IR 4.0: INTERNET OF THINGS (IOT)

01. INTRODUCTION

Industrial Revolution 4.0 (also known as IR 4.0 or Industry 4.0) is a new industrial revolution trend that focuses heavily on automation, machine learning, interconnectivity, and real-time data. Throughout history, the journey of every industrial revolution starts from mechanization of engines to mass production line to cope with globalization which is then continued by computerization. IR 4.0 continued the journey with the focus on the interconnectivity of digital devices, gathering and analysis of data, and the constant strive to realize the vision of autonomous basic decision making through technological advancements in various fields such as Artificial Intelligence (AI), Internet of Things (IoT), Augmented Reality (AR), Big Data & Analytics, and Cloud Computing. These technologies have since become the main drivers of digitalization in various industries.

02. ABOUT IOT

The term "Internet of Things", or IoT, refers to a group of devices that are connected with each other through the Internet, or any other type of communication network, enabling them to transmit and receive data with each other. In a system that utilizes IoT, its constituent devices are embedded with sensors, software, motors and other technologies. With the added capability of data transfer and computing power, a device connected to a network can now disseminate, infer, and respond to the data in order to achieve a stated goal.

03. IOT IN AGRICULTURE

Vertical farming is a relatively new type of farming, developed to combat a looming food crisis amidst a rising population and a changing climate. Unlike conventional farms, vertical farms only require a small patch of land and a small workforce while producing the same output. But how do vertical farms combat the problems of high energy requirement, and managing huge sums of produce while having a small workforce?

To solve this problem, scientists and engineers have develop a number of ways to reduce the cost of vertical produce. By utilizing the capabilities of IoT, vertical farmers can now have access to real time information regarding all aspects of plant growth, including, but not limited to:

- Light Intensity
- Chemical composition of the growth medium
- Plant growth rate

Light and chemical sensors are placed in each stack of the plants grown, allowing the work of monitoring the vertical farm to be reduced to just a few people. Besides that, IoT technology also enabled measures such as preparing new crops, circulating and distributing new growth medium, and collecting new produce to be automated, thus increasing efficiency and reducing cost.
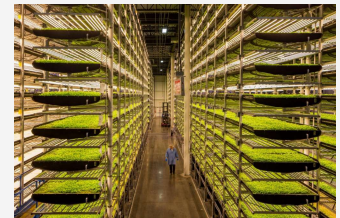

An example of a vertical farm. Estimates say that over the next three decades, the increasing human population will drive food demand up to 70%, thus creating the need for innovative application of smart farming technologies through IoT.

04. IOT IN WAREHOUSE MANAGEMENT

With more than 4.2 trillion US dollars worth of global retail E-commerce sales in 2020, it is certain that E-commerce has become an irreplaceable part of our daily lives. However, this would mean an increasing need for a systematic, long term storage and management of products. To meet this demand, companies and warehouses have looked towards IoT as a way to increase efficiency in managing warehouse operations. But how does IoT being applied to increase warehouse productivity?

In warehouse management, one of the ways IoT technology is applied is through product management. IoT technology can now be used to provide access to real-time conditions of any product. This means that warehouse managers and business will notified immediately when a product is in low stock, or if a product is misplaced, and many more. Procuring and restocking tasks are now able to be performed autonomously, while storage conditions are continuously adjusted, thanks to the application of IoT enabled technologies. Warehouse managers also obtain real time data on conditions of the technologies employed, allowing them to be notified in case of a malfunction, or a need for maintenance and servicing.
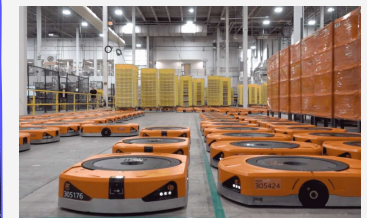
The picture above showcases Amazon's fleet of Automated Guided Vehicles(AGVs) in one of their warehouses. To increase productivity while reducing labour costs, Amazon currently have more than 200,000 of them deployed.

05. REFLECTION

Just like many other emerging technologies, Internet of Things is no different in the sense that it has a potential to impact our lives in so many ways. However, due to the distruptive nature of IoT, its negative consequences such as the displacement of human workers due to automation must not be ignored. With that being said, we can still remain somewhat optimistic about the future since implementing IoT itself will create a lot of new jobs, requiring skills that don't yet exist. To conclude, we are heading towards a future where IoT will become a dominant part of our lives, whether we like or not. But what we can do is to prepare ourselves with the necessary skills and character in order for us to utilize IoT to its fullest potential.

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IR4.0 Slide Special Topic By Dr Halinawati
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