

Science & Tech. The Nation

Technology has made more progress in the last thirty years than in the last 5000 years. The present boom in technology is the spin-off of developments in space technology. In order to reduce the payload of space modules the scientists placed reliance on the increased efficiency of the miniaturised components. It led to phenomenal developments in technology. It is said that only 10 percent of the technological developments of the space era since before 1958 have so far been commercially exploited. This in itself is quite a revolution in terms of lowering of costs and enhancement of human comfort. Can we imagine the revolution in our life times when the remaining 90 percent of the reserved technological developments are thrown open for public use?

It is not possible, at present, to fully perceive the impact of future technologies on the life style and the quality of human life. The first radios that were marketed in 1940s were the size of medium sized refrigerators of today, with large sized vacuum tubes as its main functional parts. They were in fact ungainly unmanageable gadgets indeed. Gradually the transistor took over and one transistor was the equivalent of 1700 Vacuum Tubes. Transistors were replaced with Printed Circuit Boards and then by Integrated Circuits with the capacity of more than 2000 transistors. Now the transmitters and receivers, with higher efficiency and better performance, thanks to the developments in technology are available in the size of lapel buttons at much lesser cost.

We all realise the importance of science and technology in our daily lives. Both influence the life style and quality of life of every one living on this globe both in terms of comfort and cost. The odium of devastating effect of the weapons of mass destruction, the bane of humanity, is at present not the subject matter of this article.

Science is not exactly the same thing as technology. But both are mainly dependent on research. Let us also say that science and technology are inseparably inter-dependant technology is direct application of pure science. Pure science provides the basis for technology and in turn technology facilitates and promotes pure science through technologically improved tools of analysis.

We understand that advancement of technology is not just a scientific process where scientists in white coats invent something, which after a while, ends up in home or office.

'A long way

GULZAR AHMAD QURESHI says that rapid advances of technology are making us wondering about our future and continuous changes to improve ever-growing expectations for quality and comfort are cost



MAN AT WORK: Finding solutions to complex computer problems

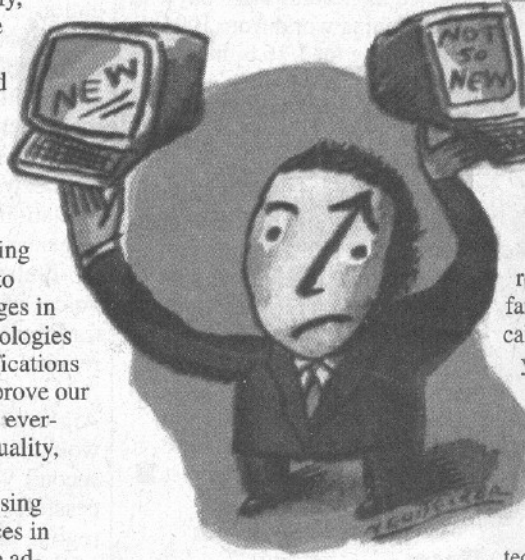
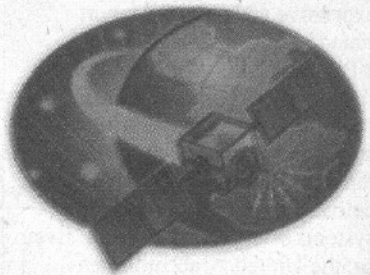
The process is immensely complex. It is an inter-action between the direction in which the research is pushed, the price of a particular technology, and its suitability to the changing needs and wants of the society.

The science and technology, therefore, serve humanity severally and jointly. Both, in the ultimate analysis, affect qualitatively, improve visibly, and make existence more viable and liveable through direct and indirect applications in Agriculture, Industry, Health Care, Education and Housing.

The rapid advances of technology leave us guessing about the shape of things to come. Yet important changes in some of the existing technologies and their commercial applications continuously alter and improve our environment and meet our ever-growing expectations of quality, cost and comfort.

In certain areas, say housing there have been no advances in Technology. In most of the advanced societies of Europe and America, though the houses have been better insulated and elaborately equipped yet the basic home has hardly changed in almost last 200 years. Few modern homes in US will be more practical and comfortable than the ones built in the 19th Century. Today the most prized homes in London are Georgian. Similarly the most expensive apartments in Paris are those that were built in 19th Century.

