School of Engineering
Department of Electrical and Computer Engineering

Capstone Project Abstract

Project Number: S16-011

Project Title: Firefighting Unit Utilizing Autonomous Modular Target-Tracking Turret

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The collaborative capstone project taken on by our team consists of two main parts:

1) An autonomous firefighting unit that is stationary by design with the capability of movement with further development. The unit will be able to find, aim, and shoot at fire, autonomously. The basic version of this unit will be showcased.
2) A basic conceptual system that is able to center a target using a stereo positioned sensor and point at the target with a desired component. The basic system has multiple applications for example missile guidance system, sentry turret, and the showcased, autonomous fire fighting unit. The concept has been shown as the basis of the autonomous firefighting unit.

Our implementation of these two concepts consists of tracking colored objects, in this case we are tracking red colored objects, in a room. By doing so, we want to demonstrate that the webcam can be replaced by a thermal camera and our basic condense air shooter, by a flame retardant dispenser in order to carry out the fire fighting operation autonomously.

The project model of the autonomous fire fighting unit which includes two webcams, NI myRIO, and a shooting system which makes use of a solenoid to be powered to on and off positions.This shooting mechanism aims at the target once the cameras have focused on the object. The two webcams are used for binocular vision which allows for depth perception as well as accurate targeting, and these are mounted on a single plane with a single servo that is controlled by the micro controller.

The goal of this fire fighting system is to be light and mobile, be able to place the unit within line of sight to fire, and for the firefighter to take on more delicate and precise tasks such as search and rescue. Even if the firefighter's mission is to only put out the fire they will be able to avoid endangering themselves by allowing the system to fight that portion of the fire and take on other sections or to relocate themselves to safer grounds. Thus, enabling a firefighting squad to be immensely more effective and safe.