# METHOD FOR SIMULATION ASSISTED DATA GENERATION AND DEEP LEARNING INTELLIGENCE CREATION IN NONDESTRUCTIVE EVALUATION SYSTEMS
## IITM Technology Available for Licensing

## Problem Statement

- Generally, NDE/NDT plays a vital role in improving the manufacturing productivity and quality. There are a few NDT/NDE inspection techniques such as feature-based classification, artificial neural networks & adaptive filtering which have been developed to perform automatic radiographic inspections of the objects.
- However, application of these techniques is restricted due to **lack of sufficient training data to train the NDE/NDT system** to perform **defect identification,** which leads to **inefficient implementation** of said NDT/NDE techniques.
- Present invention addresses above issues in efficient manner.

## Technology Category/ Market

**Technology:** Method for simulation assisted data generation for NDE system;
**Industry:** NDE/NDT, Artificial Intelligence**,** Deep learning Industries with Instrumentation fault finding; **Applications:** NDE/NDT Systems.
**Market:** The global Non-Destructive Testing **(NDT)** Software Market is projected to grow at a **CAGR** of **11.10%** during the period **(2024-29).**

## Technology

- Present invention describes a **system** and **method for automatically identifying** one or more **anomalies in the objects**.
- The system **receives experimental data** of the object and applies a probability density function (PDF) upon one or more variables associated with the experimental data to determine corresponding one or more PDF estimates.
- Further **generates simulated data** associated with the object based on at least one of the one or more PDF estimates and priori data associated with the testing of the object.
- The simulated data comprises **one or more new anomalies unknown** in the experimental data along with the one or more anomalies of the experimental data.
- Furthermore, the system **trains a learning model** based on the one or more new anomalies and the one or more anomalies of the experimental data.
- The learning model is **applied** for **detecting any anomaly** in an **object**.
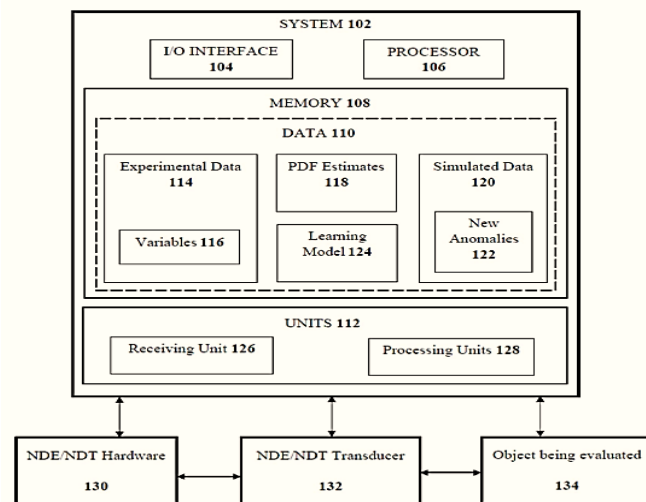


**Fig.1** shown a network illustrating a system for detecting one or more anomalies in an object;

## Intellectual Property

**IITM IDF Ref. 1898;**
**IN Patent No. 481776 (Granted)**

## TRL (Technology Readiness Level)

**TRL-4**, Proof of Concept ready, tested and validated in Laboratory

## Research Lab

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## Industrial Consultancy & Sponsored Research (IC&SR)

### Key Features / Value Proposition

❖ ***Technical Perspective:***

**Efficient Techniques:**
- The claimed invention **enhances the automation** of **detecting anomalies** in an **object** using a Non-destructive Testing/Evaluation (NDE/NDT).

**Using AI Network for generating large & relevant data:**
- The claimed subject matter further provides techniques for **generating large and relevant data** for training artificial intelligence networks (such as Deep Learning and/or Machine Learning) for the NDE/NDT system.

