Automation that Reduce Human Intervention Processes

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Introduction

Automation describes a wide range of technologies that reduce human intervention in processes. Human intervention is reduced by predetermining decision criteria, sub process relationships, and related actions and embodying those predeterminations in machines. Automation includes the use of various equipment and control systems such as machinery, processes in factories, boilers, and heat-treating ovens, switching on telephone networks, steering, and stabilization of ships, aircraft, and other applications and vehicles with reduced human intervention. Automation covers applications ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input measurements and output control signals [1]. Automation has also found space in the banking sector. In control complexity, it can range from simple on-off control to multi-variable high-level algorithms.

Description

In the simplest type of an automatic control loop, a controller compares a measured value of a process with a desired set value and processes the resulting error signal to change some input to the process, in such a way that the process stays at its set point despite disturbances. This closed-loop control is an application of negative feedback to a system. The mathematical basis of control theory was begun in the 18th century and advanced rapidly in the 20th. Automation has been achieved by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices, and computers, usually in combination. Complicated systems, such as modern factories, airplanes, and ships typically use all these combined techniques [2]. The benefit of automation includes labour savings, reducing waste, savings in electricity costs, savings in material costs, and improvements to quality, accuracy, and precision.

The World Bank's World Development Report 2019 shows evidence that the new industries and jobs in the technology sector outweigh the economic effects of workers being displaced by automation. Job losses and downward mobility blamed on Automation has been cited as one of many factors in the resurgence of nationalist, protectionist and populist politics in the US, UK and France, among other countries since the 2010s [3].

The term automation, inspired by the earlier word automatic, was not widely used before 1947, when Ford established an automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s. Industrial robotics is a sub-branch in industrial automation that aids in various manufacturing processes. Such manufacturing processes include machining, welding, painting, assembling and material handling to name a few. Industrial robots use various mechanical, electrical as well as software systems to allow for high precision, accuracy and speed that far exceed any human performance [4].

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The birth of industrial robots came shortly after World War II as the United States saw the need for a quicker way to produce industrial and consumer goods. Servos, digital logic and solid-state electronics allowed engineers to build better and faster systems and over time these systems were improved and revised to the point where a single robot is capable of running 24 hours a day with little or no maintenance. In 1997, there were 700,000 industrial robots in use; the number has risen to 1.8 M in 2017. In recent years, Artificial Intelligence (AI) with robotics is also used in creating an automatic labelling solution, using robotic arms as the automatic label applicator, and AI for learning and detecting the products to be labelled [5].

Programmable logic controllers

Industrial automation incorporates programmable logic controllers in the manufacturing process. Programmable Logic Controllers (PLCs) use a processing system which allows for variation of controls of inputs and outputs using simple programming. PLCs make use of programmable memory, storing instructions and functions like logic, sequencing, timing, counting, etc. Using a logic-based language, a PLC can receive a variety of inputs and return a variety of logical outputs, the input devices being sensors and output devices being motors, valves, etc.

PLCs are similar to computers, however, while computers are optimized for calculations, PLCs are optimized for control tasks and use in industrial environments. They are built so that only basic logic-based programming knowledge is needed and to handle vibrations, high temperatures, humidity, and noise. The greatest advantage PLCs offer is their flexibility. With the same basic controllers, a PLC can operate a range of different control systems. PLCs make it unnecessary to rewire a system to change the control system. This flexibility leads to a cost-effective system for complex and varied control systems. PLCs can range from small "building brick" devices with tens of I/O in housing integral with the processor, to large rack-mounted modular devices with a count of thousands of I/O, and which are often networked to other PLC and SCADA systems.

Agent-assisted automation

Agent-assisted automation refers to automation used by call centre agents to handle customer inquiries. The key benefit of agent-assisted automation is compliance and error-proofing. Agents are sometimes not fully trained or they forget or ignore key steps in the process. The use of automation ensures that what is supposed to happen on the call actually does, every time. There are two basic types: desktop automation and automated voice solutions.

Conclusion

Desktop automation refers to software programming that makes it easier for the call centre agent to work across multiple desktop tools. The automation would take the information entered into one tool and populate it across the others so it did not have to be entered more than once, for example. Automated voice solutions allow the agents to remain on the line while disclosures and other important information is provided to customers in the form of pre-recorded audio files. Specialized applications of these automated voice solutions enable the agents to process credit cards without ever seeing or hearing the credit card numbers or CVV codes.

References

1.   Towsyfyan, Hossein, Ander Biguri, Richard Boardman, and Thomas Blumensath.

"Successes and challenges in non-destructive testing of aircraft composite structures." *Chin J Aeronaut* 33 (2020): 771-791.

2. Hossain, Riad, and Nafiz Ahmed Chisty. "Design and implementation of a wall climbing robot." *Int J Comput Appl* 179 (2018): 13.

3. Zhao, Yanzheng, Zhuang Fu, Qixin Cao, and Yan Wang. "Development and applications of wall-climbing robots with a single suction cup." *Robotica* 22 (2004): 643-648.

4. Zhu, Jian, Dong Sun, and S. Tso. "Development of tracked climbing robot." *Intel Robot Syst* 35 (2002): 427-443.

5. Kim, Hwang, Dongmok Kim, Hojoon Yang, and Kyouhee Lee. "Development of a wall-climbing robot using a tracked wheel mechanism." *J Mech Sci Technol* 22 (2018): 1490-1498.

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