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Novel Approach for Robotic Process Automation with Increasing Productivity and Improving Product Quality using Machine Learning

Rashmi Jha, Govind Murari Upadhyay

Abstract Robotic Process Automation (RPA) is one of the smartest technology evolutions in recent years. It is, a software installed on a system. RPA can be implemented in a well-defined environment with defined procedures and clarity with reference to decision making. RPA's limitation is that it cannot be automated if it involves decision making supported by knowledge-based application. Highly invasive and intertwined supply chains are now confronted by producers, which reduce manufacturing life cycles and raise product sophistication. You therefore sense the need, at all stages of value formation, to change and adjust more rapidly. The theory of self-optimization is a positive method to coping with uncertainty and unexpected delays within supply chains, devices and processes. It would also boost manufacturing industries' stability and productivity. This paper explores the idea of development processes that are self-optimized. Following a quick historical analysis and understanding the particular needs, specifications and self-optimizing criteria of the various stages of value generation from supply chain planning and management to manufacture and assembly. Examples at both stages are used to demonstrate the self-optimization principle and to explain its simplicity and efficiency ability.. We proposed Novel approach for Robotic Process Automation with increasing productivity and improving product quality using machine learning

Keywords : Robotic Process Automation , machine learning , Deep Learning

I. INTRODUCTION

Manufacturing processes face various problem in a modern day. As one approach to address these difficulties was solve in this article, the idea of self-optimization included in the "Integrative Development Technologies in High Wage Countries" Cluster of Excellence. While the common architecture of the production processes can be used to explain self-optimisation, modifications and refinements have to be introduced to overcome the various specifications for packaging, packaging and automotive assembly. The basic theory of self designing manufacturing processes with the function itself and incorporating the individual in a socio-technical framework has been addressed in the sense of this article. Furthermore, diverse problems, modifications and comprehensive prototypes were posed at the development, packaging and assembly stage. In the historical history of control in manufacturing engineering,

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* Correspondence Author
Dr. Rashmi Jha*, Institute of Innovation In Technology & Management, GGSIP University Delhi, India. Email: dr.rashmijha22@gmail.com
Govind Murari Upadhyay, Institute of Innovation In Technology & Management, GGSIP University Delhi, India. Email: govindmurari.upadhyay@gmail.com

the dramatic improvements in efficiency also called the "Economic Revolution" are followed by a modern control technology. The next phase in control technology can be called self-optimization. In view of technologies such as the "Internet of Things," adapting to changing environmental circumstances is becoming extremely necessary since the climate constantly evolves. In addition, human and technological co-operation includes the continuous modification of control systems. Self-optimization is thus seen as a gateway to the next stage of improved efficiency.

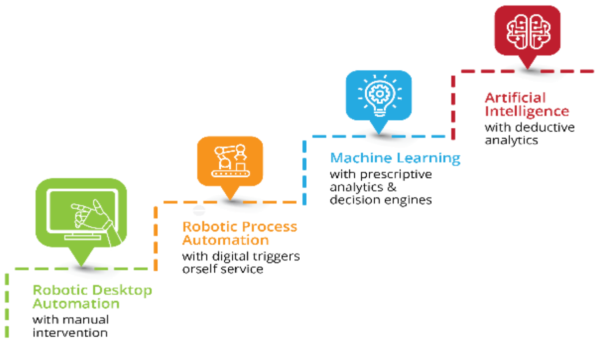

Figure 1: Robotic Process Automation Using Machine Learning[1]

It can process statistical details, for which several replicated operations, some of them of complex execution, are automated by the proposed method. For eg, an automatic script serves to re-start the server online when a specific server is identified. Additional activities require regular servicing, such as operating system setup and program development. Another important RPA is for students with special needs (e.g. sensory difficulties and issues relating to focus, which find it challenging to use the mouse and keyboard accurately). The cognitive RPA suggested allows students to carry out activities, often in the area of IT, for example network setup.

II. RELATED WORK

The familiar tools of AI include ANN, Artificial NeuroFuzzy Inference System (ANFIS), Genetic Algorithm (GA) clustering, ML, Particle Swarm Optimization (PSO), Deep Learning (DL), Martins, P. et al.[1]This paper suggests an RPA framework, where artifacts on the software programming interface are sensed dynamally in real time, facilitating consistency, efficiency and precision irrespective of Iso, device position and the appropriate menus to access it.

