

Team 2102 Robot Game Manual

FoosBot

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1 Introduction

1.1 A Message From Game Creator

You've probably heard time and time again that winning is not important. That what is truly important is how much fun you had and the skills you learned in the process. So I apologize if I sound like a broken record, but it's true. All of it. In the end, years down the line, you're not going to remember what place you came in for a mock robotics competition in high school. What you will remember are the friends you made, the bonds you built, and the laughter you shared in the process. What you will remember are the skills you acquired and probably the most important skill of them all: what NOT to do. You learn by making mistakes. Mistakes and failures are not a bad thing. Take Thomas Edison for example - it is said that he failed more than 1,000 times while trying to invent the light bulb. When asked about it, Edison reportedly said, "I have not failed 1,000 times. I have successfully discovered 1,000 ways to NOT make a light bulb." So I hope you enjoy the experience with new friends and teammates while perhaps learning a few ways to NOT build a robot.

Game Creator - Nikki Arm

1.2 Introduction

FoosBot is a soccer like game played by two alliances of two teams each. Alliances compete against each other each with a robot on either side of the field to score in the opponent's goal. Points are awarded based on the the distance away from the goal the shooting robot is when the shot is made.

1.3 Description

Full game play details may be found in later sections of this manual. The description below is a brief summary of key elements. Please read all sections of the manual very carefully.

FoosBot is played on a 16 ft. by 8 ft. field. Each alliance has a goal in their color which they defend and 1 ball in their color on the field at a time.

One robot from each alliance is placed on either side of the field. Robot may not cross the centerline of the field.

There is no autonomous period in FoosBot.

Each FoosBot match is 4 minutes and 30 seconds. After 2 minutes and 15 seconds have passed the match is paused and robots switch sides of the field. The rest of the match is played with the robots on the opposite side on which they started. Points are awarded identically in each half of the match.

Points for the match are awarded as shown in Table 1-1

Table 1-1

Action	Value
Goal from half-court	3 points
Goal from outside Goalie Zone	2 points
Goal from inside Goalie Zone	1 point

Alliances are ranked in competition by how many points they score in a match. No extra points are awarded to the winning alliance. Each team on the alliance receives the full amount of points scored by their alliance.

1.4 Questions and Answer System

2 Arena

2.1 Zones & Markings

2.2 Field

2.2.1 Goals

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2.2.3 Feeder Shoots

2.2.4 Human Player Station

2.3 Foss Balls

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2 Arena

FoosBot is a soccer like game in which two (2) alliances of two (2) teams each attempt to score their colored foos ball into the opponent's opposite colored goal.

The ARENA includes all elements of the game infrastructure that are required to play FossBot: the FIELD, the Foss balls, and all equipment needed for FIELD control, ROBOT control, and scorekeeping.

Exact measurements for the arena are not critical to game play nor are exact definitions of zones; however, they are highly recommended to enhance game play.

Illustration included in all sections are labeled in regards to their individual scale.

2.1 Zones & Markings

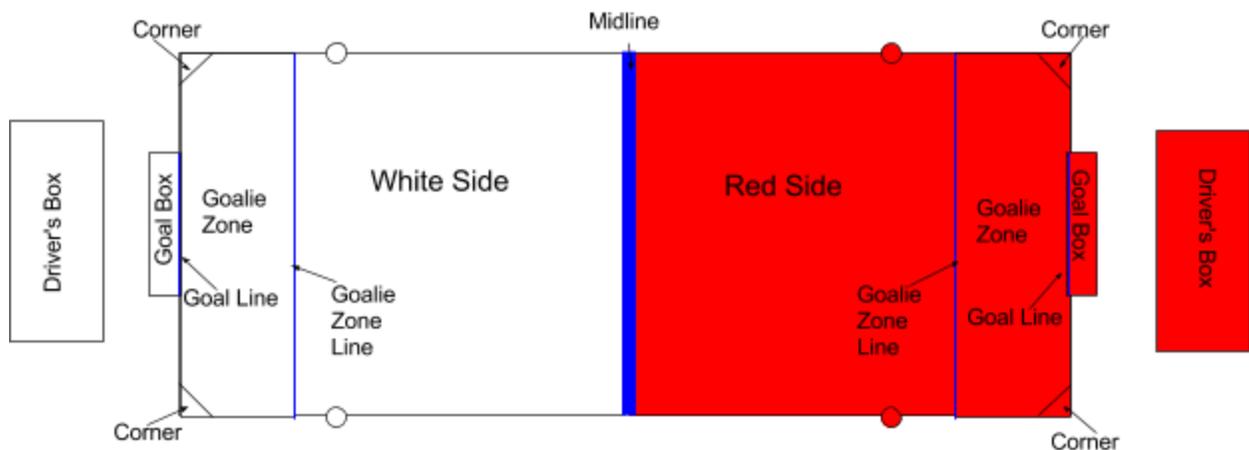
The FoosBot Arena contains the following areas relevant to game play. Each element is identified in Figure 2-1.

