

A brief report on Robotics & Automation Training at IIT Madras

Name of Event: TEQIP III Faculty Development Programme on Robotics and Automation

Date & Venue of Event: 17th to 28th February 2020

Course Content: Working and designing of robots as well automation

This Training introduced the science and engineering of mechanical manipulation in the discipline of robotics and has its applications in several classical fields. The major relevant fields are mechanics, control theory, and computer science.

Training emphasized on computational aspects of the problems throughout; for example, each chapter that is concerned predominantly with mechanics has a brief section devoted to computational considerations. Additionally, with the Training we had added MATLAB exercises.

First day was an introduction to the field of robotics. It introduces some background material, a few fundamental ideas.

Second day covered the mathematics used to describe positions and orientations in 3-space. This is extremely important material: By definition, mechanical manipulation concerns itself with moving objects (parts, tools, the robot itself) around in space. We need ways to describe these actions in a way that is easily understood and is as intuitive as possible.

Third day dealt with the geometry of mechanical manipulators. They introduce the branch of mechanical engineering known as kinematics, the study of motion without regard to the forces that cause it. In these chapters, we deal with the kinematics of manipulators, but restrict ourselves to static positioning problems.

Fourth and fifth day expanded our investigation of kinematics to velocities and static forces. We dealt for the first time with the forces and moments required to cause motion of a manipulator. This is the problem of manipulator dynamics.

Sixth day was concerned with describing motions of the manipulator in terms of trajectories through space. On next few days, many topics related to the mechanical design of a manipulator. For example, how many joints are appropriate, of what type should they be, and how should they be arranged?

On 9th and tenth day, we studied methods of controlling a manipulator (usually with a digital computer) so that it will faithfully track a desired position trajectory through space. It covers the field of active force control with a manipulator. That is, we discuss how to control the application of forces by the manipulator. This mode of control is important when the manipulator comes into contact with the environment around it, such as during the washing of a window with a sponge.

On 11th day overviewed methods of programming robots, specifically the elements needed in a robot programming system, and the particular problems associated with programming industrial robots. Last day introduces off-line simulation and programming systems, which represent the latest extension to the man—robot interface.

This training would be beneficial to our in college in exploring new advances in this field and setting up new and advanced equipments in our IAR lab.

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Signature of Participant