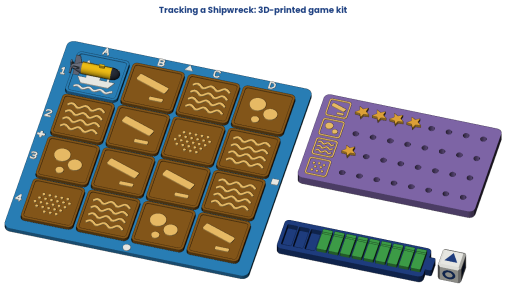
Optional · 3D-printed game kit

Tracking a Shipwreck: 3D Print Guide

These printable pieces replace the paper Game Kit with sturdy, hands-on parts: flip tiles you can feel, a robot game piece, a map tray, a peg board for the AI's stars, a battery with pull-out cells and a die. Everything prints flat, and only the AUV needs supports (they are already on in the projects). Each piece comes in two versions:

- **Single-color project** `Tracking a Shipwreck - 3D Kit (single color).3mf` : 7 plates, one filament color per plate. The tile pictures are raised and engraved, so they work in any one color and can be read by touch.
- **Multi-color project** `Tracking a Shipwreck - 3D Kit (multi color).3mf` : 9 plates, at most 4 AMS colors per plate. Pieces share a plate only when they share colors, so the printer swaps filament less, and every multi-color plate leaves a clear spot for the purge tower.
- **Other slicers** (PrusaSlicer, Cura …): `STL for other slicers/` has one STL per plate (multi-color: one per plate and color).



One team set: the plates

Single-color project			
Plate	**What prints**	**Time**	**PLA**
1	Fit test - print first white	0 h 31	20 g
2	Ocean tiles x16 brown	2 h 47	102 g
3	Map tray blue	1 h 58	106 g
4	AI Brain board purple	1 h 10	55 g
5	Star pegs x24 + AUV yellow	0 h 32	9 g
6	Battery case + die navy	0 h 31	19 g
7	Battery cells x12 green	0 h 23	13 g
	Whole kit	**7 h 52**	**323 g**

Multi-color project			
Plate	**What prints**	**Time**	**PLA**
1	Fit test - print first white	0 h 31	20 g
2	Ocean tiles x15 white, blue, brown, tan	3 h 05	102 g
3	Map tray white, blue	2 h 00	106 g
4	AI Brain board tan, purple	1 h 13	56 g
5	AUV yellow, black, gray	3 h 15	52 g
6	Star pegs x24 gold	0 h 26	7 g
7	Battery case navy	0 h 22	15 g
8	Which-way die + Start tile white, blue, navy	3 h 22	65 g
9	Battery cells x12 green	0 h 23	13 g
	Whole kit	**14 h 37**	**435 g**

*Times and grams come from Bambu Studio slicing every plate for a **Bambu Lab P2S** (0.4 mm nozzle, 0.20 mm Standard, Bambu PLA Basic, Textured PEI plate, supports on the AUV only, purge tower on for multi-color plates). Other printers differ; Bambu Studio offers to switch the printer when you open a project. Print plate 1, the fit test, first.*

How to print

Settings that work for every piece

- PLA, 0.4 mm nozzle, 0.2 mm layers
- 3 walls, 15% infill, 4 top / 4 bottom layers
- **Supports: AUV only** (its tail fins overhang). The projects turn them on for it; in other slicers, turn on supports touching the build plate. Each plate is one print, laid flat.
- Tray: add a brim if your corners lift.
- **Bambu P2S:** the projects are set for it and its Textured PEI plate. PLA prints in cooling mode with the door closed when the room is below 30 °C; in a warmer room, open the door or lift the top glass.
- Tiles print **object side down**: the engraved pictures are on the bed and the slicer bridges over them. Keep bridging on (it is by default).

Fit

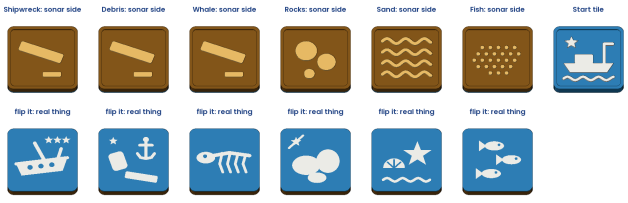
- Star pegs: 4.8 mm peg in a 5.2 mm hole (0.2 mm clearance per side). Too tight? Scale the pegs to 96%. Too loose? 104%. The fit test tells you which.
- Battery cells: 0.2 mm clearance per side in each socket.
- Tiles: 45 mm in 45.8 mm pockets, so they lift out easily.
- **Print plate 1, the fit test, first** (about 20 g): it checks the pegs, tiles and cells. Its one-page sheet says what to change.