- GOALIE ZONE: an 8x2 ft infinitely tall volume formed by the wooden barriers and blue painters tape that is included in the respective team's side.
- GOAL BOX: an _____ tall box that marks the off field section the foosball is held in until it is removed and reentered into game play by a human player.
- WHITE SIDE: an 8x8 ft infinitely tall volume formed by the wooden barriers and the MIDLINE that contains the white alliances goalie zone and the white alliances defending robot.
- RED SIDE: an 8x8 ft infinitely tall volume formed by the wooden barriers and the MIDLINE that contains the red alliances goalie zone and the red alliances defending robot.
- CORNER: the areas on the corners that are blocked off by wooden barriers.
- DRIVERS BOX: an infinitely tall volume marked by tape on the ground that contains the drivers station table. Exact dimensions are not important as the Box is to mainly show general position of the drivers.

- HUMAN PLAYER BOX: an infinitely tall volume marked by tape on the ground that signifies where the human players must be positioned. Exact dimensions are not important as the Box is to mainly show general position of the human players.

The ARENA contains the following additional makings.

- MIDLINE: a line of blue painters tape that bisects the length of the FIELD. It's width is negligible.
- GOALIE ZONE LINE: a line of blue painters tape that marks the respective teams GOALIE ZONE. It's width is negligible.
- GOAL LINE: a line of blue painters tape drawn directly beneath the GOAL OPENING. It is 2in in width.



2.2 Field

The FIELD for FoosBot is a 16 ft. by 8 ft. area. The ground used should be a hard flat surface, most likely cement or flat tiles. All lines should be delineated with blue painters tape.

2.2.1 Goals

Goals are located on either end of the field and correlated with the color of the side of the field they are on.

2.2.2 Corners

Corners are blocked off with small pieces of wood to prevent balls from getting stuck there. There is still a slight possibility that the ball will become stopped in one of these blocked off corners, but it is much less likely. If this happens, the referees will declare the ball dead and a new ball will be inserted into play.

2.2.3 Feeder Shoots

Feeder shoots are small tubes of ____ PVC pipes inserted into the sides of the field. Two feeder shoots are placed on each length of the field, at ____ from the ends. Human players will be posted at two of these shoots during the actual game. When a goal is scored or a ball is declared dead the human players will insert balls back into play through these shoots.

2.2.4 Driver Station

Drivers Stations contain 1 table shared by an alliance where they place all the equipment they need to drive their robot.

2.2.5 Human Player Station

Human players are confined to the Human Player Stations, which are next to each of the Feeder Shoots. This area is not a fully defined zone but palyer are expected to stay sitting at all times.

