Fire Extinguishing Robot

Term Project - CREATIVE DESIGN

TST 161 – Dr. Norm Asper

Objective:

To develop an understanding and appreciation for the complexity of the design and prototype development process. This process is the systematic, intelligent generation and evaluation of specifications for artifacts (products) whose form and function achieve stated objectives and satisfy specified constraints. The objective of this project then is to design a robot that will move from a starting line to a stopping zone, and then activate a suppression system that will extinguish a candle flame.

Given:
Tile floor (12” x 12” tiles)
3 ft. wide by 12 ft. long lane (marked by tape)
Candle and adjustable holder (see sketch and photos)

Design constraints:

1. The device must leave the starting line under its own power. The devices may employ manual brakes (i.e., human fingers on the wheels or power source) to position it on the track. The operator may only “let the device go” without pushing.

2. Once the vehicle is started, no external communication, interaction, or influence of any kind is allowed (i.e., the system must be completely autonomous).

3. The device must fit into a 12” wide x 12” long x 14” tall box.

4. Travel and suppression delivery capabilities may be accomplished through the use of any number of rubber bands, springs (as in mouse traps), and/or electric motors (which use no more than four ((4)) **AA alkaline batteries).** No chemicals, compressed gasses, or explosives may be used.

5. No part of the vehicle and the suppression delivery device may be left behind at the start line.

6. Each robot will be allowed three runs. Only one suppression cycle will be allowed for each run. The run is considered completed once the candle flame has been extinguished or one suppression cycle was completed (whether the flame is extinguished or not). Each of three runs must be accomplished within two (2) minutes.

7. The vehicle and the suppression delivery device can not touch the candle, the candle holder or the flame. The holder and candle cannot be hit, touched, moved or knocked down during the run.

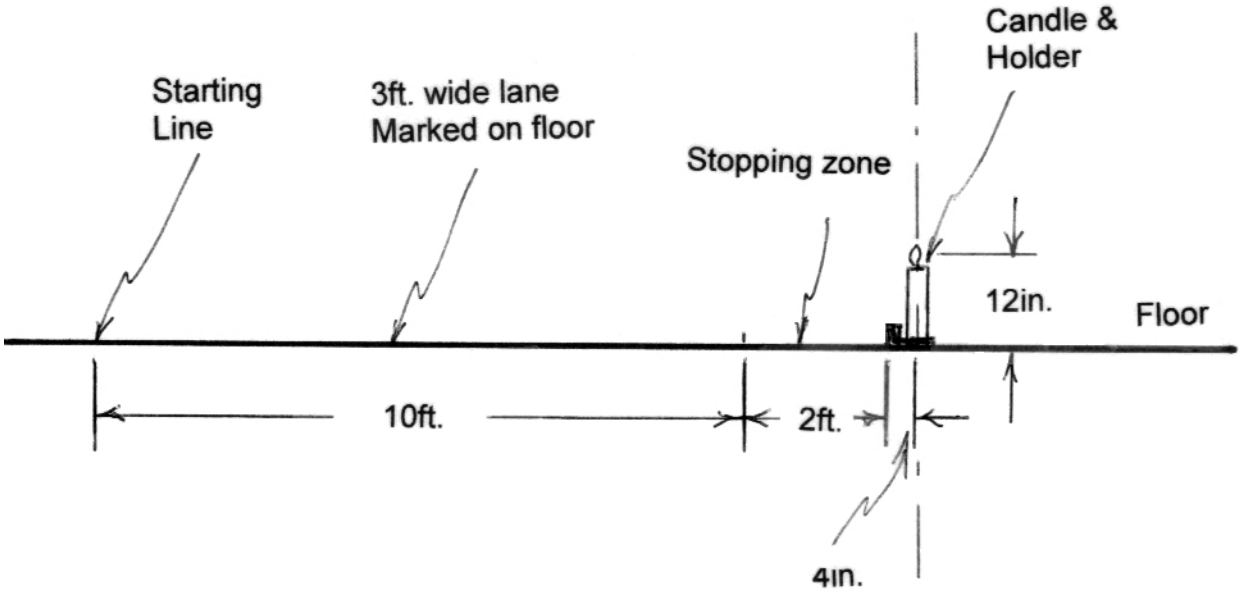
8. The vehicle and the suppression delivery device must stop in the stopping zone or area.

9. The suppression system must only be activated when the vehicle is at rest in the stopping zone.

Scoring:
The objective is to move the vehicle from the starting line to the stopping zone, and then activate a suppression system that will extinguish a candle flame. Scoring is based on how efficiently the candle flame is extinguished ranked on a 100 point scale

For the “Working Prototype” evaluation, twenty (20) points will be awarded for travelling (in bounds) the length of the 10 ft. approach lane, and thirty (30) points will be awarded stopping within the stopping zone.

