Robotics to Rural---*Innovative Teaching and Research Approaches*

by

Prof. S.K. Saha, Professor and Head, Dept. of Mech. Eng., IIT Delhi

Abstract

In this lecture it will be demonstrated how Robotics can help not only the hi-tech industries like space, nuclear or defence but also the rural population and industries of India by enhancing the efficiency and productivity of the processes and systems they use in their daily lives, be it an agricultural equipment or making items like beads for Tulsi (Holy Basil) malas (garlands) for living. The training to the students of colleges and schools using the robotics activities, e.g., participating in a competition, etc., can substantially enhance the joy of learning as well as the skill which not only make them industry-ready but also help them to build confidence in order to become entrepreneurs for the Start-up India and Stand-up India goal of the country.

The speaker will first introduce different projects in the Programme for Autonomous Robotics (PAR) Laboratory at IIT Delhi where more than 12 faculty members and 20 Ph. D/M.S./M. Tech students from the departments of Mechanical Eng., Electrical Eng., and Computer Sc. and Eng. have been engaged to fulfil the objectives of robotic assembly. The speaker will also explain how they have developed a working training simulator which can be used by sports personnel, stroke patients for rehabilitation, etc. A group under the guidance of the speaker has also demonstrated a human-robot-interface for primary school education. It is called SAKSHAR which can teach English and Hindi alphabets, and basic mathematics to the students of primary schools in an interactive way. Such interactive learning methodology can certainly enhance the interest of the students as well as the teachers.

The last part of the talk will focus on the experiences of the speaker in utilizing some of the robotics knowledge/technologies to rural applications. Several designs/developments based on the needs of the rural people were made under the scheme of Rural Technology Action Group (RuTAG) supported by the office of the Principle Scientific Advisor (PSA) to the Govt. of India. One example is a Bullock Driven Tractor for tilling a small farm. This can not only enhance the comfort of the farmer but also to use their animals more effectively without consuming diesel, thereby, saving the environment.

About Prof. S.K. Saha, IIT Delhi

Prof. Subir Kumar Saha, a 1983 mechanical engineering graduate from the RE College (Now NIT), Durgapur, India, completed his M. Tech from IIT Kharagpur, India, and Ph. D from McGill University, Canada. Upon completion of his Ph. D, he joined Toshiba Corporation's R&D Center in Japan in 1991. Presently, he is the Head of the Mech. Eng. Dept. at IIT Delhi. His main research contribution is the formulation of dynamics modelling using the DeNOC matrices, which led to two (RoboAnalyzer and ReDySim) software meant for industrial and walking robots, and closed-loop mechanisms. For his international contributions, he was awarded Humboldt Fellowship in 1999 by the AvH Foundation, Germany. Prof. Saha has written a text book on "Introduction to Robotics" (McGraw-Hill), and two specialized books on dynamics by Springer. His two key interests are: 1) How to make

engineering education fun through the building of robots for competitions (RoCK-BEE concept); and 2) Convert rural problems into research activities (MuDRA concept). He has completed sponsored projects worth more than Rs. 6 crores, and published more than 200 papers in reputed international journals and conference proceedings.