2.3 Foos Balls

The Foos Balls are the standard foos ball size. You will

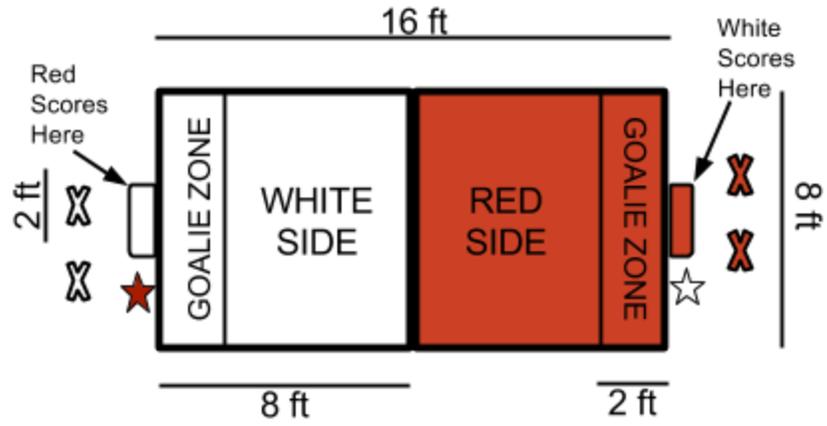
2.4 The FIELD Management System

2.5 How to Build the Field

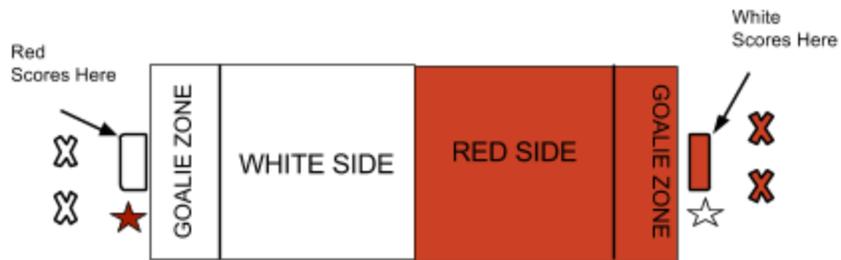
Alliances of two teams compete against each other on a 16ft x 8ft field to score goals in the soccer-like game, FoosBot. Each alliance has 1 official foosball; a total of 2 balls can be on the field at a time. Teams can only score goals by getting their colored ball into the goal on the opposite side of the field.

Field

*Note: Drawings are not drawn to scale.



-  White Drive Station
-  Red Drive Station
-  White Human Player
-  Red Human Player



-  White Drive Station
-  Red Drive Station
-  White Human Player
-  Red Human Player

3 Game

3.1 Match Play

3.1.1 Drive Team

3.1.2 MATCH Timing

3.2 Match Logistics

3.3 Scoring

3.3.1 Point Values

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3.4.1 Safety Rules

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3.4.6 Robot Gameplay

3.4.7 Human Interaction

3.4.8 Foos Balls

3 Game

3.1 Match Play

3.1.1 Drive Team

Drive Team Rules

1) **Drivers** - Only one driver per robot, however drivers may switch during any point in the game. Drivers must stay at their designated table and not interfere with other drivers.

2) **Coaches** - One other team member may stand with the driver and act as a coach to give the driver suggestions about driving or gameplay.

3) **Human Players** - Each team must provide one human player. The job of the human players is to regulate balls outside the field. Each side of the field has two players, one to catch the ball and one to put balls back into play through the slots in the goalie zone. Balls must be passed between players from one side of the field to the other to be put back into play on their proper sides. Human players sit next to the goal of the opposite team as to regulate their own balls.

3.1.2 MATCH Timing

Each MATCH is broken into two periods. Each period is two (2) minutes and thirty (30) seconds long.

3.2 Match Logistics

Robots must start facing the goal of the side of the field they are on with their backs to the centerline.

When the match starts each team's human play shoot a foos ball onto the field through the feeder shoot

3.3 Scoring

3.3.1 Point Values

Action	Points
Goals scored past the halfway line	3
Goal scored outside the goalie zone	2
Goal scored inside the goalie zone	1

3.3.2 Penalty Assignments

Action	Penalty
FOUL	1 point subtracted towards _____ total score

YELLOW CARD	A warning issued by the Head REFEREE for shocking ROBOT or Foosbot Team member behavior or repeated rule violations. A subsequent YELLOW CARD within the same tournament phase will lead to a RED CARD.
RED CARD	A penalty assessed for shocking ROBOT or Foosbot Team member behavior, or repeated rule violations, which results in a Team being DISQUALIFIED for the MATCH.

3.4 Rules

3.4.1 Safety Rules

3.4.2 Pre-Post Match rules

3.4.3 General Rules

gracious professionals

3.4.4 Robot Rules

-ROBOT height and weight, may be any measure during the MATCH so long as it is still able to be transported by the team that made the ROBOT

-ROBOTS may not extend beyond their FRAME PERIMETER (12in by 12in).

Violation: FOUL.

3.4.6 Robot Gameplay

3.4.7 Human Interaction

3.4.8 Foos Balls

Rules

- **Robot Conduct and Field Rules**

- 1) **Positions** - Each alliance must have one robot on each half of the field. The robot in the red half of the field must remain in the red half for the first half of the game. Likewise, the robot that starts in the white half of the field must stay there until half time. Then, the robots of each alliance switch places. This makes both robots in the alliance play defense and offense during a match.
- 2) **Match Time** -The match is broken into two periods. Each period is 2.5 minutes long. At the end of the first period all balls are declared dead, robots may be placed into ready positions and the robots switch places so that each team gets the opportunity to play defense and offense.

