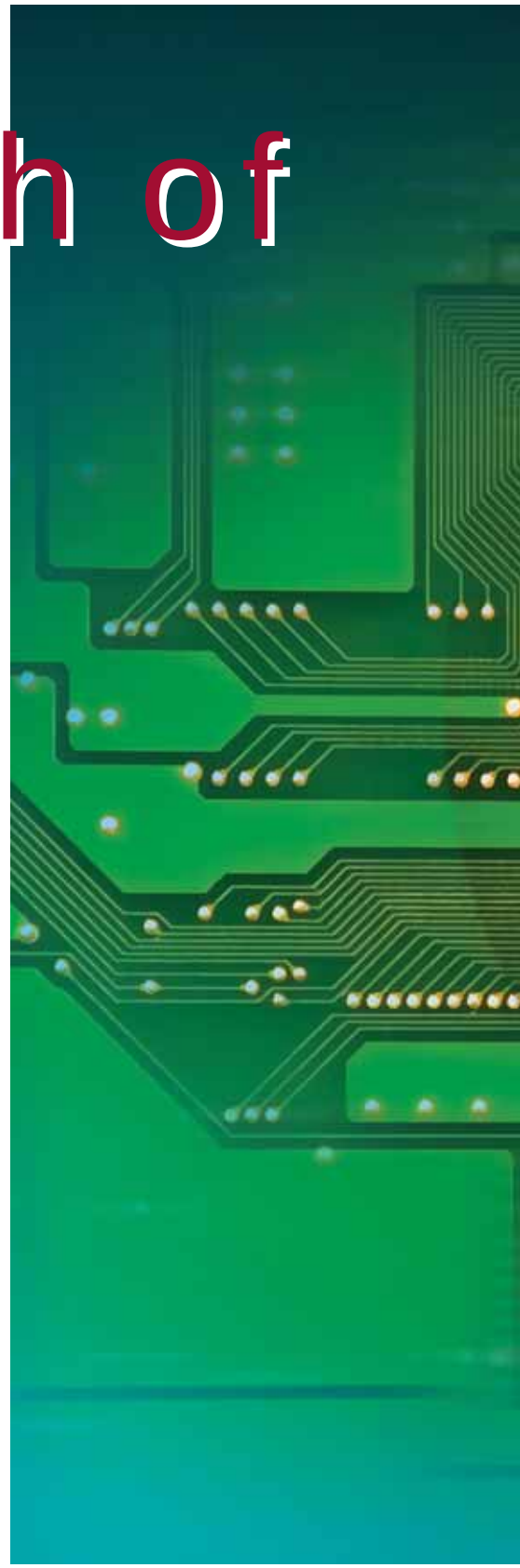
INDIA: On the Path of Innovation



India has emerged as a high-tech economy, manufacturing state-of-the-art products, mastering cutting-edge technologies and processes, and providing a plethora of up-market services for clients spread across the globe. **Shivkamal** takes a look at the innovativeness that is driving this change

When Discovery Channel recently aired the 'Daily Planet Goes to India', it not only showcased to the world India's growing prowess as a centre for innovation, but also brought to focus the innovative products from the country's research and development stable. The series focused on both grassroots and top-end innovation.

