Fashion 4.0

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Introduction of Industry 4.0:

In the world of automation and data powered manufacturing processes, Industry 4.0 is the primary driver. Industry 4.0 creates what has been called a "Smart Factories-Creating the Future Factories" and it is nothing but the Fourth Industrial Revolution. The first Industrial Revolution took place in Europe with the invention of the Steam Engine. Subsequently, the second generation was about mass production of electrical power and the third generation concentrated on electronic-driven information technology. The latest revolution converges significantly on technologies such as cyber-physical systems, AI, ML, the Internet of Things (IoT), and Cloud Computing. Firstly, it is vital to understand about the different components of Industry 4.0. There are mainly nine components namely Cloud Computing, Internet of Things (IoT), Big data and analytics, System integration, Simulation and Virtualization, Cyber Security, Autonomous Robots, Augmented Reality, Additive Manufacturing and, all components are shown in Fig. 1.

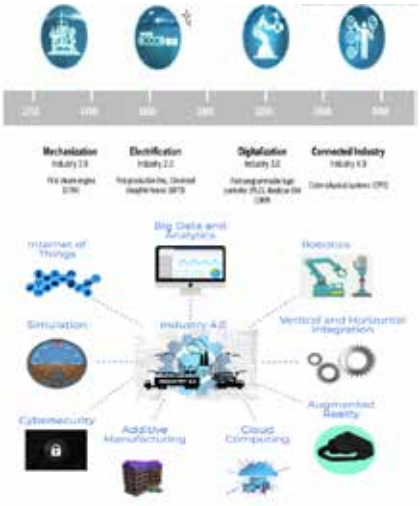

Fig. 1: Industrial Revolution and Technologies

Source: http://gbusinesswinners.com/portfolio-page/industry-40/

Empowerment of Fashion in Industry:

IoT is a vast field, it can be used on anything in this world. Application of IoT has found its way into fields of Medicine, Logistics, Military, Automation, etc., IoT in the field of Fashion Industry has made a great impact on this digital world we are living in right now [1].

Since time immemorial, clothing is considered as a fundamental human need. Early on in evolution, it was animal skins and carcasses that covered the basic needs. Later on, hand-woven clothes made of cotton and jute took center-stage. Moving into the mid-19th century, people used needles and threads to sew clothes then there was a spinning wheel which was spun using hands to make clothing material. Since the advent of sewing machines, people have started using sewing machines to manufacture clothes. This gave better and perfect sewing results. It consumed lesser time compared to sewing with hands. It was with the slow but evident evolution; the fashion industry was formulated. The growth of the Fashion Industry and IT industry advancement went hand in hand.

The onset of the new millennium created ripples in the Fashion industry making it one of the most competitive and rapidly growing industries. The fashion industry is one of the most unique industries when compared to other manufacturing fields. The sole intention of this industry is to bring "Change".

Fashion is a way something is defined and represented. The fashion industry [2] comprises of Designers, Tailors, Sewers working in the background to sales and marketing teams working in front tirelessly for the success in the industry. It is constantly growing and scaling the industry is the biggest challenge faced by the brands. Meeting the demands with maintaining outstanding quality and following the trend in the market is also among the primary challenge. The fashionistas have taken Industry 4.0 as a solution to these shortcomings with advancements happening in all the possible fields.

3-D printing:

In the recent past, 3D printing became a big invention in the fashion industry and a lot of brands started using this technology. The 3D printed clothes are shown in Fig. 2.

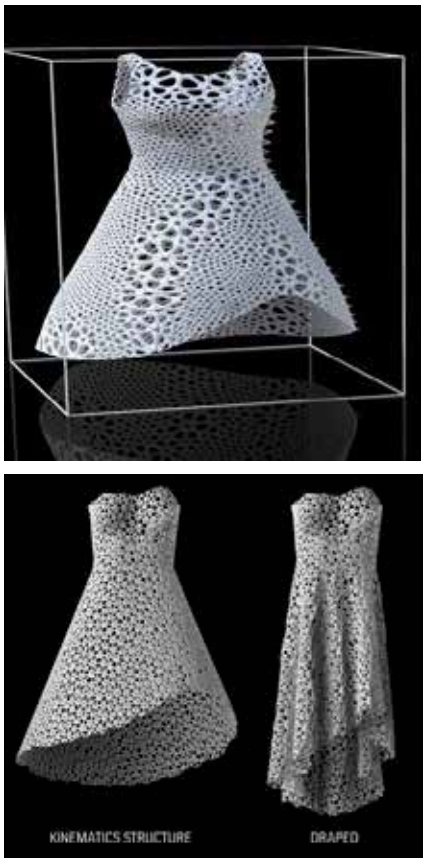

Fig. 2: 3D printed clothes

Source: http:s://garuda3d.com/3d-printing-in-fashion

Intelligent Manufacturing-RFID:

Intelligent manufacturing is also

known as smart manufacturing is a broad concept of manufacturing with the purpose of optimizing production and product transactions by making full use of advanced information and manufacturing technologies[3]. The most commonly used wireless technology is RFID. RFID stands for Radio Frequency Identification Device, is a small wireless digital chip in which data is encoded. Working of this is similar to the working of bar code technology, In RFID tags or smart labels are captured by a reader via radio waves. It automatically identifies objects, collect data about them, and enter those data directly into computer systems with little or no human intervention. RFID methods utilize radio waves to accomplish this. Clothes with RFID tag and reading using Barcode Reader is shown in figure 3. In similar terms, RFID on the clothes ensures the authenticity of it, and both the end-user and vendors use this technology.

