ANALYSIS AND STUDY OF VARIOUS TOOLS FOR TRAINING ON DIGITAL & COLLABORATIVE PLATFORM FOR INDUSTRIES /ACADEMIA

[1]Dr. S Mohan Kumar, [2]Nitin Sapre

[1]Department of Mechanical Engineering, Malnad College of Engineering, Hassan, Karnataka, India
[2]Drives & Control Academy, Bosch Rexroth India Limited, Bangalore, Karnataka, India
Email: [1]dr.s.m.kumar@gmail.com, [2]nrsapre@gmail.com

Abstract – To analyse and make optimum use of various tools in Digital & Collaborative training, the participants must be aware of these tools and should use them by interfacing with various technologies. In many places internet facility is required for using these tools.

In this paper we are introducing various tools for conducting effective Digital & Collaborative training. As training programs are planned in a calendar with compact schedules, these schedules/calendars are highly elaborative & tedious to understand the depth of training, for an industry personnel as well as students in academia. A 'Centre of Excellence' is set up by the joint venture of industry & college (academia), which is equipped with all the tools require for training.

It is a prototype automation system which provides training along with practicals to the participants from the industry/academia. Due to the emerging technologies, advances in software's, systems & high-speed networking ambience, digital & collaborative systems are at high priority.

This also aims to learn or to implement in E-Learning environment, which has become an integral part of our life in today's scenario. It ensures sharing of knowledge among each other and gains more and more in-depth knowledge of technology. It helps industry and academia personnel to understand about technology with hands on experience so that it will be easy to learn and implement it in routine practice.

We analyse both Face 2 face (F2F) and online collaborative learning, and we introduce web trainers which helps to study about technology using audio-visual presentation. Using the various tools, it is a great help for the participants from Industry and Academia to analyze & study about the knowhow of the technology.

1. Introduction

This paper introduces analysis and study of various tools for effective training on Digital & Collaborative platform. As training programs are planned in a calendar with compact schedules, these schedules/calendars are highly elaborative & tedious to understand the depth of training, for Industry personnel as well as students in Academia.

A Centre of Excellence is set up by the joint venture of Industry & college (Academia), which is equipped with all the tools require for training. It is a prototype Automation system which provides training along with practicals to the participants from the Industry/Academia. Due to the emerging technologies, advances in software's, systems & high-speed networking ambience, Digital & Collaborative systems are at high priority. Training programs have been

established to enhance the knowledge and skill of the person from Industry/Academia. It also increases the efficiency of working and performance of an individual.

This aims to implement the E-Learning environment, which has become an integral part of our life in today's scenario. It ensures sharing of knowledge among each other and enhances more and more in-depth knowledge of technology.

2. **Training – Digital & Collaborative**

Training consists of some features.
   a) Training in Classroom.
   b) Training via Audio/Video ads.
   c) Training through Webinars.
   d) Training through E-Learning.
   e) Training using the all above.

In present century, Training is required by everyone in respective field to gain knowledge & skill. This can be done in a close classroom or lab or outside the classroom i.e. open environment.

The Webinars for training can be organized by professionals, through Video conferencing, or by E-learning tool (i.e. One form of digital & Collaborative). Some training is for personal development and some for technical competencies.

Training can be conducted in-house for Industry/Academia, where an employee/faculty can deliver the training to his subordinates or colleagues. This helps to share the knowledge among each other and improvement in work culture, thus it reduces the cost of training. Even these trainings will be more practical and useful for others. Some training can be organized from outside professionals (outsource) and hence chargeable, but have some value for both i.e. cost and quality.

3. **Tools for Training**

The various tools for conducting effective training are many but some of them are available at Centre of excellence, which is developed with help of Industry & Academia, a joint venture collaboration.

In this centre, it can be visualized that all the technologies are combine, means Embedded, to work together to perform a given task. This centre has five divisions. Namely

   a) Pneumatics Lab.
   b) Hydraulics Lab.
   c) PLC Lab.
   d) Sensoric Lab.
   e) Mechatronics, Robotics & Drives Lab.

Besides this technical lab there is soft skill lab used for personal development of the participant, consists of Personality development, Communication, Leadership and Stress management.

4. **Case study : NMIMS, Shirpur.**

The Centre for Excellence was developed in 2013, in collaboration with NMIMS, Shirpur, and Bosch Rexroth India Ltd (German MNC) i.e. Industry & Academia. The lab equipments was given by Bosch Rexroth India Ltd and Infrastructure has been provided by the NMIMS Institution. A group of 10 faculties from various disciplines was selected & given training at one of exclusive centre of Bosch Rexroth in India and two faculties were sent for advance training in Germany. These Faculties were trained at Industry level and capable to handle training for Industry personnel's and Students. Enabling collaborative technology [1].

About the lab :
   a) Pneumatic Lab :
It consists of two kits with four workstations, and separate accessories for each. Approx 4 Participants can work each side means in all the kits total participants at a time is 16, this can be extend to 20. Pneumatic control [2,3,4].

The Pneumatics kits contains a compressor, Basic Pneumatic & Electro – Pneumatic components, PLC for interfacing and a close loop Pneumatic kit for control Pneumatics & Simulation software. In these kits, participants can do more than 120 experiments, and can make their projects at UG & PG levels.

Photo of Pneumatic Lab along with compressor.

Pneumatic Kit

Figure.1. Pneumatic Trainer kit

b) Hydraulics Lab :

It consists of   two kits with four workstations, and separate accessories for each. Approx 4 Participants can work each side means in all the kits total participants at a time is 16, this can be extend to 20.