Two colors on a single-color printer

Add a filament change (Bambu Studio / OrcaSlicer: right-click the layer slider, "Add pause" or "Change filament"; PrusaSlicer: the "+" on the layer slider) at the layer where the raised details start:

- **Tiles:** 4.0 mm (brown tile, then tan for the sonar shapes and rim)
- **Map tray:** 4.0 mm (blue tray, then white letters and edge shapes)
- **Brain board:** 8.0 mm (purple board, then tan sonar icons)

Tiles up close



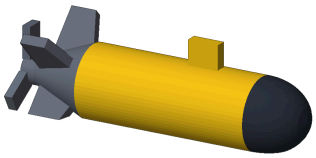
Sonar side (top): raised 1.2 mm, read by touch, with a rim so the tile sits flat. Real-thing side (bottom): engraved 1 mm, with the reward stars.

Multi-color (AMS / MMU)

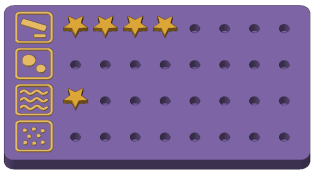
- **Bambu Studio / OrcaSlicer:** open `… (multi color).3mf`. Each plate is one print; each piece is one object sitting on the bed with its color parts already on their own filament slots. Pick your printer if asked, then match each plate's colors to your AMS.
- **PrusaSlicer, Cura and others:** open a plate folder in `STL for other slicers/multi-color/`, import **all** its files at once, answer **Yes** to "single object with multiple parts", then give each part the filament in its file name.
- A color file on its own is not a print: the tan, white and navy parts sit on top of or inside the others.
- **Purge tower:** every multi-color plate has a clear spot for it (the Start tile prints with the die to make room on the tiles plate). Leave it on; drag it only to open space.
- The AUV and die swap color on almost every layer, so most of their plates' time and filament is purge. For a faster, cheaper kit, print those two from the single-color project.

Playing with the 3D kit

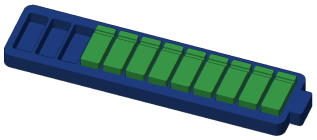
AUV game piece



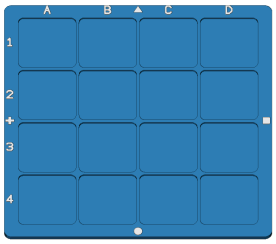
AI's Brain board with star pegs



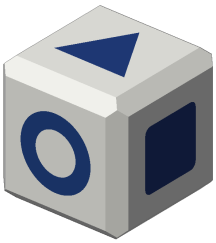
Battery case + cells



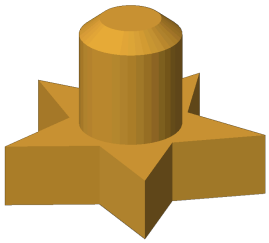
Ocean Map tray



Which-way die



Star peg



What changes

- **Map:** drop the 15 shuffled tiles into the tray, sonar side up; the Start tile goes in A1. The AUV sits on its square.
- **Peek:** lift the tile, flip it, feel and look, then put it back sonar side up.
- **AI's Brain:** push a star peg into the row to reward; pull one out to take a star away.
- **Battery:** pull out one green cell for each move (2 more for rocks). Empty sockets = battery used.
- **Ties:** roll the die instead of flipping arrow cards. Go toward the map edge with the same shape (▲ top, ■ right, ● bottom, ✚ left). ○ means roll again, and so does a shape that points off the map or to a square that is not tied.

Accessibility and safety

- Raised lines are 1.2 mm high and at least 2 mm apart, following the Round Table guidelines for touch readers.
- Sonar pictures differ by shape, so students who are blind or have low vision can play by touch; pair them with a sighted Recorder.
- Star pegs, cells and the die are small parts: fine for ages 6-8, but keep them away from younger children.
- Sand any sharp edges; PLA is not dishwasher-safe.

Sources

- Round Table on Information Access for People with Print Disabilities (2024): Guidelines for Producing Accessible 3D Prints. https://printdisability.org/wp-content/uploads/2024/07/Guidelines-for-Producing-Accessible-3D-Prints-2024-PDF.pdf
- Tactiles.eu: Line symbols (raised 1.0 × 1.1 mm lines). https://tactiles.eu/guidelines/4-1-line-symbols/
- Makelab: 3D printing design guidelines (0.2-0.3 mm clearance per side). https://help.makelab.com/help/article/what-are-design-guidelines-for-3d-printing
- Prusa Knowledge Base: Importing a multi-material model. https://help.prusa3d.com/article/importing-multi-material-model_121191
- 3D Printing Zone: How to set up a multicolour 3MF (Bambu Studio, OrcaSlicer, PrusaSlicer). https://3dprinting.zone/multicolour-3mf-file-guide/
- WHOI Oceanographic Systems Lab: REMUS 100 (19 cm diameter); Purcell et al., OCEANS 2000 (160 cm long). https://www2.whoi.edu/site/osl/vehicles/remus-100/

Files and help: https://shipwrecktracker.vercel.app · shanejwines@gmail.com