changing orders and variety of products" compared to the factories of decades ago"
Source: Canadian Manufacturing

The Dawn of the Smart Factory

"This is nothing less than a paradigm shift in industry: the real manufacturing world is converging with the digital manufacturing world to enable organizations to digitally plan and project the entire lifecycle of products and production facilities."
Industry 4.0 research was compared with that focused on the plastics industry by using data collected from current literature in the field."
Source: Journal of Industrial Information Integration

Simulation in industry 4.0: A state-of-the-art review

"This study reveals an increasing trend in the number of publications on simulation in Industry 4.0 within the last four years. In total, 10 simulation-based approaches and 17 Industry 4.0 design principles were identified. A cross-analysis of concepts and evaluation of models' development suggest that simulation can capture the design principles of Industry 4.0 and support the investigation of the Industry 4.0 phenomenon from different perspectives. Finally, the results of this study indicate hybrid simulation and digital twin as the primary simulation-based approaches in the context of Industry 4.0."
Source: Computers & Industrial Engineering

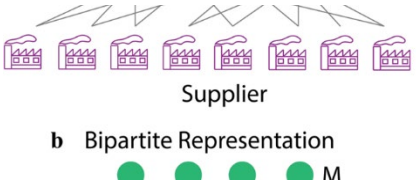
Simulation in industry 4.0: A state-of-the-art review

"This research work aims to guide the staff (project managers, engineers and technicians) who work multidisciplinary in concurrent engineering environment about the robot's implementation steps and significant tips related to the deployment phases that can be beneficial when this proposed roadmap is applied."
Source: Concurrent Engineering

Convergence of Blockchain and Edge Computing for Secure and Scalable IIoT Critical Infrastructures in Industry 4.0

"In this paper, we first introduce the IoT/IIoT critical infrastructure in industry 4.0, and then we briefly present the blockchain and edge computing paradigms. After that, we show how the convergence of these two paradigms can enable secure and scalable critical infrastructures."
Source: IEEE Internet of Things Journal

SMART FACTORIES



A Look Inside 5G Standards to Support Time Synchronization for Smart Manufacturing

"This article describes the state of the art for integrating TSN with 5G networks based on the support given in 3GPP TS 23.501 Release 16. The costs involved and the potential business value can be addressed."
Source: Pwc

INDUSTRY 4.0

Production is becoming smart. Industry 4.0 and the networked factory

"The future has long been here: The digital transformation is changing the products as well as their production. Module for module, Mercedes-Benz is networking the entire automotive value chain – from design, through production, to sales and service. The fourth industrial revolution is accelerating more and more. The foundations for a completely connected "smart factory" are set."
Source: Daimler

Digital Readiness for Industrial Transformation

"We all know something big is happening "out there" in industrial operations around the globe. Companies are going beyond standard practices in Continuous Improvement (CI) as they seek step change improvement. Among them, programs go by a range of names: Digital or Industrial Transformation, Industrie 4.0, Smart Manufacturing, and many others. Whatever your company calls it, questions remain. The study reveals that two-thirds of companies have implemented, are currently implementing, or plan to implement an Industrial Transformation program."
Source: Iiot world

ROBOTICS

The Future Of Robotics

"As the segment continues to mature, data are coming in that allow founders, investors and policymakers to establish a framework for thinking about these companies. In this special sector report, we take a data-driven approach to emerging topics in the industry, including business models, performance metrics and capitalization trends."
Source: SVB

Source: Industry Week

What makes the Factory of the Future?

"Martin Walder explores how the future of the factory floor is set to become more connected and efficient thanks to ultra-high performance motion and robotic controllers and IIoT technologies."
Source: The Manufacturer

AutoStore: Paving the Future of Autonomous Warehousing

"The robot technology company was founded in 1996 and invented Cube Storage Automation, the densest order-fulfilment solution to exist. It's mission is to combine software and hardware with human abilities in order to create the new future of warehousing. With over 450 installations in over 30 countries, it is used by some of the biggest brands in the world such as Gucci, Puma and Ocado. A total of 418 new installations were made globally in 2019, up from 104 In 2018."
Source: Manufacturing Global

The Importance of IIoT in a Smart Factory

"In the manufacturing sector, the rise of Industry 4.0 is evolving at a rapid pace and technological advancements are the backbone of this evolution. Key technologies such as Artificial Intelligence, Machine Learning, Automation and Industrial Internet of Things (IIOT) are essential. As part of connected and adaptive manufacturing, Smart Factories are a new opportunity to adopt exciting technology in order to achieve demanding production goals."
Source: Manufacturing Global

5G

5G Unravels Smart Manufacturing at Factories

"According to a report, 5G technologies are expected to contribute the US $2.2 trillion to the global economy between 2024 and 2034. Considering this, manufacturing is poised to be the biggest enterprise adopter of 5G technology. 5G emergence will change the face of factories working system with its embedment to the already existing advanced technology."
Source: Industry Wired

