ROBOTICS AND ADVANCED EMBEDDED SYSTEM

Vikash Kumar,Sanoj Kumar Singh,Ankur Kumar,Varsha Singh

3rd year student ,Department of Electrical and Electonics Engineering,

Dronacharya College of Engineering,(DCE), Gurgaon ,(Haryana).

Abstract- **Recently, human-robot symbiotic systems have been studied extensively due to the increasing demand of welfare service for the aged and handicapped under the situation of decreasing of the younger generation. In the future, it will be difficult to provide help to the aged and disable persons such as taking care, nursing, informing important information, recreation, etc., by trained human. To build human-robot symbiotic society, where robots are able to support elderly or disable people, the robot should be capable of recognizing user, gesture, gaze, speech and text commands. To use gestures is a natural way for human to interact with robot. However, gestures are varying among individuals or varying from instance to instance for a given individual. The hand shape and human skin-color are different for different persons. The gesture meanings are also different in different cultures. A significant issue in building visual gesture-based human-robot interactive system is to utilize user-specific knowledge for gesture interpretation and adapt to new gestures and users over time.**

I. INTRODUCTION

Today human world is all around surrounded by automation devices. In this context, utilization of industrial robot became peculiar in the 1960s in association with computer-aided design (CAD) systems and computer-aided manufacturing (CAM) systems & characterizes the latest trends in the automation of the manufacturing process. Industrial robots are beginning to revolutionize the industry in many aspects. These robots are advanced automation systems that utilizes computer as an integral part of their control. Computers play an important role in this field. These robots do not even look or behave like human beings, but they do the work of humans. Robotics and Embedded systems are very much inter-related with each other. Robotics has become successful effectively with the use of embedded systems design. Robots are particularly useful in wide variety of industrial uses/applications such as material handling, welding, inspection, assembly etc. However, in the current research scenario, scientists are working to make a robot that can "hear", "listen", "see" and "touch" and make decisions accordingly.

1.1 Method and Sample

The particular aim of this research was to find information about robotics and embedded system of engineering students to understand.
• Basic concepts of robotics and embedded system.
• Topics involved in the robotics and advanced embedded system.

1.2 ROBOTICS AND EMBEDDED SYSTEM

The word "Robot" was coined by a Czech novelist Karel Capek (1922) in a play entitled Rassum's Universal Robots (RUR). As per Robotics Industry Association, Robot is defined as a re-programmable, multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motion for a variety of tasks.

History in world of robotics:

• In 1922, Czech author Karel Capek wrote a story called Rossum's Universal
Robots and introduced the word "Rabota"(which means worker)
• In 1954, George Devol developed the first programmable Robot.
• In 1955, Denavit and Hartenberg developed the homogenous transformation
matrices.
• In 1962, Unimation was formed, first industrial Robots appeared.
• In 1973, Cincinnati Milacron introduced the T3 model robot, which became
very popular in industry.
• In 1990, Cincinnati Milacron was acquired by ABB.

Understanding different phase of operation

A robot typically has sensors to sense its environment, particularly to make sure that
it does not hit any obstacles in its way. The robot usually has a 3-phase sequence of
operations:

 Sense - observation
 Process - analysis and planning
 Action - movement of some kind

1.3 MAJOR COMPONENTS OF ROBOT
Robots are of different shape and sizes. These are consisting of various components
such as controller, manipulator, end effector, power suppy and a means for
programming.

1.3.1 Controller

A controller is the main component of robot which coordinates all the movements or
locomotion process of the associated mechanical system. It also receives some inputs
from the surrounding atmosphere with the help of various sensors. The heart of
controller is generally a microprocessor which controls the instructions related with
input/output and monitoring devices. Motion control mechanisms consisting of
actuators, linkages, amplifiers etc. respond to the commands issued by the controller.
Movement in actuators is initiated by a set of instructions i.e. program stored in the

1.3.2 Manipulator

The manipulator is considered as the arm of robot for doing motion in a particular
direction. It can be acknowledged by method of control, power source, actuation of
the joints and several other parameters. Manipulator is generally made up of a set of
segments and joints where segments are joined together by joints to provide the robot
arm to-and-fro motion. Joints provide either linear (straight line) or rotary (circular)
movement. In human body, as muscles provide the strength to move the arms in a

particular direction, the same function is done by actuator in a robot to move its arms
according to programmed paths. An actuator is a motor or valve which converts
power into robotic movements. In this way, actuators provide two types of
movements: linear and rotary. These kinds of actuators are also used external to the
robot frame mainly to move work-pieces. Tachometer is used to calculate the speed
of device. In robotics, tachometer is used to examine the acceleration and
deceleration of robotic arm's movements.

1.3.3 End Effector

Another name for end effector is robot's hand. It is basically attached with the
manipulator for performing various tasks such as gripping, grasping, stretching,
transporting, lifting, manoeuvring, and other operations in work-piece. End effector is
considered as most important part of robotic system as it efficiency defines how well
the end effector meets the duty requirements

1.3.4 Means for programming
There must be a memory storage device for storing various movements carried by
robotic arms. For this purpose, some programming is used to trace all the movementsinto
therobot'smemory

II. CONCLUSION

According with results we consider the next conclusions:
• It is important to note that the engineering level education needs a special field of study. One of the reasons for this is that the concepts managed in this level are complex, comparing with the concepts in lower level education. The engineering students need to be able to combine and apply new and previous knowledge to solve real situations.
• today we find most robotics working for people in industries, factories, and laboratories. Robots are useful in many ways. For instant, it boost economy because business need to be effected to keep up with the industries competition.

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