ELE700 / ELE800: Project Design 2004/2005

Topic:

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Estimated cost: $500	Project rating: Complex	Date: September 2004

Title: **INTELLIGENT PLANETARY ROBOT WITH RF-COMMUNICATION LINK**

Preamble:
Planetary exploration (e.g. Lunar or Mars surface exploration) requires having an autonomous mobile robot to get valuable information and translate it to the Earth. This robot cannot be controlled remotely because of long propagation delay of RF-signals on interplanetary distances. Thus, robot should survive itself utilizing AI-based algorithms and powerful data processing system. Robot should be equipped by temperature and atmospheric pressure sensors and color video camera. Robot also has to be equipped with solar battery charger. In case of this project Earth Mission Centre can be presented by PC coupled with full-duplex VHF RF-transceivers and wireless video-capturing card.

Objective:
Develop, built and test on the simulated planetary surface the prototype of intelligent mobile robot with wireless camera and VHF RF-transmitting system. Robot should walk on surface avoiding obstacles, holes, etc. automatically as well as measure atmospheric parameters and transmit video images. Robot should also charge battery by solar charger when necessary.

Partial specifications:
This project is scheduled for two or three students and includes two parts:
1. Mobile robotic platform with control system based on RISC-controllers with video-capturing and RF-transmitting system based on digital CMOS-camera
2. PC-based "Mission Centre" with RF-communication line interfaced to RS232 port, GUI and video-capturing system.
   - Use Microchip PIC16F87x family of RISC controllers for control system;
   - Use embedded VHF RF-modems for command / video data exchange;
   - Apply Java or Visual Basic for GUI application software development.

Suggested approach:
- Conduct literature survey on hexapod control and digital video-capturing systems
- Built the prototype of hexapod walking platform with control & data acquisition systems;
- Develop software system for the PC-b based "Mission Centre" and integrate it with robot.