For the “Competitive Effort” (extinguishing the flame), twenty five (25) points will be awarded for delivering the suppressant from the stopping zone, and finally, twenty five (25) points will be awarded for totally extinguishing the candle flame. The highest score for any of the three runs will be declared the winner. In the event of a tie, the highest average score for the three runs will be the winner. In the event of an average score tie, the fastest average time from start to final candle flame suppression will be the winner. The team receiving the highest total score when adding this score to the Design/Aesthetic score will be awarded an extra five (5) points to the term project grade.



Car Number _____

Fire Extinguishing Robot _____

Vehicle Design/Aesthetic Evaluation (@ 9%)

Score Specific Comments

_____ Use of Simplicity (15) _____

_____ Use of Appropriateness (15) _____

_____ Use of Functionality (15) _____

_____ Use of Economy (15) _____

_____ Balance – Structural and Visual (10) _____

_____ Shape and Form (10) _____

_____ Proportion and Scale (10) _____

_____ Color and Texture (10) _____

_____ Total Score

- out of 100 -

Car Number _____ Names _____ _____

_____ _____

Fire Extinguishing Robot

Performance Scoring Sheet (Totaling 16%)

Working Prototype (Best score @ 9%)

	Run #1	Run#2	Run #3
1. Traveling the length of the 10 ft "approach lane". (20 pts)	_____	_____	_____
2. Stopping within the "stopping zone". (30 pts)	_____	_____	_____

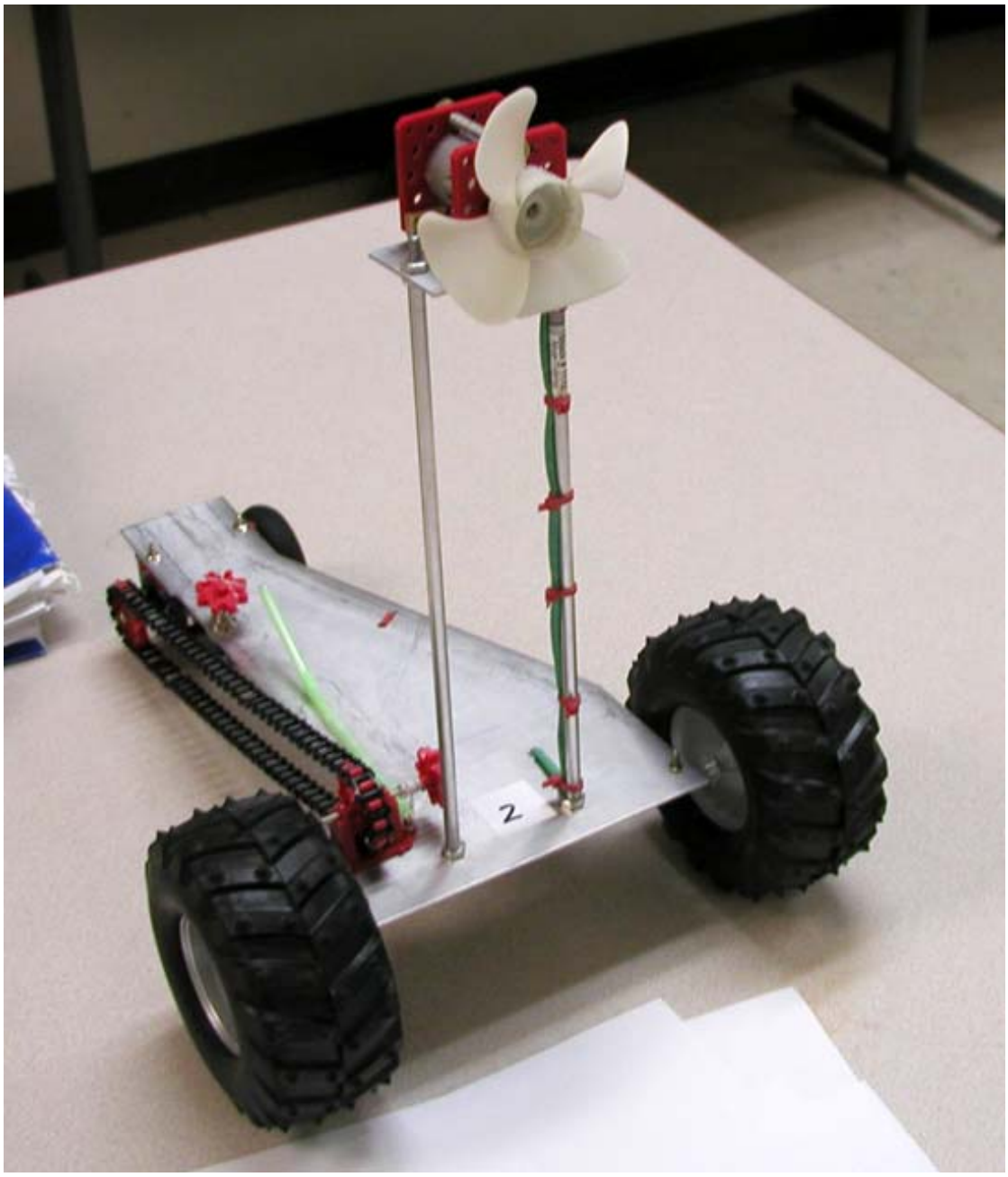
Competitive success (Best score @7%)

