Osburn Hall PLC Survival Bots (ITEC 427 R&D Project)

Overview:
Students will work to design and develop a fully autonomous PLC-controlled robot that is able to continuously explore Osburn Hall.

Requirements:
- The robot must use one Micrologix 1000 PLC as the “brains of their bot.”
- The robot must continuously move forward and explore its surroundings. A repeated motion (e.g. stuck in a corner will disqualify the robot from accomplishing that part of the evaluation).
- The robot must cost less than $200 to build (participants' costs). All parts utilized except the PLC must have a documented value. Donations are allowed, but if they are used – those parts must use documented pricing from a valid vendor.
- Each robot must be able to connect/disconnect from the PLC in less than 60 seconds.
- PLCs must remain in the lab at all times except during authorized tests during class time.
- Teams must document hours of contribution (log) with detailed description of work done for each team member, if they are unequal, the instructor may reduce a student’s grade (e.g. one student does the majority of the work).
- Robots must have an easily accessible on/off control button that turns on and shut down the robot.
- All control code must be written in Relay Ladder Logic.
- All digital inputs must be properly fused to the 24VDC input supply on the PLC (1A). You may not use the 120VAC power line for an I/O supply.
- All PLC I/O must be fused at 1A or less for each I/O used. If you require more power, you may cascade the I/O with appropriate relays.
- Robots must attempt all 10 levels of evaluation (unknown obstacles/conditions that exist in Osburn Hall).
- All robots will be tethered (PLC requires 120VAC) via an extension cord. Cords may not be utilized to influence the robot during evaluation. 120VAC line may only be used to power the PLC. All other power for the robot must be on-board.
- Robots may not be manipulated during or between the 10-level evaluations to gain an advantage. Robots must be programmed and built to encounter all 10-levels of testing.
- A technical report is required that includes a minimum of five typewritten pages and contains a title, a statement of the problem, the impact (importance) of the problem, objectives, procedure (algorithms via flow chart depiction), photos, code, results and conclusions.

Evaluation:
- Robots will attempt 10 different levels of evaluation that will be revealed on the day of the Contest. Each level will not exceed a 5-minute timed requirement.
  - 9+ Levels = A
  - 8 Levels = A-
  - 7 Levels = B+
  - 6 Levels = B
  - 5 Levels = B-
  - 4 Levels = C+
  - 3 Levels = C
  - 2 Levels = C-
  - 1 Level = D+
  - Qualify all Checkpoints on Time, no Level Demonstrated = D
  - Qualify Checkpoints Late, no Levels Demonstrated = D-
  - Note: Robots in violation of requirements above = F

- Students that do not participate fully in this R&D projects (i.e. Teams Assigned) may have their R&D grade reduced from their team’s performance at the discretion of the instructor.
- Design and code developed should be unique or is subject to academic dishonesty policy.
- “Spirit of the Event Rule” is in effect. This means that if a team should violate the spirit or intent of the event to gain an advantage, the instructor reserves the right to disqualify the team or issue appropriate penalties.
- The instructor will determine and make all final rules-related calls and determine the final evaluation of each robot. Instructor’s call is final in any unforeseen case.