- 3) **Goals** - Robots score points by putting their color ball into the opposing goal. Goals scored from past the halfway line are worth **three** points. Goals scored outside the goalie zone are worth **two** points. Goals from inside the goalie zone are worth **one** point. Scored balls are re-entered on the opposite side of the field through slots in the goalie zones.
- 4) **Contact** - This is not a contact game. Robots who intentionally come into contact with another robot are penalized with **minus one** point.
- 5) **New Balls** - At the start of play, balls are entered into the goalie zones. A human player enters the ball from pvc tubes which are located on either side of the goalie zone. A robot cannot be intentionally in control of a ball of the opposing alliance's color for any amount of time. Blocking an opposing ball is permitted as long as the ball is not held by the robot. If a ball is stuck in a robot of the opposite alliance for 10 seconds a new ball is entered into play.
- 6) **Boundaries** - Robots cannot pass the black line in the center of the field, enter the actual goal, or leave the field. However, if a robot is declared dead, its alliance bot may cross the centerline to assume both defensive and offensive positions. Robots must always be in contact with the field, **no hover robots**.
- 7) **Goalie Zone** - Defensive robots are not allowed to stay inside the Goalie Zone for longer than 10 seconds at a time.
- 8) Robots must follow **The Robot** rules and restrictions (innovative and creative ideas are encouraged, but don't do something to your robot that you know probably wouldn't be allowed)

4 Robot

- 4.1 Overview
- 4.2 General Robot Design
- 4.3 Safety & Damage Prevention
- 4.4 Budget Constraints
- 4.5 Fabrication Schedule
- 4.6 Material Utilization
- 4.8 Motors & Actuators
- 4.9 Power Distributors
- 4.10 Control, Command & Signals Systems
- 4.12 Operator Console

4 Robot

- 4.1 Overview
- 4.2 General Robot Design
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- 4.4 Budget Constraints
- 4.5 Fabrication Schedule
- When teams are allowed to build their robots
- 4.6 Material Utilization
- 4.8 Motors & Actuators
- 4.9 Power Distributors
- 4.10 Control, Command & Signals Systems
- 4.12 Operator Console

The Robot

Description

Each robot will tend to consist of the following:

- plastic/aluminum base
- two servos for movement
- two or more wheels (swivel wheel for two-wheeled robots)
- arduino board
- battery unit w/ 6 batteries
- extra boards for sensors
- gearing/gear boxes

Requirements

- Maximum supply voltage is 7.2 volts using 6 AA batteries
- Arduino nano as controller
- There must be at least one part manufactured by the students on each robot. This might be 3D printed, laser cut, or machined.
- Some form of wireless connection to control the robot
- Robots must have a mount for a flag declaring their alliance color (will change between red & white).
- All Parts used on the robot outside of the electronics allowance must be included in a Bill of Materials and not exceed a 40 dollar value.

Restrictions

- Robots must fit within a 12 inch x 12 inch perimeter. Robots can be any height and weight, while still being able to be transported by the team which made it.
- Robot parts shall NOT be made from hazardous materials, be unsafe, cause an unsafe condition, or interfere with the operation of other robots.
- Robot may NOT produce sounds in excess of 110 decibels.
- For this competition, parts may NOT be made on mills or lathes.

5 Tournament

5.1 Overview

5.1.1 MATCH Schedules

5.2 Practice MATCHES

5.2.1 Schedule

5.2.2 Filler Line

5.3 Qualification MATCHES

5.3.1 Schedule

5.3.2 MATCH Assignment

5.3.3 Ranking Score (RS)

5.5 Tournament Rules

5.5.1 Safety, Security, and Conduct Rules

5.5.2 Eligibility and Inspection

5.5.3 REFEREE Interaction

5.5.4 YELLOW and RED CARDS

5.5.5 MATCH Replays

5.5.6 TIMEOUT and BACKUP TEAM Rules

5.5.9 Special Equipment Rules

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6 Glossary

9)

Scoring

HALF ~ FIELD GOAL ----- 3 Points

OUTSIDE GOALIE ZONE GOAL ----- 2 Points

INSIDE GOALIE ZONE GOAL ----- 1 Point