3. Delivering the suppressant from the stopping zone". (25 pts)	_____	_____	_____
4. Suppressing the Candle flame. (25 pts)	_____	_____	_____
TOTAL/100 =	_____	_____	_____

Tie-breaker Average Score = _____

Time of run. (2 min. limit)	_____	_____	_____

Perfect score tie-breaker
Average Time = _____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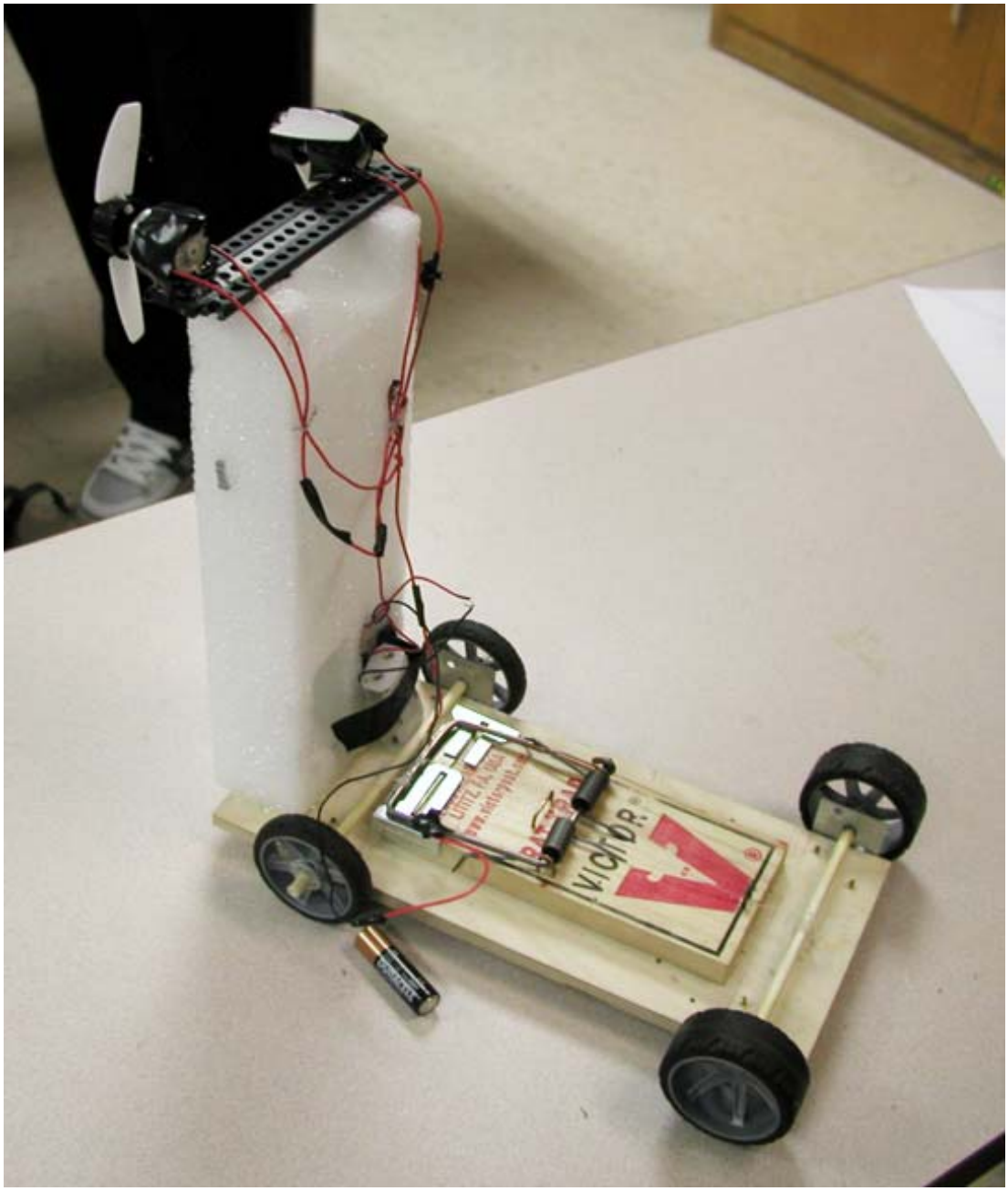
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