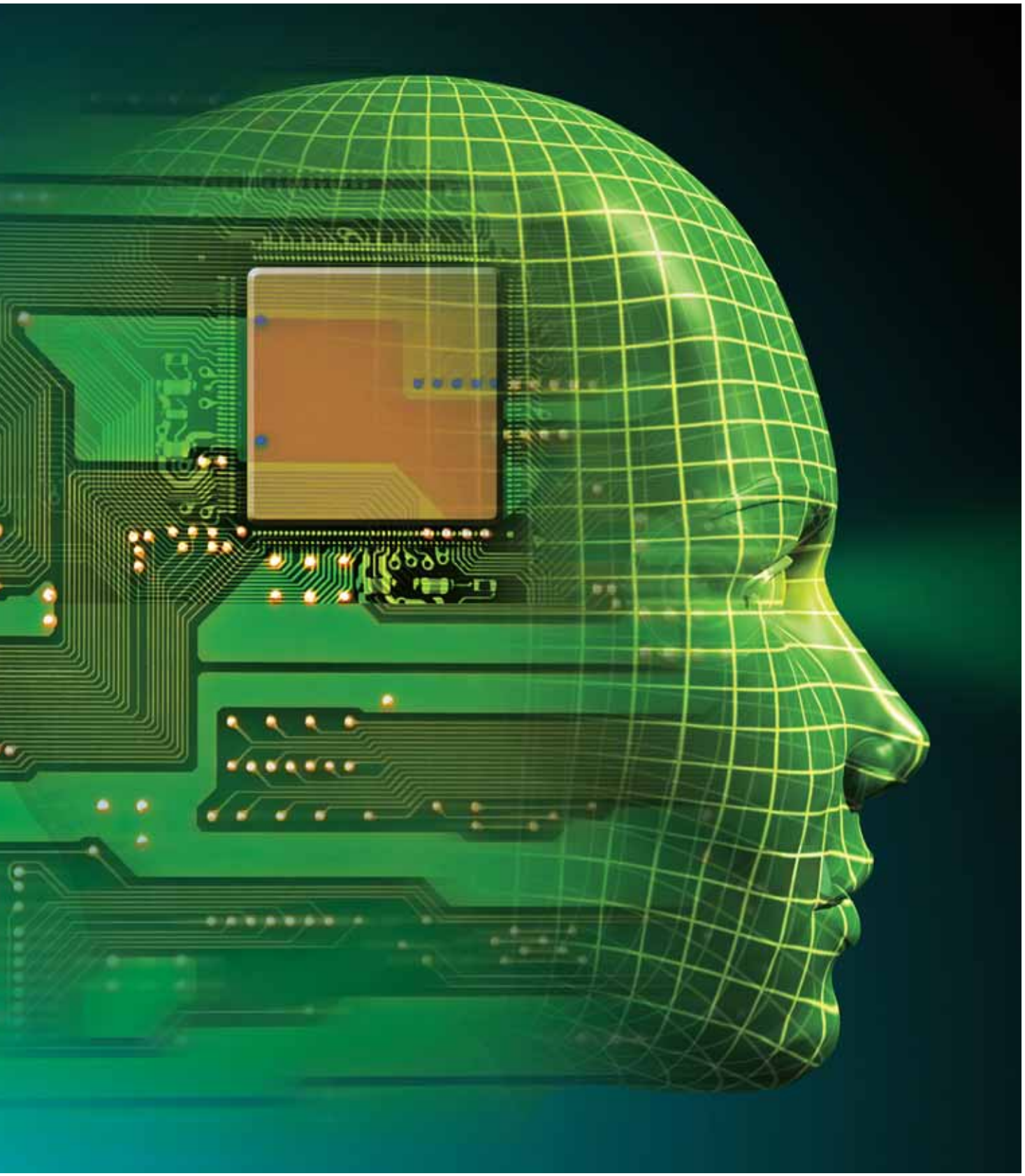
Indians have been innovators since the beginning of civilisation. Experts attribute the growth of India's innovation quotient to various factors, including the innate abilities of its people, the vast opportunities that are available in the country, and the role played by the government in promoting indigenous and products.

Indian history is replete with innovations and scientists and mathematicians including Aryabhatta, Bhaskara, Lagadha, Baudhayana, Panini, Madhava, Nilakanta and Pingala have shaped human thought through their innovative work. Lagadha authored the first astronomical text in 1300 BC. Similarly, Baudhayana is supposed to have proposed the 'Pythagoras Theorem' in 800 BC much before the Greek mathematician. The greatest contribution of ancient India is through Pingala, who in 400 BC invented the binary numerical system, which incidentally now happens to the basis for all computing devices.