A Convolution Neural Network (CNN) is equipped with different interfaces and menus and is used for real-time recognition of user interfaces. In addition, an automatic action is taken with the built program, shifting mouse pointers, scrolling, modifying text, etc.Parchande, S., et al[2]The key downside to continuous manual servicing is to repair and preserve documents of several of the current structures. This adds to time and money being lost. This essay suggests a collective work control framework focused on completely integrated computer learning and robotic process automation. Authors also developed and applied the method using an algorithm that optimizes time and human work. The suggested method has been found to reduce time and effort. Mayoral Arzaba et al[3]In recent years the image processing is an envolving issue, allows a great variety of applications. This article describe the Automation method of a conveyor belt utilising a learning algorithm to identify the numerous electronic boards of each form instantly. A camera is used for image therapy. The knowledge is delivered by a WiFi module to a free server of a web page. Is obtained an automatic and intelligent process of low cost of robotic cell. Parisi, L. et al[4]This research validates the usage of unsupervised GAs and ML to estimate the success rate of stress-sensitive material putting using stress and torque knowledge alone. There are future work to allow hybrid algorithm tested in the current study (GA-SOM) to be applied in real time. For manipuliers other than those relating to the force-sensitive pick-and - place mission, additional training data may be needed. Doltsinis, S., et al[5]A standardized feature set is recommended to obtain strong ID performance for various forms of snap assemblies. There is also an introduction to a function transformation which is important for the real-time execution and recognition of effective snap assemblies in the proposed system. The KUKA LWR4 + robotic arm is experimentally tested with three separate artifacts which result in high classification and accuracy in real time. Finally, a model-based process analysis is carried out.

Cao, L. et al[6]It can be used in function fusion systems, where several sequential sensory readings involve an incremental education. Four separate robot recognition tasks are checked for OM-ELM results. Compared to other state-of-the-art multicernel learning online models, we conclude that our approach achieves better or comparable training precision and generalization with lower training period. Practical advice to more efficiently combine sensory robot technologies online are often developed. Alsamhi, S. H et al[7]We find related problems in the case of robot swarms such as collision avoidance, maintenance of communications between robots, maintenance of contact efficiency and the maintenance of robotic cooperation. In the case of interactive robot assemblies, ML innovations that were implemented to enhance various parameters, such as usability, accessibility, quality of operation and effective energy consumption data recovery were then addressed from the point of view of their value. Finally, the paper discusses unanswered problems and opportunities for study into the future.

III. PROPOSED METHODOLOGY

Robot systems are significantly increased in industrial automation owing to continuing demand for efficiency increase and product quality enhancement and aspire to be present in more and more scenarios. The scope and scale of developments in industrial robotic systems are increasing rapidly. A robotic machine still pursues the relentless goal of improved operating performance, precision and durability. For robotic systems to conduct ever more complicated tasks and navigate broader and varied worlds, high intelligence and autonomy are important. This segment reflects on the implementation of state-of-the-art innovations to answer basic and realistic questions in all areas of industrial automation robotic systems.

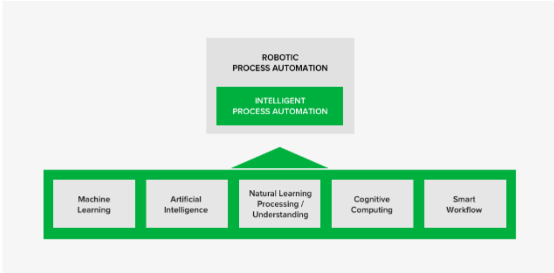

Figure 2: Smart process[4]