The standard path of technological advancement is to develop technology to perform different functions from the ones that were originally intended. The steam engine developed for pumping water out of mines, later revolutionised land and sea transport.



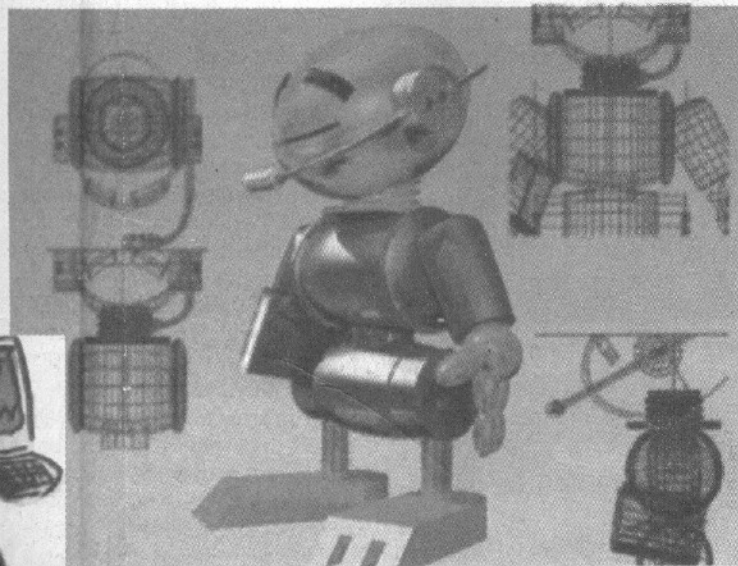
Steam turbines developed for ship engines are extensively used in generating electricity. PCs originally designed for home use, have with rapid change in technology ousted the mainframes from the offices. The video camera first developed for television industry has now become an important tool for security.

In other areas the technological advances have been incremental making available to the ordinary people what has been the privilege of the rich in the past. The air travel time in 2002 by a Boeing 747 is practically the same as by a Boeing 707 in 1960. But the comfort has increased and the real cost has decreased. Similarly the real cost (in terms of constant costs) of a motorcar has also fallen.

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The incremental advance in this case also means that the comfort and performance of an ordinary car in 1990, is similar to and in fact better than a luxury car of 1960. Thanks to incremental advances in technology that consumer durable that were available in 1960 to US wealthy homes are now within



A VISIBLE ADVANCE: From man to robot

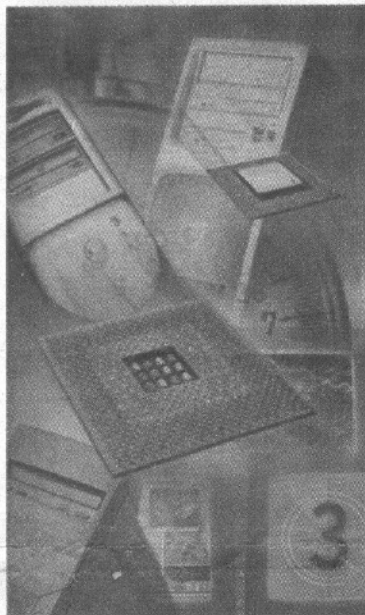
reach of every middle-income family in 2002. The technologically advanced Concorde now puts you ahead of time across the Atlantic. You miss your breakfast in Paris and traveling by Concorde you reach ahead of time for breakfast in New York on the same day.

Likewise radical advances in technology have dramatically reduced the cost of services and brought these familiar services to ordinary homes. In the pre 1960 era an international transatlantic telephone call was a luxury and the privilege of the few being expensive. Now in 2002 it is a standard facility at a nominal cost and is an affordable facility for every body. The users of Internet can establish contact abroad specially USA at practically no cost. The Chat on Internet and Chat in voice mode are the examples.

Bulky computer main frames were in use till 1970s only by large companies, and defence establishments. The prohibitive cost excluded the medium and small industrial units and commercial establishments. In the pre 1970 era a main frame IBM Comp

would cost about Seven Millions. Its RAM (Random Access Memory) was only 64 KB (1000 bytes) and storage capacity (hard Disk Drive) was also in a few megabytes (a million bytes)-a very capacity indeed by today's standards.

