

*How to Develop a Botball Tournament Strategy*  
Mekai Ely, Mark Cieslikowski, Roak Ely  
Lincoln BCBs Community Team 07-0047  
Linda Reynolds [teckteacher@yahoo.com](mailto:teckteacher@yahoo.com)

# HOW TO DEVELOP A BOTBALL TOURNAMENT STRATEGY

To help your team decide which strategy is the best, have the team come up with strategy criteria. Team members can give their ideas on what they think makes one strategy better than another. Then all the members decide on what kind of strategy the team should plan. Below are strategy criteria and criteria questions that our team, the Lincoln BCBs decided upon.

## 1. Strategy Criteria

- A.. Use the KISS principle in our strategy.
- B. Go for tasks that have the greatest chance of success, even if they are less points.
- C. Use at least one sensor other than the light sensor.
- D. Design, build, and program one robot to complete one task first before moving on to a 2nd task or a 2nd robot.
- E. Use the shortest and easiest path for the robot to navigate and complete the task.
- F. Use as few motored devices as possible to complete tasks.

## 2. Criteria Questions

- Is it simple or complicated?
- How many points do you get?
- How easy is it to do?
- Can you do it every time?
- How long does it take?
- Will it be simple to program?
- Will it be simple to build?
- If there are 2 robots, is there a risk of them running into each other?
- Are less points that you can get every time better than trying for a lot of points that are risky?
- Is it better to go for several tasks or just one that gets a lot of points?

### 3. Team Questions

Come up with questions to arrive at the strategy criteria and then have each team member answer the questions. Read the answers to the entire group but not sharing who wrote them. Then vote for what should be included in the strategy criteria. Below are questions and answers that our team developed.

#### 1. What does it mean to be a member of the Botball team?

It means a lot to be a member on the Botball team. Not many people are invited to join. There is a lot of math and science that can be learned by working with robots. This will help with school and later in college.

You need to have good grades in school to be here, because you're working with robots and advanced stuff.

My parents are really proud of me because I'm learning how to engineer robots, and that makes me feel great.

If I am on the Botball team I know I need to fit in all the other important stuff like homework and chores or my parents will not allow me to continue on the team.

Robot designing is a big challenge because you need to know everything will work right and that is a lot of work when it comes to robots. They are unpredictable. Just because they work once doesn't mean that they will work again.

#### 2. What things do you think you will learn by being on the Botball team? Why are these things important to you? Will they help you in school? Will they help you later in life?

I think I will learn to be responsible and how to be a leader and you need that later in life.

I want to meet new friends and learn to build. If you learn to build you can use it later. I could help you learn how to solve problems, and we will always have problems to solve in Botball.

I want to learn to build and program robots and make websites and make new friends. Learning new skills will help me in later life. I will be able to figure things out better because I am developing these skills now in Botball.

Being on the Botball team is preparing me for later in life. In Botball you have to be able to plan your work and get things done on time. You always need to be balanced and make sure everything is prioritized and finished and that won't change.

Botball is a team sport so you learn teamwork. This is one of the most important thing that you can learn for later in life. Employers want employees who are team players.

### **3. The term KISS stands for Keep It Simple. How do you think KISS applies to robots?**

I think KISS means to keep your robot and the strategy simple and not to make it too complicated.

Keep It Simple means that a simple method is sometimes the best method. Robots are not very smart by themselves. If the robot has a complicated mechanism to accomplish tasks then it will take very complicated and advanced programming to operate the robot. There will also be more places for the robot to mess up.

Robots need very precise information and instructions to operate. Keeping it simple will make it easier to program robots and get them to work accurately.

### **4. The team wants to practice the KISS method with the designing and building the robots. What do you think that means? Does it mean not to use a lot of LEGO to build the robots? Does it mean to make things the easy way? Does it mean not to make things complicated? Can simple things work better than complicated things?**

Simple doesn't mean simpler. So well designed simple things can work just as well, if not better, than more complicated things. This is a principle that Einstein talked about.

You should not use too many pieces to build your robot because that means it might weigh too much. Also a lot of pieces increases the chance it will fall apart. Instead you should use just what is needed to accomplish the task that you want the robot to do.

KISS means to make the robot simple so it works correctly, but not to make it just the easy way. You need to put in a lot of thought to make something simple that really works.

I think it means to use simple motors and few parts and not so many LEGOs. The way to do this is to design before you build. Then after you build, go back later and look at what you built and see if you can use less pieces to do the same thing. Rebuilding is a good way to evaluate the design and the construction techniques.

## **4. Strategy Plans and Diagrams**

After deciding on a basic strategy, have each team member explain how they would accomplish the tasks. Then choose the best way or combine ideas and plan your strategy. Develop questions for each team member and have them write down the answers to explain their strategies. Have them draw an diagram of what they think the robot should do to accomplish the strategy. Two team members drew theirs on a white board. See Figures 1 and 2.

Figure 1  
Roak and Mark Working on the Diagram



Figure 2 Game StrategyDiagram

## 4.1 Strategy Questions

Below are samples of questions and diagrams from our team.

1. The 1st robot that the team is building is going to try and get the three houses and put the umbrellas in them and then move the houses into the starting box. Below is a picture of the game board. Draw a line (red) showing how you think the robot should move to do this task. The robot is carrying the umbrellas and can put them all into the houses. It also can move the houses either going forwards or backwards. Watch out for the other pieces on the game board. We do not want to move too many of them around the board.