This 'Section on Advanced Robotic Systems for Industrial Automation,' in the International journal for Smart Robotics and APIs, discusses recent advances and notable accomplishments in advanced industrial automation robotics systems, including architecture, preparation, monitoring and control. In order to encourage ongoing innovations and gain insight into the difficulties and opportunities in this area. Three parts may be categorized into: first part contains three documentation which concentrate on robot configuration, design and control. The first part contains three sections. The three articles in this section take a look at state-of-the-art robotic architecture, managing preparation and motion control technologies aiming to boost the robotic automation performance, accuracy and robustness. The architecture of the robot has always been an critical problem for enhancing robot operations The paper "Best Fall Topology optimization for a 2-DoF hybrid robotic bracelet" by Chong et al. provides an effective method for optimizing structural topology for a global realistic 2-DOF hybrid robotic arm in view of time gaps and joint forces around the working room. In order to maintain global authenticity, the whole section of the work piece defines all the worst cases for facets of cinematic properties and enforcement and takes note of the analytical function of topological optimization. A updated guidance weight approach may be used to solve the suggested topology optimisation with rapid convergence. The analysis of results between optimized robotic Arm and Baseline reveals that the hybrid robotic Arm optimized system works more efficiently in terms of stifling, friction, and dynamics. For particular activities, a robot communicating with artefacts and environments is necessary for motion preparation and complying regulation. Chen et al. implements an important motion planning and control method to prevent failure of dual-armed motion for connection, particularly because of unavoidable errors with the grip of a robotic hand and total positioning errors of serial robotic motor handling systems. In the paper "Integration of Integrated Task and Motion Preparation with Complying Verification." The collaborative mission and movement preparation was combined such that a dual-arm robot is able to take up objects and transfer them into assembly places. Conforming techniques are implemented to solve the configuration errors and to achieve injection movement ambiguity. Experimental findings support the application of the theoretical approach to multiple interlocking functions.

Figure 3: Working process[5]

Yan et al. suggested the usage of the NE algorithm for optimizing the parameters of the model predictive control (MPC) in micro positioning systems, the paper "The predictive regulation of precision motion in the predictive framework of a neural network model" In contrast with traditional strategies, the proposed NN-PC control approach makes the precise motion analysis of a micro positioning device to be smarter and more flexible. Extensive simulation experiments indicate the NN-MPC method is stable in a number of model parameters and a large degree of noise. The second segment comprises two articles on the understanding of robotics. The two articles in this segment present the robotic understanding of the operating world in which the robot communicates. The static indoor atmosphere is a basic vision system for robotic operations.

Wang, etc proposes a framework for environmental condition interpretation dependent on description of the information in dual-arm robot assembly activities, utilizing a dual-arm robot to connect randomly-placed components. The paper is designed to build a global indoor assembly scenes environmental model that will enable robots to prepare ongoing assembly activities in the built environment. The details of target objects should not only be understood through the combination of visual awareness, the point cloud mechanism and the representation of knowledge but also be used in the architecture of a double arm robot. Simulations and experimental findings indicate that the method suggested will achieve excellent understanding of the world. A moving target is most commonly seen in many programming situations, but for robotic manipulation it is quite difficult. The paper by Sekhavati and Eghbal entitled "auto-correct integrated trackers with and without first frame memory" suggests merging various trackers in every series of pictures, which may entail a number of variants in poses, aim deformations and different forms of occlusions. By consistently fixing each other's errors, the combined trackers will reduce their deficiencies. Experimental findings suggest that certain existing trackers and their modules have been solved by the suggested solution as they function separately.by evaluating a set of 7355 system of various targets for monitoring in various areas. Three articles centered on robot learning are discussed in Section Three. The three articles in this segment illustrate that robots can become well equipped to conduct fexible tasks and can be cooperative with humans by schooling. The complexity of gathering vast transformation data and moving abilities to different roles appears to be a problem for robotics.

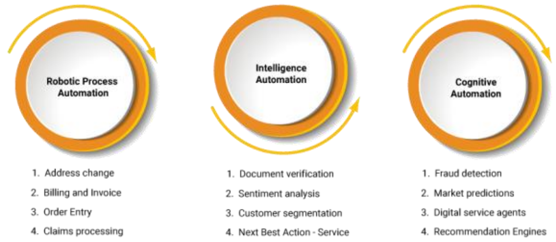

Figure 4: working task[6]