INDUSTRY 4.0

requirements for time synchronization in factory automation and integration with 5G networks are presented, together with the most recent advancements in the standardization process."
Source: IEEE

The Transformation Towards Smart(er) Factories: Integration Requirements of the Digital Twin

"This research analyses the integration requirements from the perspective of the digital twins' application functionality. In particular, we provide an explicit mapping of the integrations needed between the digital twin and existing information systems (IS) in manufacturing, which serves as a basis to better understand integration issues. These findings provide an explanation for and a conceptualization of some of the challenges that emerge when transforming towards an interconnected smart factory."
Source: APMS 2020: Advances in Production Management Systems. The Path to Digital Transformation and Innovation of Production Management Systems

Industry 4.0: The Industrial Revolution and New Concepts for the Factory of Future

": The objective of this paper is to visualize and to show the direction of Industry 4.0 to develop smart factories in future. The application of new techniques and technologies which are based upon the Internet of things (IOT) ,block chain technology, cloud computing and cyber physical system have paved the path of significant improvement such as increase of automation, quality of production and reduced the time between the development of new products and its launch"
Source: International Journal for Research in Applied Science & Engineering Technology

Computation offloading model for smart factory

":This work proposes an offloading decision model using game theory in a non-cooperative environment considering the categorization of tasks and it is shown that dominant strategy exists for the local server. For the performance study of the proposed model, simulation is done using iFogSim simulator. A comparative study with state-of-art exhibits that the proposed offloading scheme outperforms"
Source: International Journal for Research in Applied Science & Engineering Technology

ROBOTIC MANUFACTURING

Making Industry 4.0 a Reality

"Industry 4.0 is changing the way we do business. In a manufacturing setting the need to switch to digital technologies is a must for companies if they want to compete and survive. However, how to successfully implement Industry 4.0 presents specific challenges for any organisation."
Source: The Manufacturer

A guide to modern factory automation and Industry 4.0 in manufacturing

"Using automation, any organisation can perform processes with little or no human intervention. Automation is able to power a range of equipment, which is then able to fulfil a variety of objectives in a wide array of manufacturing environments."
Source: Information Edge

Virtual Reality Platform for Design and Evaluation of the Interaction in Human-Robot Collaborative Tasks in Assembly Manufacturing

"The overall aim of this thesis is to address these problems and facilitate and improve interaction between humans and robots, with a special focus on assembly manufacturing tasks. To fulfill this aim, an assembly workstation for human-robot collaboration has been developed and implemented both physically and virtually. A virtual reality platform called ViCoR has been developed that can be used to investigate, evaluate, and analyze the interaction between humans and robots and thereby facilitate the implementation of new human-robot collaboration cells. The workstation developed has also been used for data collection and experiments during the thesis work, and used to extract knowledge of how the interaction between human and robot can be improved."
Source: University of Skövde

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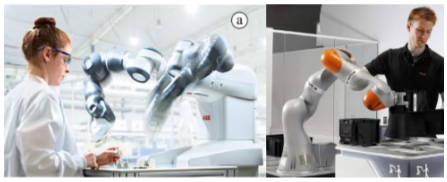

Real-time Visualization of Sensor Data in Smart Manufacturing using Lambda Architecture

"This paper proposes a solution to the challenge of real-time analysis and visualization of sensor and ERP data. Dynamic visualization is achieved using a machine learning approach. The combination of real-time visualization and machine learning allow for early detection and prevention of undesirable situations or outcomes. The prototype system has so far been tested by a smart manufacturing company with promising results."
Source: Proceedings of the 9th International Conference on Data Science, Technology and Applications

Smart Manufacturing Testbed for the Advancement of Wireless Adoption in the Factory

"In this paper the authors present a new industrial wireless testbed design that motivates academic research and is relevant to the needs of

industry. The testbed is designed to serve as both a demonstration and research platform for the wireless workcell. The work leverages lessons learned from past testbed incarnations that included a dual robot machine tending scenario and a force-torque seeking robot arm apparatus."
Source: National Institute of Standards and Technology

Sensing, Smart, and Sustainable Technologies in Big Data-driven Manufacturing

"The Author draw on a substantial body of theoretical and empirical research on big data-driven manufacturing, and to explore this, the author inspected, used, and replicated survey data from Accenture, Capgemini, PwC, Software AG, and we.CONECT, performing analyses and making estimates regarding sensing, smart, and sustainable technologies. Structural equation modeling was used to analyze the data and test the proposed conceptual model."
Source: Journal of Self-Governance and Management Economics

Smart Manufacturing and Intelligent Manufacturing: A Comparative Review

"In this work, a basis to understand SM and IM is provided, which is increasingly important because the trend to merge both terminologies rises in Industry 4.0 as intelligence is being rapidly applied to modern manufacturing and human–cyber–physical system."
Source: Engineering