2024 3D Printable Field

FIRST Robotics Competition – Crescendo

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Introduction

For 2024, the 3D printable field was designed by Stratasys employees and printed on a Bambu Lab P1S with Bambu Lab white, black, red, blue and orange PLA Matte. The field itself is a 1:40 scale field designed to fit in a small space with field components that may be able to be used in future years (game dependent).

The goal of the 3D printable field for the year was to make it as easy as possible to print on any printer that is easily accessible to a FIRST Robotics Competition Team. Every effort was made to make this field quick and easy to print for students and adults alike. A full field can be printed on a single Bambu Lab P1S in approximately 5 hours and 15 minutes. This can be further reduced by using multiple different printers to print.

While every effort is made to ensure that dimensions and tolerances are true to the real field, there can be significant variation in print quality and scaling depending on your printer, material, software and occasionally human error. Ensure that your printer is properly calibrated, you are using dry, quality filament and your slicing setting are appropriate for what you are printing.

File Structure

All files are organized into two separate folders, "Individual Parts" and "Combined Sets".

Individual Parts

This folder contains all parts individually, and not grouped together in any way. If you are looking to print a full game set, use this folder and build your own combined set.

- Game Piece
- Human Player Station Blue
- Human Player Station Red
- Driver Station Top Standard
- Driver Station Top Triangle
- Driver Station Base
- Speaker – Hood
- Speaker – Base Backboard
- Speaker – Base Red-Blue
- Speaker – Speaker Base
- Standard Field Wall Section
- Ring Cart
- Center Structure
- Truss
- Amp Station Red
- Amp Station Blue
- KB-2024-3DPrint

Combined Sets

This folder contains pre-determined sets of the game field to get you started as soon as possible. These only contain necessary elements, no game pieces and the kit bot are not included.

- Crescendo Game Specific Blue
    - Center Structure
    - Truss (3x)
    - Driver Station Top Triangle (2x)
    - Human Player Station Blue
    - Amp Station Blue
    - Driver Station Base (3x)
    - Speaker – Base Backboard, Base Red-Blue and Speaker Base (assembled)
    - Speaker – Hood
- Crescendo Game Specific Full Field
    - Human Player Station Blue
    - Human Player Station Red
    - Driver Station Top Standard (2x)
    - Driver Station Top Triangle (4x)
    - Driver Station Base (6x)

- o Speaker – Hood (2x)
- o Speaker – Base Backboard, Base Red-Blue and Speaker Base (assembled) (2x)
- o Standard Field Wall Section (12x)
- o Center Structure (2x)
- o Truss (6x)
- o Amp Station Red
- o Amp Station Blue

File Descriptions & Printing Tips
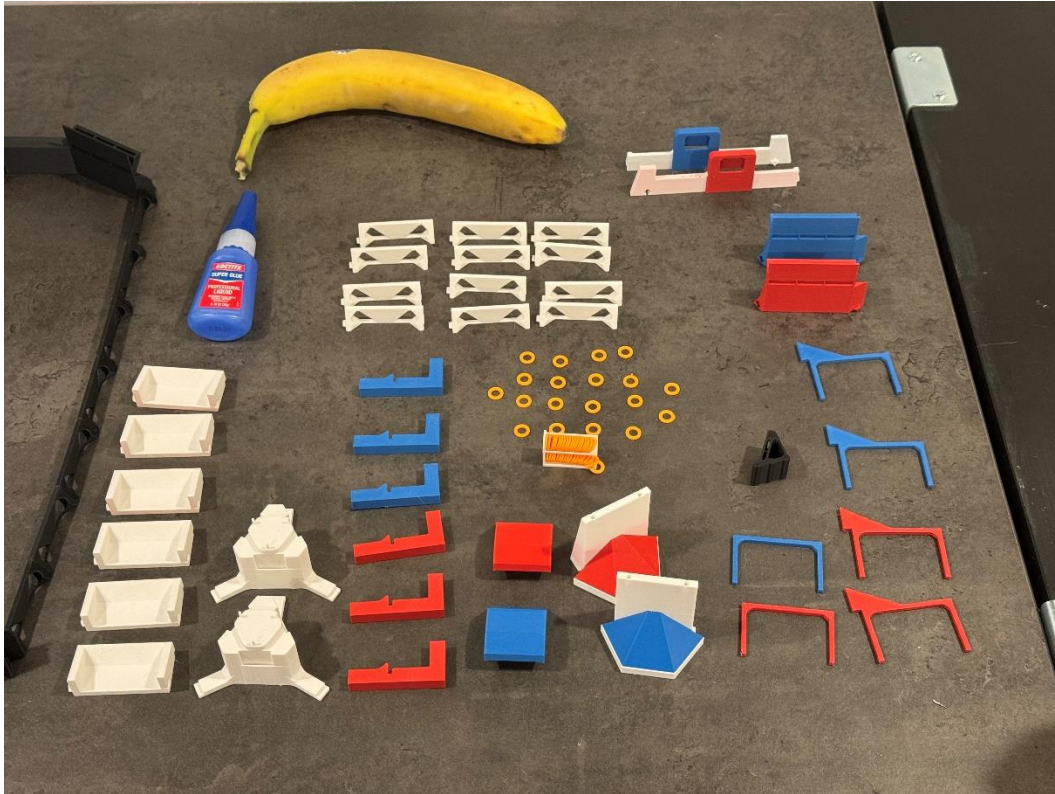
Overall Tips

Ensure that the diamond alignment shapes are always touching the build tray, some slicers will auto orient the piece for speed instead of quality, make sure to always pay attention to where the diamond alignment shape it.

No support is needed for printing the 2024 Crescendo 3D printed field.

There are a few areas where bridging occurs, there is a chance that a game piece will not fit through the human player station if your printer does not properly bridge.

Game Piece

This piece is somewhat challenging to print due to the overall size of the scaled-down game piece. We found that reducing the printing speed by 75% (100%->25%) resulted in successful parts. At full speed, the hot end was tearing multiple parts from the build tray during the printing process and the issue would compound itself.

Speaker

There are 4 components to the speaker, they were designed separately to incorporate different colors. Three components can be combined, and the fourth needs to be printed separately. Once printed, the hood will fit into the top of the Speaker – Base Backboard, make sure the hood is facing the correct direction.

Speaker Combined Components:

1. Speaker – Base Backboard
2. Speaker – Base Red-Blue
3. Speaker – Speaker Base

Speaker Individual Component:

1. Speaker – Hood

Center Structure & Truss

At the scale of the design, we decided it was not feasible to reasonably create a door for the game piece to be inserted, so we left an opening for it instead. To assemble the structure, simply press-fit the truss onto each arm of the center structure and attach raw filament between the dimples on the truss.

Kitbot

The kitbot is included as a 1:40 scale model as well, with the right materials and a slight re-design, you should be able to get it to shoot game pieces.

Amp Stations

Outer brim was used.

Human Player Stations

Outer brim was used.

Standard Field Wall Sections

Outer brim was used.

Assembly Instructions

Diamond Alignment Mechanism

Each connecting piece uses a simple alignment mechanism to help with field assembly after printing. To assemble the pieces, you simply need to push the pieces together. Depending on your printer and the overall quality of the print, they may be a friction fit.

Recommended Adhesive Methods

There are several methods that can be used to assemble the field and keep it assembled. Some of the more common methods are shared on all3dp.com, a combination of the soldering and 3D printing pen methods were used to assemble the majority of the demo field pictured. Loctite Super Glue was also trialed on a few pieces with success.

Pictures

Yes, the banana is 3D printed and feels realistic.