Challenges in Manufacturing Industry and Solving Them Using IOT

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Abstract- Internet of Things (IoT) is the technology which helps us make our life smarter and easier. Internet of Things makes the lives at all places easier and simpler. The house we live in can be smart as well as the car we drive can be smart. So here we now like to talk about how Internet of Things affects the industries and manufacturing processes simpler as well as smarter. In this paper we would like to see the benefits of Internet of Things in industries and some examples which can be seen as a good change in the manufacturing industries using IoT.

Keywords- Internet of Things, IoT, industry, manufacturing, processes.

I. INTRODUCTION

Earlier the machines used in industries were not so automated and much work was being done by the work man. Now-a-days the machinery used in factories is automated and use of robots has increased widely. IoT manufacturing can also be called as smart manufacturing. Foreign countries are using IoT in many ways but now many Indian companies have also started using IoT due to Indian Government's Digital India programme. IoT used by industries can also be known as industrial internet of things (IIoT). IoT is fast becoming a reality.

The IoT is the connection of the people, processes, data and things. For businesses, this is merger of Information Technology (IT) and Operational Technology (OP) as data is collected to gain insights, optimize processes and create opportunities.

Organizations can use IoT to improve cost saving by improving asset utilization, enhancing process efficiency and boosting productivity. IoT works on the combination of forces, including the exponential growth of smart devices, low cost technologies (sensors, wireless networks, bigdata and computing power), pervasive connectivity and massive volumes of data. IoT can help organizations utilize their business infrastructure and assets in innovative ways to offer new services and deliver additional revenue. IoT in industry is the phase of change in technology which is also called Industry 4.0.

Companies which are using IoT in manufacturing are ABB (Smart Robotics), Airbus (Factory of the future) and Amazon (Reinventing warehousing), Flipkart and many more companies.

II. CHALLENGES IN MANUFACTURING INDUSTRY

Data Integration: The world today is data-driven. Whatever work we do we generate data. We generate data in various ways. In a manufacturing company there are different departments like production, quality, warehouse, etc. So all the departments generate different data like production data which is also generated by the machines working in the production work. There are different sensors also in the production work this also generate data. Quality department also produce data in work of reports or excel sheets. All this data creates the storage of data and also many challenges for storing data. We have to design efficient algorithms for storing, using and managing this data.[8]

Solution: As we all know that different departments lack in providing correct information to the other concern department. So we can use sensor and display digital boards in all the departments which will continuously show the data produced by the departments to all other departments.

Example: The production department has to show the production done in the whole day to the quality and warehouse department. So the digital board in the quality and warehouse department will show the production done in the production department. So that both the departments can work according to that. This can be implemented using IoT. A digital notice board can be developed using Raspberry Pi.

Such IoT based applications permit the monitoring of events across a supply chain. Using such systems inventory can be tracked and deviations can be planned. This provides cross-channel visibility into inventories and managers are provided with realistic estimates of the available material,

work in progress and estimated the arrival time of new materials. Ultimately this optimizes supply and reduces shared costs in the value chain.
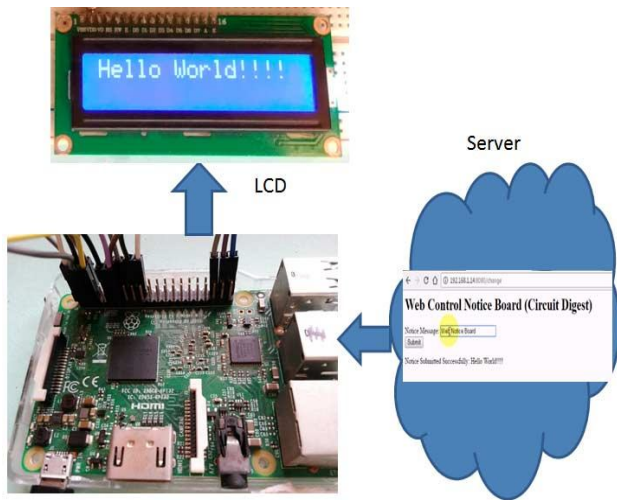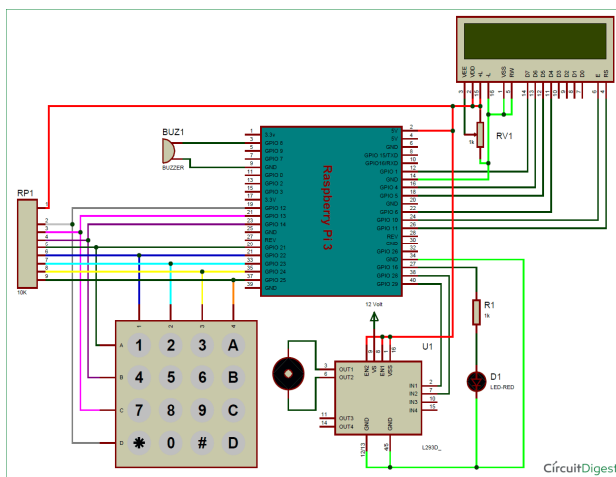

Fig.1 Digital Notice Board

Fig.2 Prototype of Digital Notice Board

This can be changed and modified by IoT sensors or wifi routers which can help display the reports and other details of the departments on the digital notice board.

