IPRO 316 ADVANCING ROBOTICS EXPERIENCES AT IIT

Abstract

IPRO 316, the fifth in a series of semester long projects inherits the main objective of winning student interest while providing a robotics platform at IIT. Imbedded in the plan of attack was, structure which saw the emergence of four distinctive sub groups and expert guidance which culminated into two campus-wide lectures. Each sub group targeted the task of expanding the robotics culture on campus by concentrating on a particular robotics challenge.

The primary objective of the ROOMBA team was to convert a robotic floor sweeper to an autonomous mobile robotic platform to which different functionalities could be added. Ultimately, a telecommunications feature, already included in the prototype, was to be exploited by creating two to three more platforms for communication between the robots. Thirty ROOMBAS were acquired and modified as a stage for the prototype design. The task of repairing the original prototype was completed in a semester's work. The prototype is now able to interface with a computer.

PEPPY's challenge was to modify and repair a robot designed and constructed by the spring 2004 IPRO. The PEPPY group aimed to provide the already existing robot with the ability to perform tasks according to human voice commands. They also aimed to renovate the robot's chassis and decrease its size to create a friendlier and more portable product. PEPPY was effectively repaired in a semesters work, the robot gained the ability to shake hands and pick up objects following voice commands.

PYRO, a robot simulation imported from Bryn Mawr University interfaces with multiple robots via: World, Brain and Robot. The PYRO group was to familiarize themselves with the operation of the simulation in order to educate fellow team members. PYRO was also presented with the task of dissecting one of the robot interfaces in PYRO to use as a model for the modified ROOMBA. A virtual ROOMBA, created using the simulation program is able to explore an obstacle avoidance course. A maze simulation created by the PYRO group features a ROOMBA which displays its level of artificial intelligence by traveling through a labyrinth of obstacles to reach its final destination.

DARPA was presented with the task of creating a mini version of a grand challenge which involves building an autonomous Robot capable of navigating a 200 mile course, over rough terrain. Also the group's objective was to provide robotics clubs and other universities an opportunity to adapt their existing robots for outdoor use in a challenging event. The group managed to acquire the use of a Geographic Information System (GIS) Satellite to obtain satellite images of the IIT campus which would facilitate the design of pathways for the competition.