

# **AUTOMATION**

*Its Impact On Our Lives*

By

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## AUTOMATION – *Its Impact on our Lives*

*“Automation is the use of controlled systems such as computers to control industrial machinery and processes, replacing human operators [1].”*

The term ‘automation’ translates to ‘self-dictating’ in ancient Greek. It refers to any process or function which is self-driven and reduces, then eventually eliminates the need for human intervention.

I focus on the 21<sup>st</sup> century interpretation alluded to in italics above when the art of automation is no longer confined to manufacturing industries but has seeped into every aspect of our daily living. My essay will specifically focus on the viewpoint that modern automation equals computers performing tasks which were previously managed by humans. Ever since their first appearance during World War II decoding of secret messages, computers have *“significantly exceeded human mental dexterity in their ability to remember and process information ([2], pg3).”* This is the computer age and *“microprocessors are now in hundreds of millions of appliances and devices ([3], pg3).”* Computers are built into ATM machines, microwave-ovens, automobile ignition systems, medical instruments, cash registers at supermarkets, cell phones, industrial equipments, manufacturing factories, security mechanisms at residences, etc.

Thus our surroundings are populated with controlled systems that are a step higher than mechanization. Automation does not assist, but replaces human operators. One such example is the Automated Teller Machine, which enables us to check our account balance, withdraw cash, or make any such banking transactions at any time of day or night, even in the middle of nowhere. As Sara Baase tells us in her book ‘A Gift of Fire’ ([3], pg4), *“the automation of the most common teller functions led to a decline in employment for bank tellers.”* The number declined from 480,000 people in 1983 to 301,000 tellers in 1993 in the United States [4].

*“Why, here’s a change indeed in the commonwealth! What shall become of me? ([5])”*

Displacement of jobs is merely one of the impacts of automation. Substitution of human labor and skill with computing machinery sways economic stability (increased productivity, focus shift of highest paying jobs, unemployment) educational policies (vocational training, new skills set), government rules and regulations (safety issues i.e. result of automated systems malfunction), cultural environment (theme of entertainment mediums like books and films). Thus change is inevitable and the impact of automation on our lives is undeniable. This leads to the question asked by Shakespeare’s *Mistress Overdone* in the above quote. The purpose of this paper is to examine the current trends and consequences of automated systems so that we can better prepare ourselves for an automated future. After all, as Ray Kurzweil puts it ([2], pg253), *“We still have the power to shape our future technology, and our future lives.”*

Before predicting the future and over viewing the present, it is essential to recount the past. Following in a brief overview of the development of automated systems, I will describe how it has changed our way of living. This will be illustrated with two case studies namely textile industry and libraries. Another section will be devoted to the societal responses to this change and what we can expect in the future. I will then conclude with options the future holds for us.

Recorded history dates the emergence of *Homo sapiens* to 500,000 years ago. They are distinguished by their ability to create tools, their innovation in a record of tool making, and a progression in the sophistication of tools. These tools or devices originated as a means to simplify and improve task performance by substituting one form of effort with another. Simple machines like pulleys were invented to aid manpower in drawing water from a well. This was followed by replacement of one

form of energy with another when windmills and wind power pulled water from wells instead of human energy. Technology evolved further and mechanisms were invented to tap into artificial sources of energy like channelled flowing water. Thus by the middle of the 20<sup>th</sup> century, small scale automation existed using simple mechanical devices for manufacturing processes. In the mid 1900s manual pumps were being used to suck up water from underground. Innovation and technology climbed another step and modern automation developed with the evolution of the digital computer in the sixties. Where once sinuous muscles raised a bucket of water from a deep well, there are automatic pumps which transport water with the mere flick of a switch. Robotic arms found use in industries for assembling equipment.

The evolving programmability and adaptability of computer technology allows it to drive any sort of task. Sara Baase ([3], pg25) reports that although automation in manufacturing (example – Jacquard’s Loom in 1801) began long ago, “*computers have added to the capabilities and flexibility of automated systems.*” Many factories and warehouses now use computer-controlled automation. An example is the 1987 automated warehouse system implemented by a southern California supermarket chain. This sophisticated technology managed retrieval of goods by automatic cranes, repaired faulty and malfunctioning cranes, improved stock management, and reduced land usage and property costs. Combining the processing speed and storage capacity of microprocessors with the pre-existing robotic arms and devices has also birthed automation in our homes and offices. Note that I have classified the personal computer as automation because what it processes was once performed by human beings with their bare hands.

The following table illustrates random instances of how automation has changed our lives.

