ELE8700 / ELE800: Project Design 2004/2005

Topic:

| Student name: | | E-mail: |
|--------------------------|-------------------------|---------------------------------|
| Student name: | | E-mail: |
| Faculty lab coordinator: | | Faculty advisor: Lev Kirischian |
| Estimated cost: \$ 500 | Project rating: Complex | Date: September 2004 |

Title: MOBILE ROBOT-FIREFIGHTER WITH VIDEO-AIMING SYSTEM

Preamble:

Most of existing firefighting systems can bring a lot of damage itself because expensive electronic and / or computer equipment can be completely destroyed by water. Instead, the mobile and intelligent firefighting robot is proposed. This robot should reach the place where an initial stage of fire was detected and activate extinguisher to shut down the flame. All steps of firefighting must be performed without any control from the operator. This is important for unmanned or dangerous environment (e.g. storages, nuclear stations, etc.). That is why robot should be equipped with fire-recognition & video-aiming system to recognize the flame location in the room and in seconds aim the fire-extinguisher to the fire. Robot also should inform via wireless transmitter the security personnel in regard of firefighting events, their location and current status.

Objective:

Develop and design intelligent unmanned firefighting system with fire recognition and videoaiming system and wireless communication with security personnel.

Partial specifications:

This project consists of two parts scheduled for two students:

- 1. Video-acquisition & recognition system based on digital CMOS-camera and embedded RISC-controller;
- 2. Mobile platform with RISC-controller-based embedded control & communication system interfaced with host PC via RF-link.
 - Apply PIC 16F877 RISC controller for video-processing and control system,
 - Use CMOS-camera with embedded video A/ D converter,
 - Implement DC motors for mobile platform and stepper motors as extinguisher actuators,
 - Utilize RF transceivers interfaced with PC via RS232 port.

Suggested approach:

- Conduct literature survey on video-aiming and recognition algorithms and RISC controllers,
- Develop algorithms for video-aiming and positioning,
- Built the mobile electro-mechanical platform with X-Y stepper-motors,
- Design robot control systems based on Microchip RISC-controllers and implement videorecognition and laser pointer positioning procedures.