BEST Fever 2004

Game Specific Rules

August 2, 2004

Introduction

Alas, poor Squeaky has been feeling under the weather. Little by little over the past 10 years, he has shown increasing symptoms of a terrible problem. After last years Transfusion Confusion, he really started to behave unusually. He constantly wants to be building and rebuilding other robots. He is always waiting until the last minute however, and many times has rebuilt robots the night before they are due to the customer. After numerous tests, the experts can conclude only one thing. Squeaky has a severe case of….. Best Fever.

Six weeks of treatment can make him better but the treatment can be severe. His system must be treated to re-sequence his DNA in order to give him more energy. His DNA must be denatured, sorted and then re-sequenced. There is a large Hidden Gene in the human genome that causes aging. Capturing this will allow Squeaky to never grow old. Damage to his good DNA must be limited so doctors have decided to try a new radical procedure. Nanotech biobots will be injected into Squeaky's system to separate and isolate his cells. This is a new technology with several shortfalls. First, the energy packs for the biobots only lasts 3 minutes; not much time to complete the mission. Also, mobility is limited. This allows the biobots to utilize more of the available energy saving DNA. Because of these limitations, BEST feels that teams working together enhance the chance of Squeaky's full recovery.

Your job is to initiate the denaturing process by activating the Denaturing Thermal Switch and then to separate the PCR Primers from the DNA deoxyribonucleotides. It is also advantageous to capture the hidden aging gene. Work together to save Squeaky so he will be at his Best for another 10 years.

1.0 Objective

The objective of this game is to separate the PCR Primers from the DNA deoxyribonucleotides. You can maximize your score by working with your neighboring competitors and placing your game pieces in a shared area on the blood vessel wall. Capturing and placing the Hidden Gene game piece on to the elevated capture receptacle can further enhance your score.

2.0 The Game Field

2.1 General Description

The playing field is composed of a ring (blood vessel) with an outside diameter of approximately 20-feet and an inside diameter of approximately 12-feet. Driver / Spotter boxes are located outside of this ring in what would be the corners when placed on a 24-foot square piece of carpet. The ring tapers from a vertical height of 18-inches at the outside diameter to the floor at the inside diameter.

The blood vessel wall has three scoring areas (DNA Sorting Receptacles) for each team. Two of each team's three scoring areas are shared with another team.

In the center of the playing field is a 4-foot octagon. The Hidden Gene game pieces, Hidden Gene scoring area, PCR Primer scoring areas and Denaturing Thermal Switches (tiebreaker switches) are mounted on this octagon.

A general layout of the field is shown in Figure 1.

