

# ENGR 120, LAB # 1 - Automation and Robotics

## Objectives

The objective of this lab is application of the following concepts in the development of an autonomous robot:

- 1) Team formation and teamwork
- 2) Communication skills
- 3) Creative problem solving

## Material & Sources

- 1) Introduction to ECSE textbook
- 2) Course website: [www.EngrCS.com](http://www.EngrCS.com)
- 3) Computer and Internet
- 4) One Mindstorms Kit (Only one kit should be used)
- 5) Other Laboratory tools and supplies as needed

## Procedure

- 1) Review Sumo-Robo Competition Rule
  - a) All robots must be self powered and autonomous during the competition.
  - b) Only one Mindstorms kit must be used in each robot's construction.
  - c) Two robots will be position at 90 and 180 degrees at the start of each competition segment.
  - d) The competition will be stopped at the end of 2-minute segment or when one robot has moved or been pushed outside of the white ring surrounding the competition field. The robot closest to the center of the competition board is considered the winner.
  - e) Each competitor will have a minimum of 5 minutes between competition segments. Competitors may modify the robot prior the next scheduled competition segment but must be ready at the start of next segment or they will be disqualified.
- 2) Form a team with 2-3 students and complete the following:
  - a) Shared Objective
  - b) Shared Plan
  - c) Roles and Responsibility
- 3) Apply the five-step Creative problem solving to developing an autonomous robot for the Sumo-Robo competition:
  - a) Needs/Issue Analysis
  - b) Problem Definition
  - c) Idea Generation
  - d) Optimal Solutions Selection
  - e) Solution Implementation
- 4) Competition  
Each team should have a Sumo-Robo ready for competition and participate in the competition during the designated Competition time.
- 5) Report  
Reports must be prepared as a team. All reports must be computer printed (Formulas and Diagrams may be hand drawn) and at minimum include:
  - a) Cover sheet with your name, lab, date of completion and team members' names
  - b) Record of Team formation and Creative problem solving steps
  - c) Outline of research and analysis results
  - d) Description and specification of the robot entered in the competition

- e) Describe the actual operation of the robot vs. actual operation during the competition and what improvements would be incorporated into the design to do better.
- 6) Peer Evaluation
- Each team member is responsible for submitting a one page team evaluation. The evaluation sheet should contain:
- a) 100 to 200 words description of team development and identification of team's development stage (Forming, Storming, Norming, and Performing).
  - b) 50 to 100 words evaluation of each teammate.
  - c) Award each teammate 1 (lowest) to 5 (highest) based on their performance in the project team.