**Improved Performance:**
- the claimed patent facilitates improved the **accuracy and efficiency of the NDE/NDT system**

❖ ***Industrial Perspective:***

**Utility:**
- Applicable in the industry such as **NDT/NDE** Industry, automation Industry and flaw detection industries, Instrumentation, Oil & gas industries.

### Images



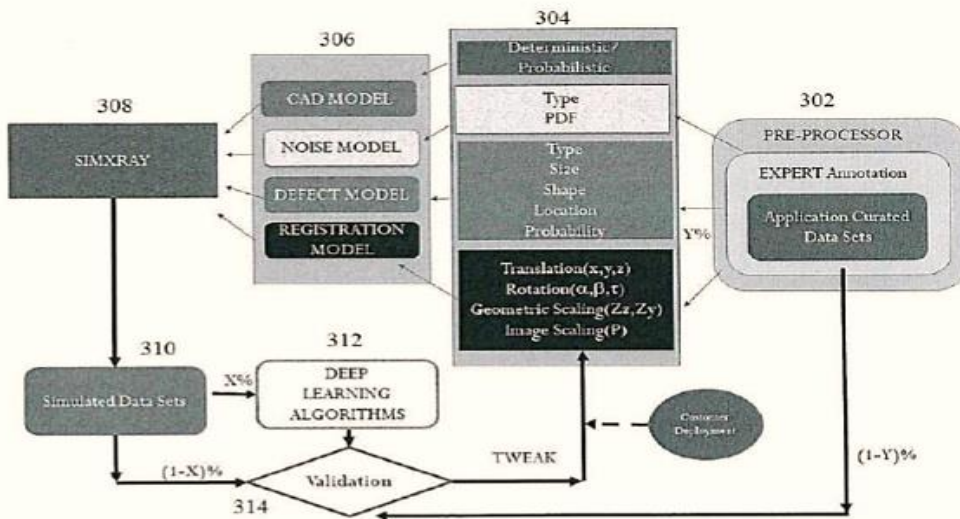**FIG.2(above): Illustrates a flow chart of a method for detecting one or more anomalies in an object;**

### Simulation Process



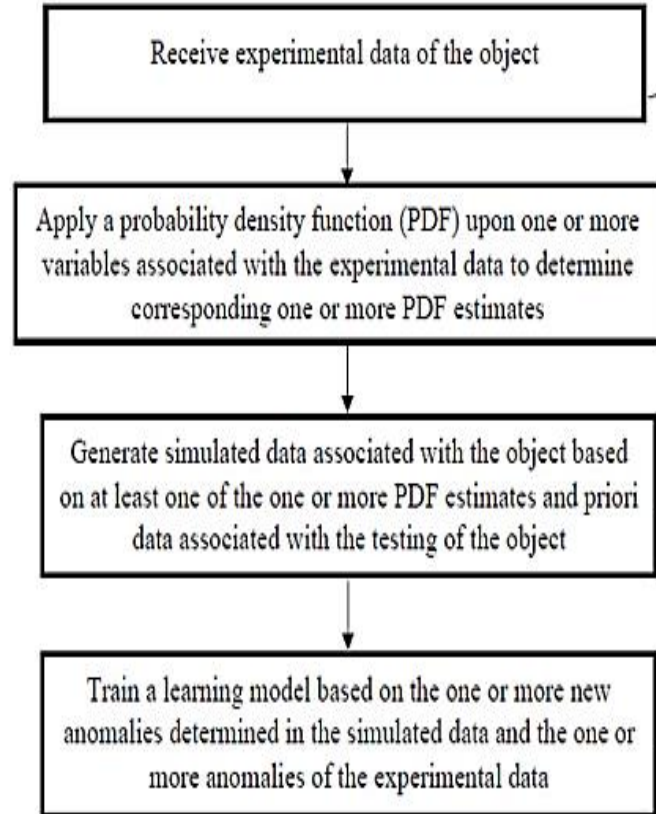**FIG.3(Left) : Illustrates a block diagram illustrating flow of information for explaining working of the system;**

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