Cut to the present: information technology (IT) giant Hewlett Packard (HP) chose Bangalore, India's Silicon Valley, to produce the next generation of products for the world market. Incidentally, a majority of the researchers in HP's lab are Indians. Microsoft selected Hyderabad to locate its research lab, which is developing software for local languages around the world, including Indian languages.

It is not just IT sector though. A number of traditional industries are relocating their R&D facilities to India because of the immense talent. For instance, energy major Royal Shell Group, has its second largest R&D centre – Shell Technology Centre – in Bangalore, a testimony to India's innovation power.

At HP's research centre, a team is working on a product called Script Mail, a device, which makes electronic communication easier for people, who speak languages that cannot be typed on a



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CONSTRUCTION FEAT: The Delhi Metro, built within a record time, has been a huge success

standard keyboard. It contains a pad with a small monitor attached to it. A user has to position a piece of paper on the pad and write in any language with an electronic pen. Script Mail immediately recognises the language and the words written are displayed on the monitor. This device eliminates the role of the keyboard.

It is not just foreign multinationals, which have encashed on India's innovation capabilities, a number of local research institutes have led from the front. The Indian Institute of Technology (IIT) – Mumbai, has developed a 'compact media centre' for schools, which do not have adequate computer equipment.

It puts a range of home entertainment systems and a personal computer into a single black box of about one cubic foot in volume. It has a 120 gigabyte hard disk, a Pentium 4 processor, a modem, a hard disk, a DVD drive, USB ports to connect external devices and a television tuner. It is a television and a personal computer rolled into one, but it does not have a monitor. The black box contains a projector with SVGA resolution, which can beam a 300 inch high image sharply on the wall.

The device, consisting of a wireless keyboard and a mouse, is now being marketed to educational institutions under the brand name 'K-yan' by Infrastructure Leasing and Financial Services of India. Priced at $3,200 per unit, a single 'K-yan' can tutor a large classroom of nearly 100 students in schools, which cannot afford multiple personal computers.

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The Hyderabad-based Institute of Information Technology is also attempting some thing new. It is developing software that translates English into Indian languages. Termed 'Shakti', the software has the power to translate English prose into three Indian languages – Hindi, Marathi and Telugu. Work is on to develop the software to recognise other languages.

Even in the medical field, India is spearheading innovation. The Aravind Eye Care Centre in Madurai, has developed an inexpensive cataract surgery method. Designed by an ophthalmologist, G Venkataswamy, the Centre can carry out a cataract surgery from as low as $50 to $300, compared with over $2,000 in the US. The price even includes the cost of a locally made intraocular lens, inserted during the surgery to restore sight. The hospital has taken up manufacturing of the lens for just $5 each when compared to $50 that it paid a US firm for lenses approved by the Unites States Food & Drug Administration.

One of the earliest contemporary innovations from India that has made worldwide impact is the prosthetic feet called Jaipur Foot. Made from rubberised material and more flexible than many standard prosthetic feet available in the US, Jaipur Foot is available for just $30 when compared to $250 to $1,500 in the international market.

The Jaipur Foot is suitable for long periods of immersion in water – essential for Indian farmers, who stand barefoot in the rice fields for hours together. The Jaipur Foot was not an innovation by any renowned Indian scientist, but by a temple sculptor called Ram Chandra. He had noticed that patients in cities had trouble using imported artificial limbs, which could not accommodate Indian postures like squatting. He developed the artificial limb way back in 1960s. Now, it is exported to countries like Afghanistan and Rwanda. The cost of the Jaipur Foot is set to come down further – to $27 – with the Indian Space Research Organisation stepping in to provide polyurethane, a light weight material, used for making rocket propellant.

Research institutes are also coming out with innovative products to improve the life of masses in rural India where the bulk of the population is concentrated. The Media Asia Lab is pioneering research to reach out to villages lacking telecommunication facilities. At present, the lab is working on a Wi-Fi enabled computing device to carry voice from remote regions to the other parts of Uttar Pradesh.