The paper “Model accelerated reinforcement learning for high precision robotic assembly” from Zhao et al. provides an optimized process of improving learning in order to practice montage strategy effectively. This paper teaches assembly policy the optimum entropy increasing learning climate and is carried out using impedance regulation that guarantees the productivity of experimentation and allows for the transition of skills between tasks. The paper thinks about environmental factors through policy preparation in order to reduce sample quality and increase training performance. The dynamic model is used to enhance the calculation of target value and provide examples of transformation from abstract data to statement. Experimental studies indicate that the approach suggested increasing the quality of training by 31%, as opposed to the model-free system, enables new activities to move on the acquired capacity to speed up the preparation of new policies. Strengthening research should be used to acquire expertise of robot management. Zhang et al. proposes a deep reinforcement learning algorithm focused upon the concept "A prototype Efcient Deep Reinforcement algorithm with Knowledge Replay for robot handling." In this article, the device dynamics was represented by the deep neural network model. The paradigm is flexible enough to perform dynamic processes of management and has the potential to generalize. This paper adopts a curiosity-based experience-play approach to solve the sparse incentive issue and increase the sample quality. Simulations indicate that the new approach is extremely successful. In such a complicated hierarchical structure different simulation functions are effectively completed and also in a sparsely compensated setting sample performance is expanded as the learning period is considerably less. The ideal direction or goal of human actions is a crucial but typical issue in the physical relationship between person and robot. Xia etcoll. proposes an epochal iterative learning scheme for a robotic control system to learn a goal course, which is programmed by a human partners but not understood by the computer, in "Interpretative learning of a preferred human partner route for constructive human robot cooperation."

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In order to eliminate human contact power, the suggested protocol updates the reference course of the robot in an iterative, instructional way.

Experimental findings indicate that the proposed approach is capable of minimizing the likelihood of human-robot interaction and passing human capacity to robots that are appropriate for applications such as heavy container transport and compatible machining in the automotive field. Together, we agree that the above papers offer a valuable summary of advanced robotic automation systems that discuss robot architecture, preparation, power, cognition and learning issues. We are glad that the writer and employees of the Multinational Ropotic Process Automation (RPA), as opposed to the common notion of "workforce contraction," is a systematic form of maximizing human use on global workers. The simulation of a process automation project is a necessity since it functions as a software blueprint. The Proposed Model allows a detailed overview of the market process to quantify variables like production efficiency, difficulty and FTE savings in a specific method. Different criteria such as shift duration, dynamic cognitive capacity, etc. are regarded. We select if it is appropriate to be programmed using these variables and parameters.

Compared to the standard model, the new model is significantly stronger since it discusses more criteria with its own requirements for and feature. The suggested model often analyzes the mechanism from almost any possible perspective, offering a more comprehensive explanation with increase in accurate precision. And if the job is early in the process, we would like to continue working on it. Our next issues are: I to strengthen the model, taking into consideration further parameters and variables such as cost calculation, payback, and advantages (ii) to reinforce the scientific basis of the method model to help further market trends (iii). This survey is intended for developers and researchers in the field of robotic communications and engineers who work on AI-based robotic communication issues solutions. (a) We analyze first, the robots' perception of the world and behavior with assistance of IoT and ML. The output of this study can be summarized. (b) Next, a debate on the use of ML technology in integrated robot communications is being held focused on factors such as QoS, agility, data collection and robot cooperation contributing to improved robot contact. (c) We are evaluating core strategies and methods for the implementation of ML for robotic communication for accurate and reliable task efficiency. (d) In conclusion, the potential course and obstacles of science are underlined.

IV. PROPOSED MODEL

Manufacturing processes for models are focused on the restricted response period for the delay-free activity of their subsystems. This short response time is the core constraint of a model, considering its short computational resources and the task of incorporating process information into a system. Method knowledge-based models usually need the solution of partial differential equations on computational grids resulting in differential equation structures of several millions of variables. The goal of the reduction model is to differentiate between major and marginal results. It is possible to differentiate between four models of reduction: algebraic analysis, analytical, computational and guided results. Reduced models are used to simulate the process behaviour, and to extract process variables from sensor signals, for two separate advantages in the modeling framework: both under difficult time constraints. The diameter of a laser beam at the top of the sheet in the laser cutting of metal sheets is a method aspect that affects the consistency of the cuts, such as roughness. The laser burns metal and the gas jet throws out of the cutting bracket the cuf. Stefan 's problem of free boundary conditions The basic connection of the melting process to the geometric form of the melting front is defined as computationally costly. The model can be decreased to calculate the target location using the bracket dimension. This makes the on-line parameter change. In the cutting technique (physically driven model with an analytical tuning parameter) the mechanism force also is demonstrated in mechanical models. Auerbach et al . [4] develops a device that designs and executes cutting experiments dynamically to establish mechanistic force models in friction. The framework plans experiments using DoE and fits into a parameter model by symbolic regression – a curve fitting approach which uses elementary analytical technology and evaluates the results in terms of accuracy and complexity of functions. The defined model for the active force FA in frying is seen in Equation 1:

$$F_A = f(a_e, a_p, f) = C_1 + \frac{c_2 . a_e . a_p . f}{a_e + c_3}. \qquad (1)$$