Now the personal computers with several times the computing power and phenomenally large storage capacity, in very manageable small sizes, at unbelievably low cost are within the reach of households, young students and even small children. Now an ordinary PC has a RAM of 512 MB (million bytes), a storage capacity of 40 GB (Billion Bytes) or more. It is expected to be in terabytes (Trillion bytes) in a few



PENTIUM 4: Boon or Bust? months. Processor speeds of 1 G Hertz (one billion Hertz) are common. The cost has phenomenally gone down to around R 70,000 or so.

FAX Machines in pre 1960 era were bulky, rare, and expensive. Thanks to the technology and use of IC's around 1958 they are now lighter in weight, are cheaper and

have moved into an average home.

Technology has opened new vistas of opportunities in food retailing business. Bar coding and electronic tills have revolutionised the business by providing instant information on the items sold from various outlets. The sale point technology in advanced countries like Japan has greatly contributed to the efficiency in this sector. The application of this technology in Food Retailing business has transformed the habits and culture of people in Japan and America. Thanks to technology the fresh. As a result a chain of small stores (due to expensive space in Japan) have come up in large numbers that thrive on efficiency and high responsiveness. It has been made possible now by quick transmission of precise sales information to warehouses.

Business circles in USA nominated a Pakistani in LA in 1997 as a businessman of the year. He achieved his record retail sales of several hundred million Dollars, at zero inventories. It is innovative and at the same times quite a feat. Development of technology or efficient use of it is not specific to any nation or any ethnic group.

The electronic calculator with four simple functions cost me PS 6000 in 1972. Now very advanced calculators with elaborate scientific functions thanks to technology development can be purchased for less than RS 1000/.

Flashlight batteries in large sizes with a few hours of life have now been replaced with tiny Lithium ion batteries with a life of more than five years in watches and ten years in Cardiac pace makers. Some of us must have experienced the expensive mechanical watches like Rado, Rolex, Cartier, Longines and Roamer. They are good pieces of jewellery and a status symbols in the society. But most of them are not good timepieces in terms of accuracy. Compared to these, the cheap digital watches are more accurate and more reliable in keeping time-obviously due to the superior edge of technology.

The under water tunnel in English Channel has completely replaced the ferries and has permitted high volumes of traffic flows between England and France

Although some persons ventured to forecast some advances in technology on the basis of erroneous presumptions, yet the desired technological advances could not be achieved actually. The case in point is the failure of technology, so far, to develop a practical cheaper way of storing solar energy or electric power. This has frustrated the plans to storm the market with Electric Cars, to reduce

pollution, and to take over from petrol and diesel cars. Similarly noise and cost problems have so far prevented the development of vertical take off airliners for city-centre-to-city-centre air traffic.

Technology advances in Pakistan are a few. We have even for our industrial growth and development depended on import of Machines and expertise. We largely produce consumer goods. We have neither the will nor the ability to advance in technology. Machines of pre partition days, early fifties, sixties and so on are still in evidence in the country. This is demonstrative of our could not care less attitude towards innovation and technology. So long as a machine is running and producing there is, no express desire or intention on the part of our entrepreneurs, to improve the technology or the marketable products.

The circumstances in Pakistan are not conducive to innovation in technology. With a given set of user or product specific machines what innovation can be made in the production of consumer goods. Unless we start producing the manufacturing machines at large scale in the country we can hardly be innovative. We should machines at large scale in the country we can hardly be innovative. We should produce basic materials, chemicals, and other metallurgical materials to permit innovation. Producing consumer goods with the help of imported machinery and exporting agricultural produce is the least friendly situation for innovative technology.

In the world of today what matters is not where the technology is developed, but how effectively technology is applied. Phillips developed products like the Cassettes and in Holland. Micro-chips are the contribution of USA. Japan made the best use of the products more aggressively. Japanese tape recorders and digital watches are the case in point. From imitation technology the Japanese have become the leaders in technology in electronics, watches, cameras air conditioners, cars and a myriad other products. Japan is now a symbol of quality as against the rest of the world.

This is one strong reason for introspection and to judge where we stand in the world of today. We, therefore, need to review early our development strategy to meet the global challenges that we face today. ■

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