UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description for FALL 2016
Project Title: IEEE Robot Challenge (IEEE_ROBOT)

Supporter: IEEE/UNC Charlotte
Supporter Technical Representative: ASSIGNED
Faculty Mentor: __X__ ASSIGNED _____ TBD (check one)
Single Team __X__ Dual Team _____ (check one)
Personnel (EN/ET): __2__ E, __2__ Cp, _____ Cv, __2__ M, _____ SE
(Complete if the number of students required is known)
Expected person-hours: (250 per student)

Description of Project:

A long time ago, in a galaxy far, far away a lot of stuff happened that pitted good against evil in some strange universe. Unfortunately that has nothing to do with this challenge.

Instead, in this robot competition you will build a robot that must discover the unknown, use the Force in a lightsaber duel, bring down the energy shield protecting the enemy base, and then launch a proton torpedo to defeat the enemy.

And the robot must complete these tasks in under four minutes!

The students working on this team will compete in the IEEE SoutheastCon 2017 Hardware competition in Charlotte from March 30 to April 2, 2017.

Details of the competition can be found on the IEEE website:
http://sites.ieee.org/southeastcon2017/student-program/

Initial Project Requirements (e.g. weight, size, etc.):

The robot must be completely autonomous and must fit entirely within a 12”x12”x12” cube at the start of each match. The robot must at all times be wholly contained within the playing surface and cannot reach more than 3” beyond the edge of any the arena walls.

There is no weight restriction on the robot.

The robot may expand beyond the initial size to any size, and may even split into multiple independent robots during the competition. If multiple independent robots are used, they must start all within the same 12x12x12 space and split after the competition begins. In addition, the independent robots must communicate over a wired link – wireless communication between the various robots is not allowed - this includes radio, light, sound – any non-wired communication channel. This is a safety issue to avoid interference with, and to, other robots that are running at the same time.

You may not tether or control the robot in any way including wired or wireless tethers, two way

data transmission, or one way data transmission to or from the robot.
The robot cannot contain any explosives or flammable liquids or gases. Compressed gas is allowed on the robot as long as the pressure is limited to no more than 30 pounds per square inch at any time. Gasses other than air are permitted as long as they do not pose a safety threat if accidentally released.

While multiple switches can exist on the robot for powering up and controlling the various subsystems on the robot, there must be a single clearly visible and labeled start switch.
This switch can be either a pushbutton or a toggle switch and will be actuated by the robot team once the judge indicates the start of the match. It is recommended that the robot have an easily reachable emergency cut off switch to allow the robot team to disable the robot if necessary (this is to avoid damage to both the robot and the arena in case a sudden stop is required). If the robot splits into multiple independent robots, the single emergency cut off switch should stop motion of all the robots.

The robot may not present any danger to the judges, spectators, the playing arena or neighboring area around the arena. If at any time the judges deem the robot is causing, or is likely to cause harm, the judge may terminate the match immediately and will have the discretion whether any points are awarded for the match, and if the robot is allowed to complete any remaining matches.

The arena is a single 4' x 8' sheet of smooth sanded ½" (nominal thickness is approximately 15/32") BC grade plywood (B side up) that is surrounded by standard 2x4 'stud' lumber (nominal size is approximately 1.5" x 3.5") walls that form a frame on top of the plywood sheet (the arena inner dimensions will thus be approximately 93" x 45").

(Note that all ½" plywood referenced in the construction of the arena and stages will have a nominal thickness of approximately 15/32" and all 2x4 'stud' lumber will have a nominal size of approximately 1.5" x 3.5", and all 1x2 lumber will have a nominal size of approximately 0.75" x 1.5". Standard building material tolerances are expected).

The arena is divided into five levels, each at a different height. The robot begins in a starting square in the middle of the lowest level. This layer is the largest area, and comprises over half of the playing surface (45" wide by 57" long), and contains the robot starting square and the locations of stages 1, 2 and 3. The starting square is 15"x15" and is located in the center of this space (15" from the inside of the long walls of the arena, and
21" from the inside of the short wall). A 1" wide and 8" long white navigation stripe leads from the middle of the starting area square toward stage 1.

The rest of the arena contains a four tier stepped area consisting of three full-width steps and one smaller step. Each of the full-width steps are 12" deep and 45" wide. The first step is approximately 0.5" high (one thickness of ½" plywood) above the ground/starting floor, followed by a 1" step (two thicknesses of ½" plywood) to the second step and a 1" step
(two thicknesses of ½" plywood) to the third step. The fourth step is 1" high (two thicknesses of ½" plywood), or approximately 3.3" above the ground floor) and is only 12"

Expected Deliverables/Results:

The deliverables are to include:

1. All drawings required for the build of the robot
2. All Required software and programming code to support the robot
3. Documentation to support the design and implementation of the project

List here any specific skills or knowledge needed or suggested (If none please state none):

None