Security: Security is a major issue everywhere, may it be at home or industry and it will remain in future also but we can try to minimize it. Industries want to keep people, products, working environment and machines secure from security risks. Now as we are using IoT devices in industry for production the risk even increases more. Advance technology provides us ease of work but also imposes other issues on us. Monitoring of such devices is necessary to reduce risk and it is a challenge from hardware and software perspective [8].

Process Flexibility :

Manufacturing : Quick response to fluctuations in demand; maximized operational efficiency, safety and reliability, using smart sensors and digital control systems.

Supply Chain : Real-time tracking of parts and raw materials, which helps organizations preempt problems, address demand fluctuations and efficiently manage all stages of manufacturing.
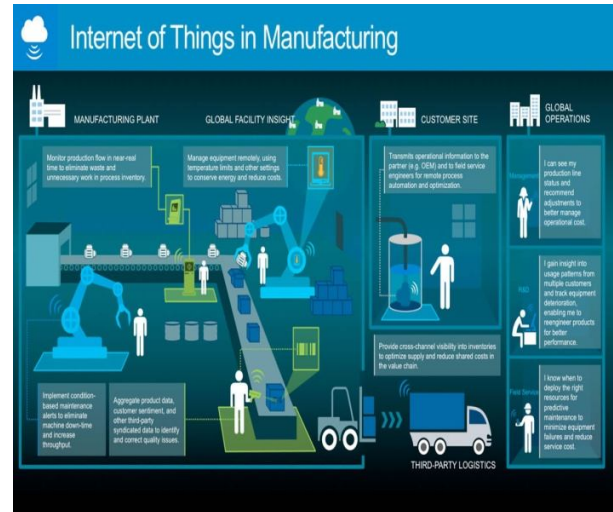

Fig.3 Internet of Things in Manufacturing.

III. COMPANIES USING IOT

There are many companies which are now working with Internet of Things.

Lido Stone Works is a company which provides premier stones and architectural designs started using IoT to automate the machines and streamline the solutions of its company and as a result it has boosted its revenues by 70% and has also increased its productivity by 30%.

Stanley Black & Decker Inc. is a leading global provider of hand tools and related accessories, mechanical access solutions, electronic security and monitoring systems, and products and services for industrial applications. The company operates one of its largest tool manufacturing plants in Reynose, Mexico, which serves North America market. By implementing IoT on the router production line, overall equipment effectiveness (OEE) increased by 24 percent and the plant's utilization rate improved from 80 percent to 90 percent. [10]

BOSCH is a German multinational engineering and electronics company. BOSCH combined hands with Cisco to improve product quality and worker safety in one of their factories. Leveraging a Cisco network and their software, Bosch automated a number of routine tasks on their plant

floor. Automated notifications inform employees when worn parts on power tools need replacement. Since deploying its IIoT solution, the factory has increased efficiency, competitiveness and worker safety while lowering the number of production errors. [10]

DAIMLER TRUCKS NORTH AMERICA (DTNA) is a trucking industry in North America. DTNS's existing infrastructure and network in its Western Star production facility was marked by low resiliency and performance, limited scalability and poor wireless coverage. The result was reduced visibility and monitoring on the factory floor. DTNA chose Cisco and Rockwell Automation as a strategic partners, designing and deploying a new network infrastructure based on the Converged Plantwide Ethernet (CPwE) validated designed guides. Since the introduction of new network, DTNA team leaders and supervisors can communicate reliably over wireless phones to manage production on the floor. [10]

IV. CONCLUSION

Here we see that companies which were working without Internet of Things are now starting to work with the same as it is the latest technology and this technology is tend to grow in a positive direction and help us for our better future.

REFERENCES

[1] https://www.happiestminds.com/Insights/industrial-iot/

[2] https://www.i-scoop.eu/internet-of-things-guide/internet-of-things-in-manufacturing/

[3] https://internetofbusiness.com/9-examples-manufacturers-iiot/

[4] 5th CIRP Global Web Conference Research and Innovation for Future Production Industrial Big Data as a result of IoT adoption in Manufacturing D. Mourtzis*, E. Vlachou, N. Milas Laboratory for Manufacturing Systems and Automation (LMS), University of Patras, Rion Patras 26500, Greece

[5] http://iotindiamag.com/2017/01/10-emerging-iot-startups-india-watch-2017/

[6] http://www.ioti.com/industrial-iot-iiot/top-20-industrial-iot-applications

[7] IDC Manufacturing Insights, Market Spotlight, Transforming Manufacturing with the Internet of Things, May 2015, Sponsored by Cognizant

[8] "A survey of current challenges in manufacturing industry and preparation for Industry 4.0", Ateeq Khan and Klaus Turowski, © Springer International Publishing Switzerland 2016

[9] https://www.newgenapps.com/blog/8-uses-applications-and-benefits-of-industrial-iot-in-manufacturing

[10] CISCO-How to start your journey on The Industrial Internet of Things.