The Hydraulics kits contain a Hydraulic Power pack, Basic Hydraulic & Electro – Hydraulic components, PLC for interfacing, a close-loop and proportional Hydraulic kit for control Hydraulics & Simulation software. In these kits, participants can do more than 80 experiments, and can make their projects at UG & PG levels.

Photo of Hydraulic kit along with Power pack.

Hydraulic kit

Figure.2.   Hydraulic Trainer kit

c) PLC Lab :

It consists of 4 kits with separate accessories for each. Approx 3 Participants can work on one so in all the kits total participants at a time is 12, it can be extend to 16.

The PLC (Programmable Logic Controller) kits contain a Software CD, Ethernet cable & Power cables. In these kits,

participants can do many programs and can make their projects at UG & PG levels. Indra logic [5,6,7].
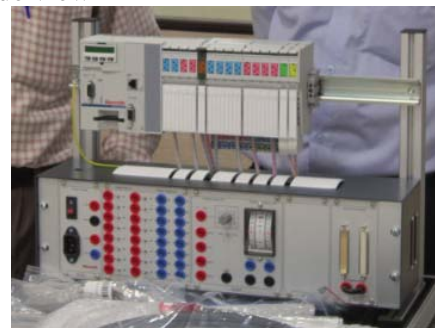
Photo of Programmable Logic Controller (PLC) Lab.

PLC

Figure.3. a)   PLC Trainer kit

Inside view -

PLC

Figure.3. b)   PLC Trainer kit

d) Sensoric Lab :

It consists of   4 kits with separate accessories for each. Approx 3 Participants can work on one so in all the kits total participants at a time is 12, it can be extend to 16.
The Sensoric kits contain a Software CD, Various sensors, Ethernet cable & Power cables. In these kits, participants can do many experiments and can make their projects at UG & PG levels. Sensorics [8].

Sensoric

Figure.4.   Sensoric Trainer kit

e) Mechatronics (mMS), Robotics & Drives Lab.

It consists of 1(3 stations connected together) kit with separate accessories for each. Approx

group of 4 Participants can work on one similarly for Robotic kit.

In Mechatronics (mMS kit) there are three stations namely Magazine station, Processing station with Pneumatic press unit and Storage station having Cartesian Robot.

In Robotic kit, there are 4 axis ie. X, Y, Z and rotary axis which is rotating at 360^0 .   mMS [9,10].

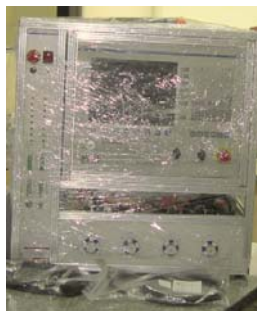Photo of Mechatronics (mMS) Lab.

mMS

Figure.5.   Mechatronic (mMS) Trainer kit

Photo of Robotic Lab.

Robot

Figure.6.   Robotic Trainer kit

There are two drives contains a Software CD, Ethernet cable & Power cables. In this kits, participants can do demo experiments.

Photo of Drive.

Drive

Figure.7.   Drive kit

These entire kits combine together to form an Automation Lab. The participants get theoretical as well as practical knowledge of the technology involved. This lab can build Industrial circuits & testing, which can help Industrial person to test before investing any cost for Implementation.

The participants are free to work on kits, study and discuss their issues anywhere in the environment. It is unique and collaboration with Industry/Academia so helpful for Industry persons & Students from academia as it is bridging gap between Education and Industries. With the help of effective training on digital & collaborative platform, participant enhances their knowledge, skill and performance.

Software :
The software helps to simulate the entire experiment so as to understand better about the system. Simulation [10]

Benefits :
- It fills the gap between Industry & Academia.
- It improves skills of all the participants.
- It helps Industry person to know about details of technology.
- It helps Student to know about various technologies which increase his skills & stability in future.
- The audio/visual adds helps to understand better.

5. Conclusion

In this research we proposed a study of various tools for conducting Effective Training on Digital & Collaborative Platform for Industries /Academia. The system displays about the real actions of the equipment and sharing knowledge among each other.

Future work is focussed on designing advancement of training in every field and to ensure easiness, time saving & cost effective method for training on digital & collaborative Platform for Industries & Academia.

References -
1.   S. Mohan Kumar, Rajashekar Patil, and E. Abhilash, "**Enabling collaborative technologies for effective   e-learning within and**

outside   class   rooms",   ISTE Convention at PESIT, Bangalore.

2.   Project Manual, Pneumatic control technology by Bosch Rexroth AG, Didactic Maria-Theresien-Straße 23 97816 Lohr am Main, Germany.

3.   Project Manual, Electro-Pneumatic control technology by Bosch Rexroth AG Didactic Maria-Theresien-Straße 23 97816 Lohr am Main, Germany.

4.   Dipl Ing Rolf Balla , The Pneumatic Trainer Vol 2 Bosch Rexroth AG Didactic Maria-Theresien-Straße 23 97816 Lohr am Main, Germany.

5.   PLC Programming with Rexroth IndraLogic 1.0   published by Bosch Rexroth AG P.O. Box 11 62 • D-64701 Erbach.

6.   Rexroth IndraControl L20, Bosch Rexroth AG, Bgm. Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main.

7.   Rexroth IndraLogic L20, System Description,Bosch Rexroth AG, Bgm.-Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main.

8.   Training System Sensorics Basic, Bosch Rexroth AG, Bgm. Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main

9.   Mechatronics Theory and Applications, Bosch Rexroth AG, Bgm. Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main

10.   Trainer Manual Mechatronics, Bosch Rexroth AG, Bgm. Dr.-Nebel-Str. 2 • D-97816 Lohr a. Main

11.   Simulation Software for Designing Circuits, Fluidsim P By Festo Controls, Germany.