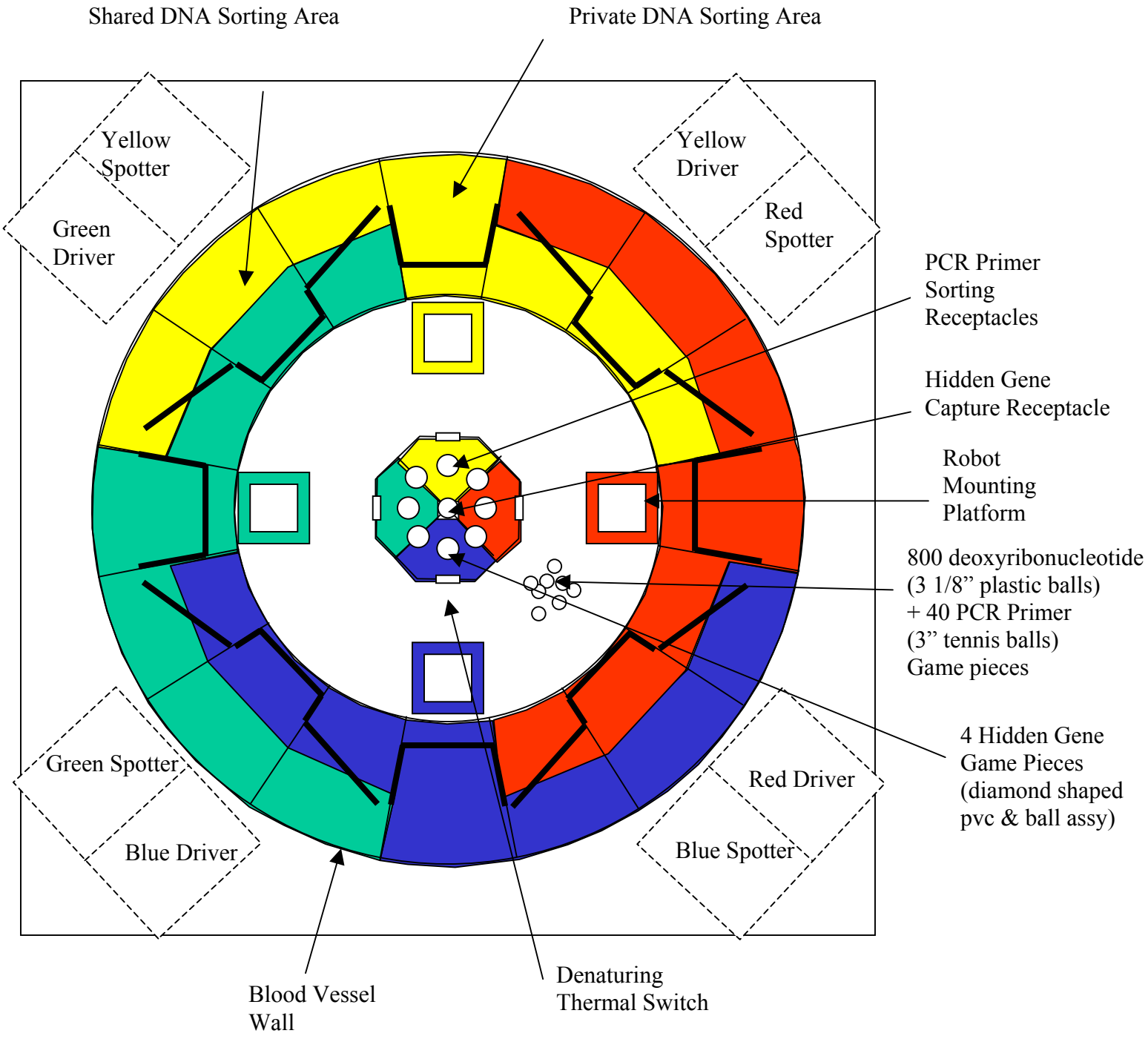

Figure 1

2.2 Center

In the center of the playing field is a 4-foot octagon made from 4” PVC sewer pipe. The PVC octagon is covered with a piece of 1/8” plywood, which is painted to correspond to the colors of the panels of the blood vessel wall. Mounted on the top of the panel are eight inverted frisbees. The frisbees measure 9” +/- ½” in diameter and are mounted on top of 10” lengths of 4” PVC sewer pipe. The location of each frisbee corresponds to a scoring area on the blood vessel wall. The frisbees are set on a 12” radius from the center of the octagon. In the very center of the octagon another frisbee is mounted on a length of 4” PVC sewer pipe rising 28” from the top of the platform. At the beginning of each game, a Hidden Gene game piece sits on top of each of the four frisbees located in private scoring areas on the center octagon. The Denaturing Thermal Switches (tiebreaker switches) for each team are mounted on the perimeter of this octagon.

2.3 Denaturing Thermal Switches

The switch is constructed from a 16-inch long piece of standard 1x4 lumber, and pivots on a hinge. The top of the switch tilts towards the mounting position of the robot and is returned to that position with a 3/16 shock cord connected near the bottom of the paddle. The switch is activated when the pivoting portion of the switch is moved such that the bottom edge is roughly ¼-inch away from its initial position. When the switch is activated, the light at the top of the paddle will turn off momentarily. The switch is connected to the electronic tiebreaker system that automatically determines if the switch has been activated and the order in which the switches have been activated.

