Robo-Rat Final Competition

For the final competition, teams will design autonomous robots (Robo-Rats) that will navigate the competition board collecting 2” foam cubes with holes through their centers (cheese). Points will be awarded based upon the cheese that is collected and where it is deposited. The competition format will be a seeded, double-elimination, ten-team tournament. Seeding will be based on a team’s performance in the preceding line-following race, wall-following race, and solo competition. Determination of your grade will be based upon the quality of your participation, not necessarily the outcome of the tournament. You will be rewarded for challenging yourself and for the uniqueness of your design.

Board Setup:

Before each competition, cheese will be returned to its starting location, as defined on the competition board figure. The competition official will determine the location of the random cheese by rolling a single die. The number shown on the die will be the number of random cheeses placed on the near-side of the board. The remaining cheese, if any, will be placed on the opposite side of the board. Another roll of the die will determine the location of the golden cheese within the three middle locations of hanging cheese. A low (1/2), mid (3/4), or high (5/6) roll value will determine the location of the golden cheese to be in the near, middle, or far position, respectively.

Competition Format:

Robo-rats compete head-to-head on the competition board. Competing teams place their robots at either end of the board, facing to the right (as referenced from their end of the board) and within the black lines surrounding the starting lights, which define their starting boxes. Two rolls of a die will determine the positions of the random cheeses and the golden cheese. Afterwards, teams will have a minute to make adjustments on their robot; however, robots must be kept in their starting box and no new code may be uploaded. The competition will begin when the LED start circles are lit by the competition official and a 2 minute timer will begin to count down. The robots will need to detect the start lights in order to begin. Teams may not touch their robots at anytime during the competition; doing so will cause them to forfeit the round. There is one exception- if there is a collision between robots, the competition official will indicate that each team should deactivate their robot using their kill-switch and the countdown timer will be paused. After the robots are stopped, they will be moved back to their starting positions. Be careful! Any cheese that falls off the robots must be left where it lies. Robots may now be placed facing forward, backward, left, or right. Teams will have a minute to make adjustments on their robots (again, robots must remain in their starting boxes and no new code may be uploaded). The competition is continued by the lighting of the LED start circles. If more than three collision-caused restarts occur, the match will be called and the current score will be final. Otherwise, the competition will continue until the two minutes expire and the robots are stopped. In the event of a tie, each robot will be allowed to complete a one-minute solo round; no modifications may be made to the robots or the code before this round. The competition board will be reset before each attempt and scoring will be the same, except that only the participating robot may score points.

Scoring:

At the end of the competition, points are awarded based on which cheese was collected and where it is being stored. Cheese can be stored in two places for points; on your robot or on your wall. Cheese is considered to be 'on your robot' if it stays attached when the competition official lifts your paused/stopped robot straight up. Your wall is the 4" deep, 3" high ledge at your end of the board. Cheese is considered to be on the wall if it is on or above the top surface of the wall and is not supported by anything in contact with anything but the wall. Points received for cheese on your wall are four times those received for cheese on your robot. The points awarded for each type of cheese are shown in the table below. Points for the golden cheese will only be awarded if it is placed on your home wall AND if there is no other *hanging* cheese on your wall. Additionally, if the golden cheese is stored at the same location (on the robot or on the wall) as any of the other hanging cheeses, the point value of those hanging cheeses shall be halved.

Cheese Type:	Your Cheese: (On Robot/On Wall)	Neutral Cheese: (On Robot/On Wall)	Opponent Cheese: (On Robot/On Wall)	Maximum: (On Robot/On Wall)
Regular	2/8	3/12	4/16	84/336
Hanging	4/16	6/24	8/32	48/192
Golden	N/A	0/150	N/A	0/150
Maximum	26/104	54/330*	52/208	132**/534*

*Golden cheese on wall, hanging cheeses on robot.
**Golden cheese not collected.

Additional Rules:

- Robots must have an easily accessed and functioning kill-switch; missing this component is grounds for disqualification.
- The robot must fit inside a one foot cube at the beginning of each match. A 'rat cage' (cardboard box) is used as the official standard.
- Robots are defined as the Arduino stack and all of the attached materials.
- All structural elements (i.e. not related to electronics) must be built from LEGO® components.
- There is **ABSOLUTELY NO USE OF GLUE ALLOWED**.
- Zip ties should be used minimally and only for attachment of sensors and actuators. They should not hold LEGO® pieces together and may not be used as active parts of the robot (e.g. cages, nets, spears, structures, etc.).
- Between rounds of the competition teams may modify their code and their robot, but not between a round and a tie-breaker. Be careful that you will be able to complete modifications in the short time between rounds; you will have to compete with what you have or forfeit the round if you are not ready at competition time.
- You are encouraged to customize or augment your robot's components. These additional components cannot be complete systems (RC controllers, drive trains, etc.) or motors. Examples of acceptable additional components include LEGO® pieces, sensors, electrical components and batteries. The total cost of components purchased cannot exceed $20.
- If you have any questions or need clarification please ask the TAs or professor. Final interpretation of the rules lies with the teaching team.

Competition Board

- Your Cheese
- Opponent's Cheese
- Neutral Cheese
- Random Cheese (6 Total)
- Neutral Hanging Cheese
- Golden Cheese (Hanging)

Randomly Arranged

- Your Hanging Cheese
- Opponent's Hanging Cheese

Scale: One Inch = One Foot