ROBOTS & AUTOMATION

By Prof SK Saha,
Prof Santanu Chaudhary and
Manish Chauhan

The writers belong to IIT, Delhi

Today Robotics and Automation has emerged as a key technology component for industrial growth, management of hazardous scenarios and improvement of the quality of life. There is almost no task which can be imagined without automation. The idea of automatic robots, performing day to day repeated activities with accurate ease and intelligence is unique. The essence of Robotics and Automation has seeped into the awareness of people in general and this can be clearly understood by studying the research and development activities being carried out in the defence industry, in healthcare, in industry automation and of course as domestic helps.

India is a huge country with diverse technological needs. Various organizations, research laboratories and startups have addressed these technological needs. Consequently, we do not always have a clear picture about the scale of growth, the market size and pulse of the nation. In order to have clarity regarding the above-mentioned points, robotic activities in India can be broadly classified as follows:

(1) Academic Research Laboratories
(2) Government Research Laboratories
(3) Industry Research Laboratory
(4) Professional Organizations
(5) Robot Manufacturers
(6) Software Organizations
(7) Healthcare Robotics
(8) Defence Robotics

While academic institutions like the IITs, the Indian Institute of Science and others have successfully disseminated the knowledge of robotics to enthusiastic students, very few have focused on the targeted application of robotic technology. One such attempt is at IIT Delhi called Programme for Autonomous Robotics which was established in 2010 in collaboration with BARC, Mumbai. About 10 faculty members and 20 M. Tech/M.S./Ph. D students from the departments of Computer Science and Engineering, Electrical, and Mechanical are engaged in developing robotic technologies in the following areas: ***Immersive Virtual Environment for Robotic Applications; Formation Control with Multiple Wheeled Robots; Computer Vision Based Control of Industrial Robots;*** *Tele-manipulation of Industrial Robots.*

DEFENCE ROBOTICS

Traditionally robotics and automation (R&A) technologies have not enjoyed success in the Indian milieu, partly due to the prohibitive technological costs and the in-parallel availability of an inexpensive labor force. However, it is noteworthy that this has not been due to a shortage of scientific temper to address challenging problems or the willingness to apply the most appropriate solution. As a nation, India is witnessing rapid industrialization, with a growth rate hovering between 7% and 10% over the past decade and an eye toward the global export marketplace. In the past decade, R&A technologies have hastened the coming-of-age in India by helping speed up, simplify, and enhance the quality of various heavy industry processes. Defence

industrial applications remain a major growing area for R&A and allied control-system technologies. There are various organizations like various DRDO Labs., PARI Robotics, Robosoft Systems, Hi-Tech Robotics, Serial Innovations, KUKA Robotics, Fanuc Corporation, Idea Forge that have contributed towards the development of Defence Robotics in India.

Various robotic products have been demonstrated in the field. For example, Unmanned Aerial Vehicle (UAV) NETRA has found its place in surveillance activities for defence as well as in search and rescue missions during various calamities. NETRA a collaborative development between the Pune based Research & Development Establishments of the DRDO and Idea Forge, is a completely autonomous hovering UAV ideal for short-range missions and requires very short training time. Its intuitive point and click graphical user interface requires minimal user assistance, allowing the user to concentrate on the mission objective rather than the flying of the vehicle. Its quick deployment time and vertical take-off and landing ability expand its usage to confined areas of operation. It has been used for anti-terrorist operations, counter-insurgency in forested areas, hostage situations, border infiltration monitoring, local law enforcement operations, search and rescue operations, disaster management, aerial photography and more.

Other than various private players in the market, that have filled the technology gap with innovative products, there are various government laboratories which have done immense work in defence robotics. The Centre for Artificial Intelligence and Robotics established has research focus in the areas of Artificial Intelligence, Robotics and Control systems. It has developed a Mini ROV. Besides, R&DE Pune has developed the Daksh bomb disposal robot. There is also an unmanned surveillance vehicle from the Vehicle Research & Development Establishments, Ahmednagar. The MUNTRA-S is another unmanned tracked vehicle from the Combat Vehicle Research & Development Establishment in Chennai..

CONCLUSIONS

Clearly, robotics and automation have their due significance in the Indian mindset. This is clearly exhibited by various industrial, academic and research organizations working in the above-enlisted categories. To cater to this need, there has also been rapid growth of institutions to support the professional development and personal growth of the robotics community in India. The Robotics Society of India is one such body formed in 2011, which is mandated to develop a full set of services to support a robust robotics-ecosystem by promoting interaction between various robotics researchers in India through conferences, workshops, newsletters, training programmes and tutorials.