2.4 DNA Sorting Area Panels

2.4.1 General Construction

The lower border of the DNA sorting areas are made from 1x4 standard lumber set on edge. In order for game pieces to score, they must be touching the panel above the sorting area borders at the end of the game. Game pieces that are touching the panel below the sorting area border will not score.

2.4.2 Private DNA Sorting Area

The private DNA sorting area is the panel directly behind the robot.

2.4.3 Shared DNA Sorting Areas

The shared DNA sorting areas are the 3 panels on either side of the private DNA sorting area.

2.5 PCR Primer Sorting Receptacles

The PCR Primer Sorting Receptacles are the 8 inverted frisbees corresponding to the scoring panels on the platform in the center of the game field.

2.6 Hidden Gene Capture Receptacle

The Hidden Gene Capture Receptacle is the frisbee located in the center of the game field.

2.7 Starting Position

2.7.1 Robot

The robot will be placed on a 24 by 24 inch structure that is directly in front of the private scoring DNA Sorting Receptacle for that team. The structure is constructed from standard 2 by 4 inch lumber and has two 1/2-inch diameter pins that extend 3/4-inch above the surface of the wood. The robot must be completely located within the outer edges of the structure before the start of the match and must remain on the structure throughout the match. Failure to do so will result in zero points for that match. The two pins may be used for locating the robot on the structure. Attaching the robot to the pins is allowed as long as no damage to the pins occurs (i.e., the pins are to remain clean with no dents or nicks). Please refer to section 2.8 for additional restrictions.

2.7.2 Driver / Spotter

The driver and spotter are located outside the blood vessel wall as shown in Figure 1. The driver is located behind the shared DNA sorting area to the left of their private DNA sorting area. The spotter is located behind the shared DNA sorting area to the right of their private DNA sorting area.

2.8 Restrictions

1. Machines may not drive on the field surface: this includes all portions of the field outside the 24-inch starting area. Passive devices (e.g., non-powered wheels, skids, etc …) may contact the field to aid movement or to support a device extending from the starting area, but no motive power can be based on the field surface outside the starting area. This restriction supersedes the BEST Generic Game Rules.

2. Game pieces are NOT considered projectiles; therefore, they are not subject to the projectile restrictions defined in the BEST Generic Game Rules.

3. Actions that challenge scoring by other robots while not actively pursuing an increase in the combined score for all robots on the field will be considered defensive in nature and are NOT allowed. Violators will be given one warning in a match; a 20 second dead machine penalty will be imposed upon a second violation.

2.9 Game Pieces

There are three separate types of game pieces. The carpeted surface of the playing field is covered with 800 +/- 100 3 1/8-inch plastic balls (deoxyribonucleotides) plus 40 +/- 5 tennis balls (PCR Primers). There is a Hidden Gene game piece located on each of the four private PCR Primer sorting receptacles. The Hidden Gene game piece is a structure consisting of two 14-inch long, 3/8-inch diameter dowels fastened into an "X" pattern onto which a total of eight 3 1/8-inch plastic balls are attached (two per each leg of the "X").

3.0 Scoring

3.1 Scoring with Game Pieces

Each team has seven potential scoring areas. Five of those scoring areas are shared with at least one other team. Deoxyribonucleotides (multicolored plastic balls) placed in the private DNA sorting area on the blood vessel count one point apiece. Deoxyribonucleotides placed in the shared DNA sorting areas on the blood vessel count 4 points apiece. The 2 teams that share a particular DNA sorting area will both receive 4 points for each deoxyribonucleotide game piece.

PCR Primer game pieces placed in a PCR Primer sorting receptacle count 10 points apiece. If the sorting receptacle is shared, then both teams will receive 10 points.

