

## Deployment of DeepTech AI Models in Engineering Solutions

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### Keynote

Industrial Engineering is a branch of engineering that focuses on the design and operation of industrial processes. It involves the application of science to the construction of production systems. This field has undergone significant advancements over the last decades. In the last centuries, the emergence of different technologies has led to breakthroughs in engineering, making it possible to automate processes in industries. Steam, electricity, the internet, and now Artificial Intelligence technologies have all brought with them greater levels of automation to machinery, gradually decreasing human involvement in processes such as procurement, raw material handling, manufacturing and quality control.

One of the paradigms that has led to recent advances in the area of Industrial Engineering is the Internet of Things. The concept of the Internet of Things describes the interconnection of real-life objects with electronic devices such as sensors, using communication protocols. IoT is the driver of Industry 4.0. because it enables the collection of vast amounts of data from all industrial processes. This opens a door to knowledge that was previously unattainable. The use of IoT is becoming a reality in many industries which seek to obtain information that will enable them to make decisions faster. By extracting valuable information from data IoT is capable of optimizing all machine related processes in an industry, making it is possible to:

- Execute manufacturing processes more swiftly by monitoring variables in real-time. Run time, speed of operation and cycles may be optimized while using resources more efficiently.
- Make better usage of space.
- Increase production capacity. IoT can measure the output of each machine and of each employee, helping to identify any inefficiencies.
- Prevent machine failures by constantly monitoring their operation. This is an important element in optimizing production. Downtime within a factory leads to big economic loss, it is therefore extremely important to constantly monitor the performance of machines and establish thresholds that indicate the machine requires revision. Moreover, thanks to data, if failures occur, they can be solved much faster as historical data help identify the cause of a malfunction and recommend the most optimal solution.
- Ensure worker safety by monitoring their vital signs and the conditions in the work environment. This can be done by means of sensors placed

in Personal Protective Equipment and sensors in the environment to measure variables such as temperature or harmful gases.

- Ensure customer satisfaction by creating high quality products on the basis of the collected data. All this is made possible through the Internet of Things.

The potential of IoT is immense, however, appropriate management must be put in place in order to ensure efficient Internet of Things network operation. Otherwise, data coming from the IoT may be difficult to manage and analyze, failing to fulfill the goal of IoT, which is real-time response. To implement the Internet of Things, industries must first decide whether their IoT network data is going to be sent to an IoT gateway or Edge devices or whether they prefer to send their IoT data directly to the Cloud. The Deep Intelligence platform, which is deployed in a Cloud environment, can work with IoT networks directly or with IoT networks and Edge devices. Deepint.net offers a user-friendly and rapid deployment solution to industries that are searching for robust management of their IoT network.

The Deep Intelligence tool can help manage the IoT devices deployed in an industry, monitor their position, state and check for anomalies. The platform has a modular design which makes it possible to organize different IoT network data into different modules, such as worker safety, machine health, process efficiency.

The real-time analysis of data on the Deepint.net platform means that anomalies in the working environment or the worker's health problems can be prevented. In case downtime or injury occurred, the Deepint.net platform would enable a rapid response. Deepint.net conducts a full data analysis through the application of disruptive AI models, which are readily available on the Deepint.net platform.

Let's consider last mile delivery, which is one of the most complex processes in logistics engineering. This is because it involves many uncertainties, such as weather conditions, road conditions, traffic, car accidents, delivery vehicle anomalies, choice of route, avoiding parcel damage and delivery errors, and communication with the retailer or the recipient of the parcel; all this makes the successful delivery of parcels at the customers' doorstep difficult. In addition, today's consumers have much greater expectations regarding delivery services, they demand to receive their parcels much faster or be able to choose the time and place of delivery. All this increases the cost of last mile delivery, accounting for 40% of overall supply chain costs.

Deepint.net increases the companies' possibilities to analyze greater amounts of data and therefore, acquire more accurate knowledge regarding the variables involved in last mile delivery. Data regarding a company's logistics may be collected through sensors, GPS, CRM etc., and analysed by Deepint's AI algorithms. Moreover, predictive models on Deepint may be used to provide real-time support in logistics by, for example, providing suggestions on the route to be taken through the consideration of variables such as traffic, roadworks, shortest distance, weather and mileage.

The platform has been built to work semi-autonomously through the use of a wizard, which advises the user throughout the whole data analysis process. This means that industrial workers and managers will be able to use this platform with no need for training in the use of the technology. This simplifies much of the work that would normally have to be done in the operation of an IoT network, which is carried out by data analysts or Machine Learning experts. Moreover, this helps save costs on training and eliminate the need for hiring experts in data analysis. Moreover, it frees companies from having to implement all these AI technologies separately which also contributes to significant savings both economic and timewise.



<https://english.corchado.net/2021/12/03/ai-in-the-field-of-mechanical-and-automation-engineering/>

The use of Artificial Intelligence techniques is an essential element of IoT data analysis. The Deep Intelligence platform uses both supervised and unsupervised Machine Learning, offering capabilities such as classification, regression, clustering, rule discovery and dimensionality reduction. This makes it possible to extract knowledge from the data and make predictions.

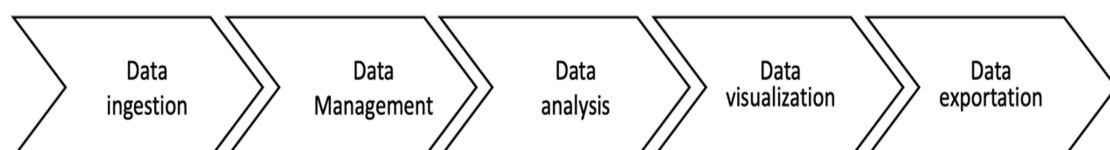


Fig.1 Data analysis stages on the Deep Intelligence platform

Deepint.net can help industries gain their client's trust. Through the application of Blockchain to the real-time data obtained from the IoT network, customers can be provided with transparent information regarding the entire production process. The industry can also use Deepint.net to become greener through the analysis of IoT data regarding the emission of gases and implementation of corresponding measures. They can then use this data to take measures that will help them decrease their environmental footprint and Deepint could also help make such decisions in real-time, in a way that would not affect the efficiency of the industry's operation.

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