Another innovation is by the Hyderabad-based International Advanced Research Centre for Metallurgy and New Materials. It has developed filter candles coated with silver nano materials, which reduce the organic impurities in water. These nano material-based filter candles are an example of how high-end research and innovation in technology, filters down

AN INDIAN LAPTOP FOR $100

It seems Indian innovators have a penchant for computing devices. The Indian government has embarked on an ambitious project to develop a sub-$100 laptop for the masses. The Union Human Resources Development Ministry is working with a group of experts from the Indian Institutes of Technology (IITs), the Indian Institute of Science (IISc), and the Vellore Institute of Technology (VIT) to evolve this low cost laptop.

The ministry has also approached the Chandigarh Semiconductor Complex Ltd to manufacture chips required to power the low cost laptop. The aim is to at least get the manufacturing cost reduced to the maximum possible extent since marketing costs will not be involved.

The government is of the view that low-cost PCs/laptops can be successful only if they have huge volumes. In terms of the technology the laptops will certainly be the scaled-down versions of what is available in the market. Instead of a hard disc for storage, these laptops might use flash memory of 2 GB. The motherboard will be one-fourth the size of what is available in the market. Due to this, the cost will come down considerably. Flash memory is quite popular in devices like USB drives as it does not need power to maintain the information stored in the chip, is durable and resistant and most importantly cheaper than the storage devices used in computers.

The laptop will have an operating system (most probably Linux) and support all Word-related applications, a web browser and MP3 capability. Currently, testing of boards have started and people involved in the project are certain that over the next few months they would also finalise on the components of the laptop and the layout of the motherboard. While the government in working on this model, Chennai-based Novatium has come up with a PC solution that costs about $100. The computer is thin-client based, that means a small box is used to connect to a remote server, which has all the applications such as Word and Excel and can be accessed easily. The user will have a screen, keyboard, mouse and a box slightly bigger than a modem for connectivity speed of 512 Kbps. After a pilot run in Chennai, the company is now launching it on a commercial basis in Delhi and Chandigarh.

A Bangalore-based firm has already made a mark at the international level with its innovative hand-held computer called 'Simputer'. Conceptualised at the IISc, Bangalore, this 'simple and low-cost' computing device made it from the drawing boards to the production stage in 2002. It was developed by Encore Software, one of the teams working to commercialise the 'simputer,' and make it relevant to the millions on the wrong side of the digital divide, kept out by the high cost of computers. Each Simputer, which sits comfortably in an adult's hand, uses a 'smart card' device. This could be used for micro-banking applications to help the common man. A 'soft modem' would enable the Simputer to dial-up to a centralised server (and download relevant information like vegetable prices) or even to the Internet.

Priced at around $200, the Simputer is versatile and inexpensive. This innovation could drastically change the way in which the common man does his computing. There has been growing interest, from countries like Cuba and the Philippines, for this product designed by a team of computer scientists at the IISc. The Simputer does not have a keyboard, and data can be fed-into it through a stylus and a system called tap-a-tap devised by the Bangalore scientists. It is based entirely on free software. It will be useful for the average Indian's educational, communication and entertainment needs.

One need not be literate to use a Simputer. Its text-to-voice facility means it can read out — in selective languages — an electronic-mail message that the person receives. Simputers could be used to book train tickets — or even to communicate with a 'tahsildar' (a rural village official); send out e-mail and voice-mail; undertake micro banking operations; or even for promoting education and literacy.

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JAIPUR FOOT: Exported to several countries

the benefits to the people to provide cost effective solutions.

But it is not just in products alone. Many Indians, without any formal training in business schools, have developed innovative processes.

There are a number of other highly successful indigenous products developed by India. They include the $200 suitcase-size voting machine; Skybus (suspended coach transportation system) and a train anti-collision device by Konkan Railway Corporation; construction feats such as the Delhi Metro Rail and the Bandra-Worli Sea link project under construction in Mumbai.

With an army of talented scientists, engineers, technologists and even graduates, well-versed in science, mathematics and English, India has an enormous pool of skilled researchers and qualified personnel, who will ensure the continued flow of innovative products and services over the coming years.