A bonus of 50 points will be awarded to all teams participating in the match if any team captures a Hidden Gene and places it in the Hidden Gene Capture Receptacle in the center of the game field. If multiple Hidden Gene game pieces are in the Capture Receptacle at the end of the game, then 50 points will be awarded for each.

All scoring is determined by the position of the various game pieces at the conclusion of the match. Any game piece that is in contact with any portion of a robot at the end of the match will not be counted in the score. Each team associated with a shared scoring area collects the same number of points for that area.

3.2 Denaturing Thermal Switch

Activating the switch scores 3 points for the team corresponding to the switch color. The switch only scores points the first time it is activated. Since the switch automatically returns to its initial position, the score is not affected by subsequent changes in the switch position. The order in which the switches are activated is used to resolve ties as described in the competition protocol section of this document. As previously mentioned, switches are electronically monitored to determine both the scoring status and switch order.

4.0 Match Protocol

Each match is 3 minutes long and is played with four teams. The scoring software will assign teams to a match and will determine teams' starting locations.

If necessary, matches may also be played with less than four teams. When matches are scheduled to included only three teams, the shared scoring areas of the missing team will be shared between the two teams that border the missing team's location. For example, if a match is scheduled without a blue team, then the red and green teams share the points associated with the green/blue shared scoring area and with the red/blue shared scoring area. This virtual sharing does not occur for matches where less than four teams participate as a result of the scheduled team not participating in the match.

5.0 Competition Protocol

There will be three phases to the competition: a seeding competition, a semi-final competition, and a final competition.

During the seeding competition, each team will play up to eight matches against randomly selected opponents. Less than eight matches per team may be played when time limitations exist, but all teams must play the same number of matches. The team ranking for the seeding competition will be based on the average of the points scored during the seeding matches excluding the team's lowest scoring match.

The top seven teams from the seeding competition will advance to the eight-team semi-final competition. The eighth team for the semi-final competition will be determined by a single "wild-card" game between the four teams with the highest BEST Notebook score. Teams that are advancing to the semi-final competition based on their seeding score are not considered for the wild-card game. Regional and other competitions with a team count greater than 32 may choose to advance more teams for the semi-final; however, Regional competitions will not include a wild-card game.

During the semi-final competition, each team will play a total of three matches based on the rotation shown in the table below. The team ranking for the semi-finals will be based on the total points the team accumulates during the three semi-final matches (i.e. no scores are dropped, and results of the seeding matches are not included.)

Semi- Final Match	Starting Position			
	Yellow	Green	Blue	Red
1	Seed 1	Seed 7	Seed 2	Seed 8
2	Seed 3	Seed 5	Seed 4	Seed 6
3	Seed 4	Seed 8	Seed 5	Seed 1
4	Seed 6	Seed 2	Seed 3	Seed 7
5	Seed 8	Seed 3	Seed 1	Seed 6
6	Seed 2	Seed 4	Seed 7	Seed 5

Table 1 – Semi-Final Match Rotation

The four top ranked teams from the semi-final will advance to the final competition where they will play three additional matches in the field starting positions shown in the following table. The final team ranking will be based on the total points scored during the three final matches.

Final Match	Starting Position			
	Yellow	Green	Blue	Red
1	Semi 1	Semi 2	Semi 3	Semi 4
2	Semi 4	Semi 3	Semi 1	Semi 2
3	Semi 3	Semi 1	Semi 4	Semi 2

Table 2 – Final Match Rotation

The average tiebreaker position will be included in the team position calculation for each phase of the competition. The tiebreaker position is determined by the order in which the switches are activated. The tiebreaker position includes only those matches played during a particular phase of the competition. For the seeding matches, the tiebreaker position of a team's lowest scoring match will be dropped (along with the score). If the average tiebreaker position does not resolve a tie, the tiebreaker positions of the tied teams will be compared starting with the most recent match and proceeding to earlier matches (within a competition phase) until a difference is found. The team that activates the switch first will place before the other team(s).