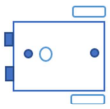
TER 4M
SumoBot Ex.



Overall Requirements

- Construct a SumoBot using TinkerCAD circuit
- There are 3 challenges. The challenges are two sumobots facing each other, back to back and in opposite directions. The front and back sides of sumobot will be determined and fixed before any match
- Overall requirement: the Sumobot must be safe for the team and opponent!
- Size: 20cm(L) x 18cm x 18cm max.
- There should be two students per group. Each student should hand in her/his own TinkerCAD circuit. The rest of this exercise should be one copy per group.

A) **Layout (20%) (K)**

1) SketchUp, SolidWorks or other 3D software approved by teacher
   - electronic or mechanical components can be imported. In case a component (say DIP switch) cannot be imported, use a labelled and colored rectangular box with dimension closely resembled the actual one
   - basic structure (e.g. the covering) cannot be prebuilt
   - no wire need to be shown
   - have all the components (13%)
   - can build the model from the design (2%)
   - decoration & attractiveness (5%)

B**) Design Strategies (25%) (T)**

1. Rotation (8%)
   a. Facing, side by side (same direction, opposite directions)

Facing	Back to back	Side by Side (same direction)	Side by side (opposite direction)
			

   b. A DIP switch to control the angle of initial turning (90°, 180°, 360°, …)
2. Speed control (8%)
   a. Searching
   b. Facing – constant vs variable motor speed
   c. Near the edge
3. Design (9%)
   a. Weight distribution – front, mid, rear, left, right, high, medium, low
   b. Wheel positions – front drive, middle drive, rear drive
   c. CG (Center of Gravity)
      i. determine the CG of irregular objects
      ii. determine the height of CG

C**) Applications (45%) (A)**

- TinkerCAD circuit

a) Arduino with a small breadboard

b) Two LDR with two (white) LED, such that the LED is always on, and the LDRs keep sending the reading to Arduino. The reading can be displayed in the LCD display.
There can be unlimited number of LDRs and LEDs /2

c) A motor chip (L293D) controls two given motors /2

d) A DC power supply to the motors in part (c) /2

e) A switch to control the DC power supply in part (d) /2

f) An ultrasonic sensor to read the distance of an object in front of it, and send the reading to LCD Display. Maximum 3 ultrasonic sensors. /2

g) A LCD display to replace the Serial monitor /2

h) A DIP-switch to control the degree of turning /2

- Programming (3%)

- Testing (18%)

1. Rotation

a)	Facing		/2
b)	Back to back		/2
b)	Side by Side (same direction)		/2
c)	Side by side (opposite direction)		/2

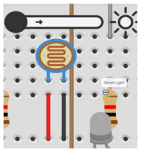
2. Speed control
   a. Searching /3
   b. Near the edge /3

3. instruction manual /4
   - it should simple and clear
   - it can be a mix of pictures and word
   - there are 2 parts: goal and procedures
   - Example Street lamp in TEJ 3M ISP

     Goal: it is turned on when it is dark, and off otherwise

     Testing procedures: - move the slider of the LDR (photoresistor) to the left, the white LED will turn on

     - move the slider to the right, the LED will be off



D) **Documentation (10%) (C)**

A report with

- Master Schedule (1%)
- Planning Organizer (2%)
- GANNT Charts (3%)
- PERT Charts (3%)
- Two-day Log (1%)

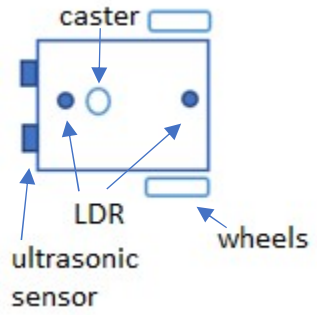
Due: 10 May, 2021 (Mon)

Upload: 1) A report

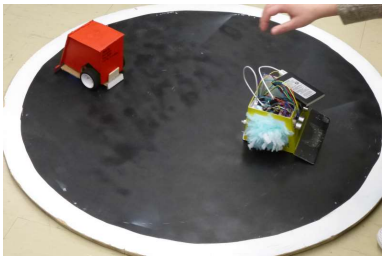
2) a Word or PDF file with a link to the TinkerCAD circuit, screenshot of the circuit, the program, Design Strategies, and instruction manual

Reference

For the basic model – the wheels are 6 cm in diameter and 16 cm apart



1) Arena



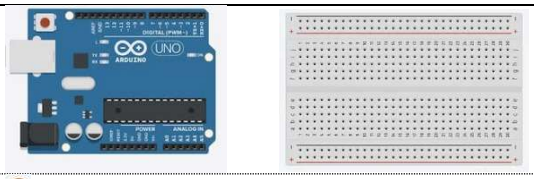
2) Front view of a SumoBot

3) Bottom view of a SumoBot

Programming Styles

1. Top four comments
2. Comments for
    a. Each function/procedure
    b. Special variable(s)/algorithm(s)
3. Proper indentation
4. Spacing between declaration, functions, …
5. Meaningful variable and function names
6. Clean version, that is no debugging or tracing statements
7. KISS

TinerCAD components

a	
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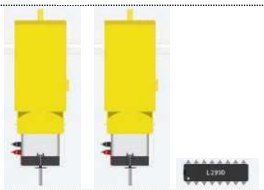
c)	
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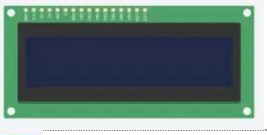
g)	
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