It is a non-linear method of cut ap distance, cut ae width, and creative f eating. The word c1 may be interpreted as a friction constant that is superimposed. The cutting range ap and feed f linearly lead to the complex word second. The method defines the configuration of the empirical model and the relevant coefficient values.

V. ROBOTIC PROCESS AUTOMATION USING MACHINE LEARNING :

The ranges of manufacturing vary from the level of collaboration between firms to the level of machine control. Self optimization for systems for production management can be characterized as adaptation to an optimum working point since the action of human judgment is assumed to take account of evolving internal and external factors. Self-optimization systems allow the human operator to discourage, assess and provide the operator with suitable assistance to enhance the operational point continually on the current device state at various levels of the development system (e .. supply chain, business, shop floor, cell and computer manufacturing). A cybernetic production management reference model was built to deal with the complex ecosystem that combines multiple engineering and industrial layers. Functional and socio-cultural feedback loops are merged to allow individual decision-making into consideration. It specifies the preparation and control activities and the communication sources necessary and appropriate for self- optimized output management using the Stafford Beer Viable Framework model.

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The Viable Framework Model offers an appropriate mechanism to incorporate trans-disciplinary control loops reliably and to coordinate them with a superordinated goal system. The strategy and decision-making process shall be distributed in the overall sense of project management and construction specifications as a regulatory structure. A robot represents a collection of sensors, control mechanisms, power supplies and software that operate together automatically to carry out a variety of complicated activities. Robotics are powered by IoT innovations like cludic computation, Big Data, sensors and control systems; linked, IoT and robotics give rise to a modern and efficient IoRT technology. IoRT is an articulate term that provides the opportunity to discuss, consider and assign relevant matters.
The paper introduces a model-driven methodology focused on the data gathered for automatic part placement. In the face of uncertainty, efficient assemblies are accomplished with this method (Figure 5). There are three key measures for operation of a self-optimizing assembly device. Second, via the implementation of advanced process metrology for data collection, an individual assembly situation during output is established. Secondly, data obtained are represented on the basis of model goods and devices. Differences in product feature are defined in the extracted details. In order to accomplish the optimal product purpose, the research is aimed at finding new controls for the assembly system. The third and final stage is the transition to these basic points of the assembly method.

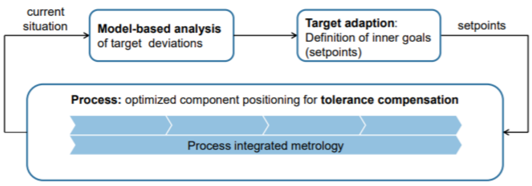

Figure 5: Control of a self-optimizing assembly system[8]

The core principles of self-optimizing assembly systems are model-based analysis of the acquired data and the discovery of new setpoints. The decomposition of goals for assembly activities is a traditional approach to minimizing uncertainty. The interactions affecting results of design models may also be extracted from the items described in. This method contributes to very broad and very limited organizations, since it is often difficult to identify specific priorities or because of the existence of contradictions that contribute to competing expectations. This strategy leads to bad outcomes. In order to reach maximum device status in the case of an optimal product feature, modell-based system management must also typically find a balance between many – even competing – priorities. The solution to this multi-faceted optimization problem is self-optimization.