Fig. 3: Reading RFID tag with Barcode Reader

Source: https://immago.com/rfid-tags-how-why-should-be-using-them/

Smart clothing:

We have reached a point in technology where fashion and technology are combined for Smart Clothing. Smart clothing [4] is the cloth that is developed in such a way that it can be used to measure heart rate during workouts, baby outfits have access to the baby's sleep pattern or the clothing is also in such a way that it preserves the body from pollution or decay. Many smart clothes can connect to an app or program on a secondary device using Bluetooth or Wi-Fi. Innovative companies are recently presenting a promising outlook on the future developments within the context of Smart Clothes and its given in Fig. 4.

Fig. 4: Smart clothes

Source: https://www.google.com/search? q=Smart+clothing&tbm=isch&hl=en&chips=q:smart+clothing,g_1:technology:p3WBww0KoeM%3D&rlz=1C1CHBF_enIN850IN850&sa=X&ved=2ahUKEwjgzqmqwKntAhUSOLcAHTfHAvoQ4lYoAnoECAEQHA&biw=1499&bih=667

Fitbit:

It is something which is an example of fashion meeting fitness and smartwatch is shown in figure 5. It has a partnership with a lot of luxury fashion brands. Fitbit owns the latest Cloud healthcare API by Google. This combines data into the healthcare applications which also gives valuable insights about a particular person to doctors. These wearables are constantly transmitting crucial data required for diagnosis automatically including tracking heartbeats, blood pressures, pulse rates

Fig. 5: Fitbit Smart Watch

Source : https://www.amazon.in/Fitbit-Fitness-Smartwatch-Tracking-Included/dp/B07WLVGDX8/ref=asc_df_B07WLVGDX8/?tag=googleshopdes-21&linkCode=df0&hvadid=397009877449&hvpos=&hvnetw=g&hvrand=7976887040349854486&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9062077&hvtargid=pla-818104621169&psc=1&ext_vrnc=hi

3D Knitting:

3D Knitting in fashion has been one of the most useful technologies. It helps the designer to visualize what a product is going to look like when released in the market. It gives the most accurate samples which help the designers to look into it and make any changes required before the release of the product. It helps in fast and easy collaboration with in-house and external customers. There is less wastage of material. Customizations can be easily done. Companies like the Ministry of Supply, Adidas, Endeer, etc., majorly use 3D Knitting. 3D knitting progressively works towards high rate production in the future and 3D Knitting clothes are shown in Fig. 6.

Fig. 6: 3D Knitted Clothes

*Source: https://www.textileworld.com/textile-world/features/2020/05/innovations-in-knitting-2/*https://newatlas.com/knitting-machines-3d-objects/54032/

Data Analytics:

Ivyrevel is a Swedish based brand which has a partnership with Google to create a Coded Couture application. This app tracks our activities to design a dress according to the place where we go. For example, if the place is a popular night club, then it'll design a dress according to that. This app also

suggests what extra elements like jewelry or a particular color can be added to the dress.

With the advent of Image Processing and Artificial Intelligence as a part of Industry 4.0. The old school method of using scales in seeking measurement for custom-made apparel has taken a back seat. You click and upload a picture from different angles which instantly points to the range of available clothing. PerfectFit and other avatar generators are an example of this. They make the user experience pretty seamless and perfect.

Further Innovations:

Since we know that, now there is a tap to pay card for making payments, with the same technology there can be cloth pay as well. It'll work in the same way, so there can be RFID linked with the particular person's bank account attached to the end of sleeves of a jacket, pullover, a shirt, t-shirt, etc., which can be scanned to make payments instantly and reduced the waiting time in long queues.

There can be an app designed in such a way that, you upload a picture of a person with a particular attire which you wished to have, and that app displays where the attire is from. So for example you find a girl wearing a black dress and shoes, you would want to know where that attire is from, this app will have all the data in it, it'll analyze the particular picture, go through the data it has and it'll tell you the name of the brand of that particular dress and the shoes she's wearing. This will make it easier for you to buy the same dress and shoes from that particular brand itself which you wished to have. The data in the app keeps getting updated now and then so that the users can get the best result.

One more app can be designed where you upload your picture, choose a particular attire from any of the online website which you want to buy, this app should show you how you'll look when you wear it. This will help you get a better image of you'll look when you wear it and will make it easier for you to decide if you would want to wear it or not.

Fashion is growing every day. People are following trends these days. Most of them want to look good and make a fashion statement. Every particular attire can be worn in several different ways. For example, consider a plane black full sleeves top, a few ways this can be worn are as a normal top itself with a nice high rise blue jeans, with a flared short skirt, it can be worn as a blouse for a cotton saree with nice oxidized jewelry, it can be worn with a grand lehenga, it can be worn with palazzo pants and many more different ways. So, there can be a QR code attached to all the clothes available in the store, for example when you go to buy a top, you can scan that QR code and it'll give you all the different ways how you can wear it. This will also help you to stay updated with the new trends.

Conclusion:

As Peter Sondergaard from Gartner Research facility pointed out, Information is the oil of the 21st Century and analytics is the combustion engine. Industry in the new world runs by information gathering and right usage of it. Ever growing fashion industry too has collapsed in the need of technology to grow and scale. Smart technology requires this industry to evolve in a greater sense to provide service to the customer. IoT, Data Analytics, Image processing, and AI are just the tip of the iceberg compared to what lies ahead in this industry. Automated manufacturing, 3D knitting, Community cloud for the designers are also the new age technologies rising in the 21st Century. As discussed at the beginning of the article, challenges that exist are being contemplated constantly by the industry giants for solutions.

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