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<b>THE OLD WAY</b>	<b>THE AUTOMATED WAY</b>
Records and data stored in binders and files and manual access	Storage in compact discs, hard drives enabling speedier automatic retrieval
Not able to fill gas tanks if the station is closed or the attendant is absent	Card readers and sensors have enabled automated gas pumps
Washing dirty dishes in sink by soaking them in soap water	Dishwasher with no human intervention except loading and unloading
Copying by hand useful text from books	Photocopying, scanning, printing
Manual labour to assemble automobiles	Robotic arms and cranes for machine assembly
Climbing stairs in skyscrapers	Elevators and escalators increase accessibility
Certain surgical operations were fatal and risky because of human error	Programmed surgical operations achieve precision and accuracy
Payment of Utility bills by mailing	Payment through Internet and Phones
Accidents and time loss in working in dangerous areas like mines, volcanoes or in severe climactic conditions	Motorized robots with cameras attached to them now perform these dangerous tasks, including collecting data for space travel and below the earth's surface
Researchers and librarians waited for months to order a material from another location	Online access to information has bridged distances and broadened horizons
Communication transmitted by delivery boys and post offices	E-mails, faxes, sharing of data through computer networks

Now we are in the 21<sup>st</sup> century and new technologies and applications are being produced that will change the way we work and play. I referred to several impacts of automation on society. In order to understand these in detail, I have highlighted two avenues in particular where automation has revolutionized the field. The first case study presents the development of automation within the world wide textile industry. The second brushes through automation in library reference services. While the first example is bound to have economic and social influences, the second hints to intellectual and educational progress with the digitization of information.

Industrial Revolution is one of the most wide known events in world history. The late eighteenth century movement represented the invention and widespread adoption of machines that replaced human muscles with machine power. Moreover, the truth is that the *“English textile manufacturing was the primary motivator and the main immediate beneficiary of these inventions”* and innovations ([6], pg4). The result of inventions like the automated loom (invented by Joseph Jacquard using punch cards to control weaving of patterns in the fabric) was the manufacture of textile products that started a long process of ever-improving worker productivity. There were certainly issues raised at the time of workers displaced by machines leading to unemployment. This issue is one of the prime concerns of any automation project.

John Diebold candidly points out the dilemma of automation ([7], pg2). He says that automation is *“just more of the kind of stuff which creates more and better jobs all the time”* and is *“not essentially different from the process of improving methods of production”* which has been going on throughout human history. To all intents and purposes, automation implies a basic change in our attitude toward the manner of performing work.

David Pearl, President of Gerber Garment Technology Inc. delivered a speech in 1984 ([6], pg9) suggesting that the “*purpose of automation in apparel industry is not the mere replacement of human labour*” but rather the improvement of product marketability and production efficiency. This in turn leads to generation of more income by reducing unit costs, and supplying the increased demand by automated optimal management of income and expenditure balance. It seems to me that the gain in income brought over by automated manufacture should neutralize the issue of unemployment caused by automated machines.

The development of new technologies like automation, robotics, and information transfer has strengthened the production innovation in textiles. Some examples are robotic technologies for package doffing and transport in the fibre industry, computer-aided design and manufacturing of textiles, integrated information flow throughout an apparel plant via computer networks, quality control monitoring of yarn production, automated weaving, automated manpower scheduling, and artificial intelligence expert systems to assist in troubleshooting looms. Largely, “*computer integrated manufacturing*” ([6], pg31) achieves management goals and increased productivity to counterbalance stiff competition in the textile industry.

The manufacturing environment ([6], pg 38) in the 21<sup>st</sup> century is characterized by rapidly changing markets with worldwide competition when it is no longer enough to be the low cost producer; it is necessary to differentiate by quality, reliability and responsiveness. Thus automation plants have become an essential component of the textile and apparel industry.

We now take a brief glimpse through the information environment, the second case study. The effects of automation ([7], pg-xi) continue to sweep over information

resources and institutions, “*changing forever the ways and means by which information is collected, connected, stored, retrieved and used.*”

Online Public Access Catalogue (OPAC) ([7], pg13) is an ever-expanding opportunity, a new epoch in information retrieval. A computerized catalogue transforms the whole concept of location. Intellect the world over expands and increases by automated access to information. Efforts are also being made to design “*natural language interfaces*” ([7], pg 100) as potential reference automation. The automation of information manipulation in terms of storage, classification, retrieval, and integration into intellectual activity is only a few decades old. One wave of progress is how discrete resource entities of the traditional library find themselves interconnected through computer networks.

The changing nature of work is evident as automation continues to be implemented in other fields besides textiles and library services. Sara Baase says ([3], pg329) “*telework*” and “*telecommuting*” have become part of our vocabulary, describing the phenomenon of working at a distance from the traditional static office, connected by computers and automation.

As we prepare ourselves for an automated future, which is accelerating toward us ([2], pg 32 – “*Law of Accelerating Returns*”), we consider how computerized systems have a “*profound impact on work*”. They have eliminated jobs and created new ones in place. Repetitious, boring nature of tasks are being replaced with creative, dynamic ([3], pg329) jobs. For example, architects now design buildings on computer aided design first; accountants have more time for thinking, planning and analysis by using spreadsheets.

Automation is inevitable. However, the depths to which we accept it is up to us. Currently we use computers to automate our tasks. But will there come a time

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when computers will be automated sufficiently to think and do the tasks. Does the future of automation hold computers thinking and not just doing without human intervention?

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