2. What do you think the 2nd robot should do? These are the choices:

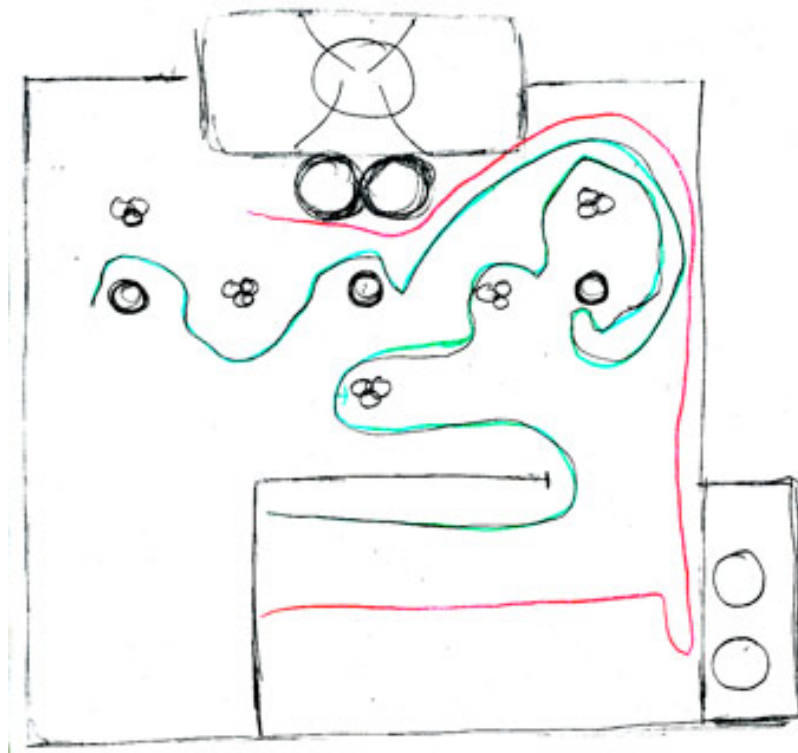
- A. Pick up the pineapples (the gold pom-poms) and put them in the yellow container (3 points per pineapple)
- B. Pick up the leaves (the green pom-poms) and put them in the green container (1 point per leaf)
- C. Pick up the two blue balls and put them in the containers (5 points for each ball)
- D. Reach up high and grab the 7 volcano lava (the red pom-poms) and throw them on the other side This has to be done before 45 seconds has past. The volcano may erupt between 45 and 55 seconds into the game. The game is only 90 seconds long. (2 points for each of the lava)
- E. Use a shield to block the volcano lava pieces from falling on our side of the board

2. Draw another line (blue) on the picture of the game board below to show how you think the 2nd robot should move to do the task you chose. Be careful that the robots don't run into each other. Tell which robot will move first and if it will do its whole task or if it will wait somewhere on the board for the other robot to do something.

When it turns it needs to push the pineapple plant out of the way.



### 4.3 Rejected Plans (See Figures 4 and 5)



Robot 1: Blue

Moves first to push the 3 bunches of pineapples and leaves out of the way. Then it visits each house and drops an umbrella. 15 points

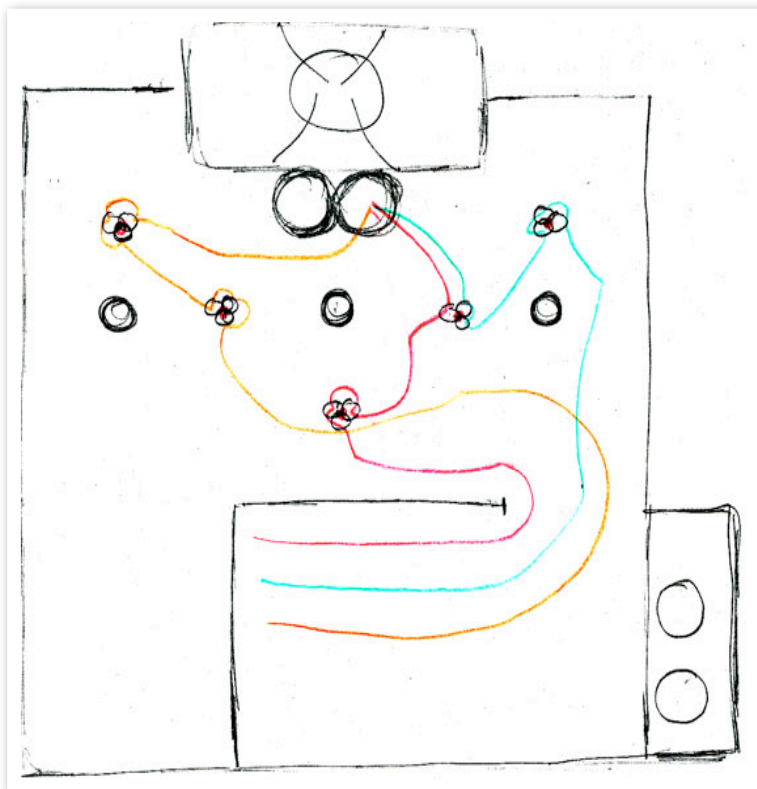
Time: 40 secs

Robot 2: Red

Moves after the 1st robot is finished with its task. It moves to the blue balls, picks them up and then travels to the bins to drop them in. 10 points

Time: 25 secs

Figure 2 Rejected Plan 1



Robot 1: Blue

Moves first to pick up pineapple and leaves farthest to the right. Then it moves to the next pineapple and leaves and picks them up. All the pineapples and leaves are then put in the compost bin. 6 points

Time: 30 secs

Robot 2: Red

Moves after the 1st robot is past the 1st house. It moves to the pineapple in the middle and picks it up. Then it gets the next two pineapples and puts all 3 in the pineapple bin.

Time: 30 secs

Figure 3 Rejected Plan 2