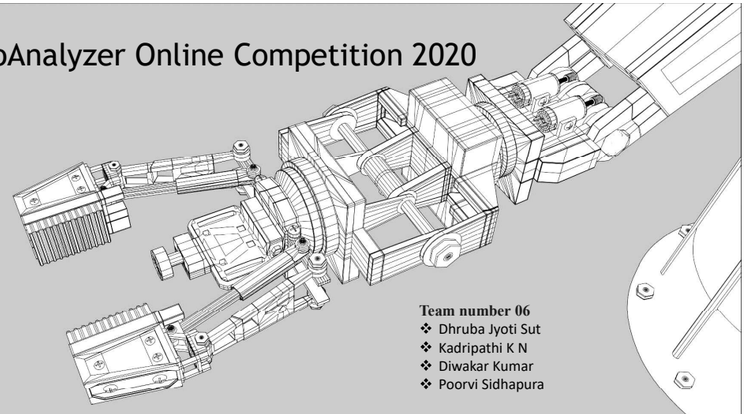
RoboAnalyzer Online Competition 2020



Team number 06

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"We certify that this project was undertaken by us for the Roboanalyzer-based online competition (ROC)" conducted by Dr. Nayan M. Kakoty of Tezpur University in collaboration with Prof. S.K Saha of IIT Delhi and Mr. Rajeevlochan C.G. of Amrita Vishwa Vidyapeetham, Bengaluru Campus during October 12, 2020, to November 30, 2020"

RoboAnalyzer

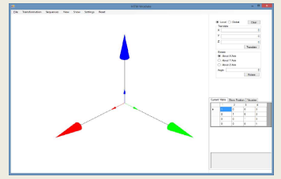
RoboAnalyzer

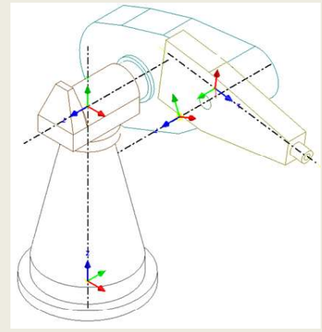
- 3D Model Based Robotics Learning and Teaching Software.
- Developed by Prof. S. K. Saha and Team (IIT Delhi).
- The following are the main features of RoboAnalyzer:
  - DH Parameter Visualization
  - Forward Kinematics
  - Inverse Kinematics
  - Inverse Dynamics
  - Forward Dynamics
  - Motion Planning
- RoboAnalyzer can be used to perform kinematic and dynamic analyses of serial chain robots/manipulators.
- Techniques used in the task are:
  - Homogeneous Transformation Matrix
  - Inverse Kinematics
  - Cartesian control

RoboAnalyzer

Homogenous Transformation Matrix (HTM) Module

- Translation
  - Local Frame
  - Global Frame
- Rotation
  - Local Frame
  - Global Frame

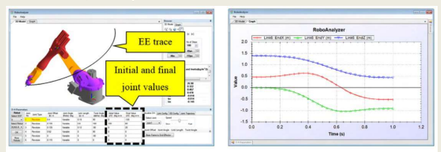




RoboAnalyzer

Inverse Kinematics

- Unlike forward kinematics problem which has a unique solution, inverse kinematics problem of a typical industrial robot is not straight forward, mainly, owing to the existence of multiple solutions of the highly non-linear trigonometric functions.
- The inverse kinematics module of RoboAnalyzer was designed to tackle the above issues.
- The users can supply the position and orientation of the EE in the form of the Homogeneous Transformation Matrix (HTM) containing 3 × 3 rotation matrix and the 3-dimensional end-effector position, and then obtain all possible solutions, if they exist.



(a) Animation of the robot

(b) Plots of EE's position

RoboAnalyzer

Features of Virtual Robot Module used by our Team

- Robot use: KukaKR5_IND
- Start Record Motion
- Cartesian Control
- Draw names
- Stop Record Motion
- Export File
- Edit CSV File
- Read and Playback

RoboAnalyzer

Our Task…