

# **PROGRAM FOR INDIVIDUALIZED LEARNING**

## **UNIVERSITY OF MINNESOTA**

**NARRATIVE TRANSCRIPT FOR: Alan E. Kilian**

**MAJOR PROJECT TITLE: Implement a Robot for the Trinity College Fire Fighting Robot Competition**

**MAJOR PROJECT DESCRIPTION:** The goal of the Fire Fighting Robot contest hosted annually by Trinity College is to provide an environment where high school and college students can compete to complete a well-defined task in a known environment. The challenge for the entrants is to build a computer controlled robotic device that can move through a small model of a single floor of a house, detect a lit candle and then put it out. For my major project, I will design, build and test a robot which meets all criteria for the competition however, I do not intend to submit the robot to the competition. I will write a 7-10 page paper describing the process used to design, build and test the robot and what I learned through the process that was applied to the computer controlled robotic device.

**PROJECT DURATION: Fall 2012 – Spring 2014**

**PROJECT EVALUATOR: \*William K. Durfee, Professor, Department of Mechanical Engineering, University of Minnesota, Minneapolis, MN.**

**1. Discuss how well the student understands the mechanical, electrical and computer systems; and tools to design and implement each system in the production of a machine capable of performing a task.**

Alan has a good understanding of these systems. For example, he designed, built and tested dual-bearing wheel mounts to eliminate radial loads on the motor shaft. He used sensors appropriate for the task, and implemented control code on a small real-time operating system. These are all required to realize a useful robot.

**2. Please comment on how well the student understands the rules, regulations and goals of the Trinity College Fire Fighting competition.**

The comprehensive description of the competition rules and the overview description of the competition that appears in the reports is evidence that Alan has an excellent understanding of the competition.

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**page 2**

**3. How well did the student determine a computer system that allows for the robot to complete the competition goals?**

Alan based the software on a micro-controller and implemented the control code under a real-time operating system. These were appropriate choices for a robot that can complete the competition, as evidenced by the tests described on pp 20-21 of the report.

**4. How well did the student build a working robot, specifically select electrical components, fabricate parts, write software and assembly, to meet the rules and complete goals of the Trinity College Fire Fighting competition?**

The tests described on pp 20-21 demonstrate that the working robot meets the rules of the competition, and can complete many of the tasks required to complete the competition. As described in the conclusions section, the robot would need additional capability to actually complete the competition.

**5. Please comment on how well the student tested and documented the robot's ability to complete task of the Trinity College Fire Fighting competition.**

Pages 20-21 describe an appropriate test plan and documents test plan results. The experiments in the test plan split what is needed for the competition into independent robot capabilities that can be tested one at a time. This is the right way to conduct testing.

**6. How does the quality of this project compare to other undergraduate projects of a similar nature?**

The project meets or exceeds the level of sophistication that is expected of projects by Mechanical Engineering students at the University of Minnesota. More importantly, what Alan learned by conducting this project meets or exceeds what we expect Mechanical Engineering students to learn when they undertake a project.