VI. MANUFACTURING SYSTEMS

Products need increased consistency standards for sustained business performance. The effect of the absence of such a standard of quality will trigger development interruptions or goods that do not fulfill the customer's requirements. For each commodity, consistency is described differently. Stoffweight or ruggedness of the surface are just few of the consistency defining characteristics of the cloth. In terms of the overall manufacturing process, it may be expanded to involve development variables such as the usage of raw materials, the processing period or the workers needed to produce the component. The difficulty to know more about the manufacturing method resides in industrial processes designed to maximize these output variables. Where established frameworks for effective execution of setting parameters are configured, self-optimizing frameworks must be configured for product consistency. This can be done only if professional understanding of the method and the boundaries are combined. The present ranges of manufacturing systems are systems that complete with one particular method one phase in the production chain. Examples include the framing of metals, cloth sewing, frame welding, pouring plastic pieces or laser radiation cutting of metal panels. Both of them are in

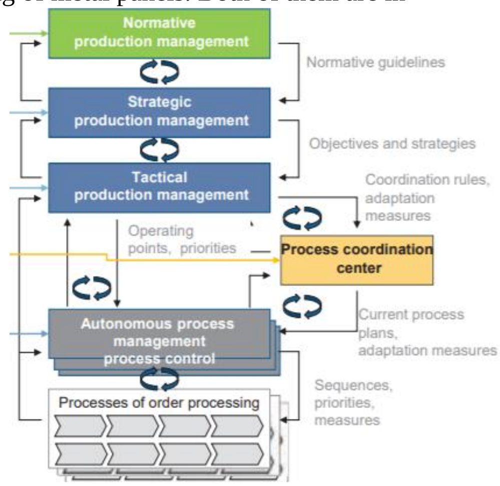

Fig. 6. Concept of the Viable Systems Model[9]

They normally process content to give it new capabilities. With each computer generation and control technologies, efficiency and durability of certain production systems improve. Suppliers rely on durable products and, when necessary, add quicker actuators. To boost monitoring of subsystems and to enable a more efficient coordinated operation of all components on a computer, modern sensors and quicker bus systems are being introduced. New development systems must obey these parameters on this route.

VII. RESULTS

EXPERIMENTAL SETUP CPU i7 3.6GHz; 16 GB RAM; 3 TB HDD; Asus Nvidia GeForce GTX 1070 8 GB is included in the implementation and testing. To train the neural network, a dataset is needed. There are no databases on user interfaces as far as our quest was concerned. Thus, during the creation of this study, the dataset was generated and named by hand. Additional databases are used to verify and analyze CNN. The neural network has to be equipped with a dataset. There are no databases on user interfaces as far as our quest was concerned. Thus, during the creation of this study, the dataset was generated and named by hand.

Further CNN analysis and research data sets are included. The dataset includes over 10,000 snapshots, including complete configuration snapshots for various desktop programs (all of them for Windows 10), setting tables, guides, setup menus and administrative webpages. These images include multiple policies, patterns, shades and instructions. The data collection also comprises three major categories, preparation (60%), research (20%) and evaluation (20%). With the aid of our study community the marking is performed manually. This role is performed image by picture using a graphical image labelling method, with the production of n XML, which contains coordinates and designated marks. The PASCAL VOC file contains all annotations in XML. The next move is to migrate them to a CSV format, with a custom script that produces the YOLO v3 algorithm files for all label mappings ('labelmap.pbtxt'). We concentrate on the screenshots of one program, Eclipse IDE, for convenience purposes only.

VIII. CONCLUSION

In this article, the general principle of self-optimization for production processes in terms of its self-related configuration and human incorporation into a socio-technical environment has been studied. Furthermore, diverse problems, modifications and comprehensive prototypes were posed at the development, packaging and assembly stage. Technology is growing at a pace unimagined before. Movement from a coded life to codeless life is the new journey. And it's ML, DL concepts which are playing a great role in transforming the way life will look like in the future. Clinical domain must open its arms cautiously to embrace the applications of the technology in all its processes. The journey of a chemical entity from lab to market could be made much easier, accurate, efficient and faster thus saving more suffering and holding on to the smiles on faces for a longer time bettering the current scenario

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AUTHOR PROFILE

Dr. Rahmi Jha is working as a Associate. Professor in Institute of Innovation In Technology & Management, GGSIP University Delhi, India. She has completed her PhD from Baba Saheb Bhim Rao Ambedker University(State Govt. University), in area of Data Mining Applications. She has presented/ Published many papers in national/ International conferences and journals. She has guided many students in their research work.

Mr. Govind Murari Upadhyay is working as a Associate Professor in Institute of Innovation In Technology & Management, GGSIP University Delhi, India. He has obtained MCA and M.Tech (Information Technology). He has 13 years of teaching experience. His teaching area is Object Oriented Programming and area of research is Cloud Computing and Machine Learning.