



Project Synthara - Generative Design FPV Drone Frame 3.5 Inch



MacNeill

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Summary

Synthara is a 3D-printed, generatively designed FPV drone frame optimized for sub-250g builds with a Naked GoPro.



4.66 hrs



2 pcs



0.20 mm



0.40 mm



PET
PC



48 g



Prusa MK4S

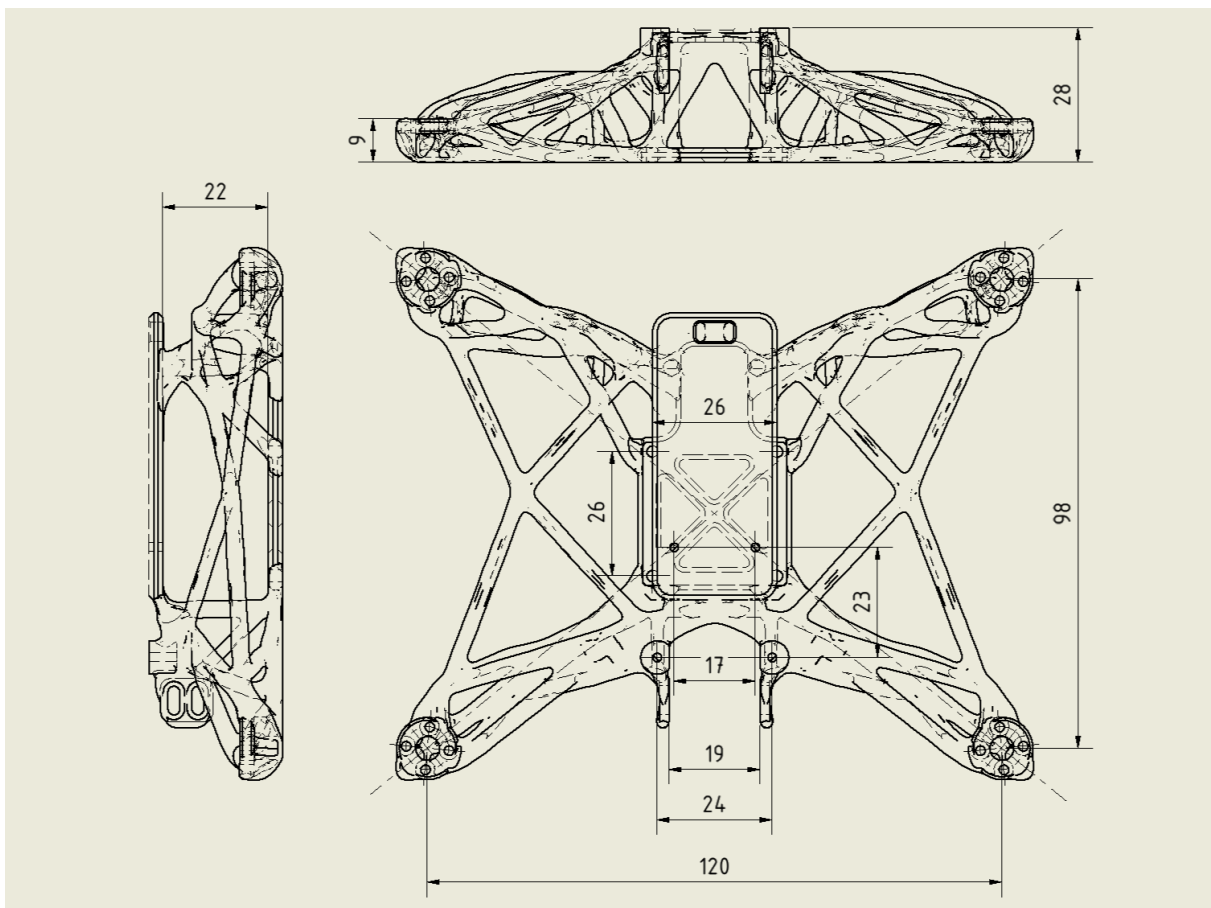
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Drones are a perfect playground for lightweight yet robust designs, and Synthara takes full advantage of cutting-edge generative design techniques. This 3D-printed drone frame is engineered for FPV enthusiasts looking for a balance between strength, weight, and aesthetics.

Design Philosophy

The goal behind Synthara was to create a sub-250g FPV drone, even when equipped with a naked GoPro. To achieve this, the frame was developed using an iterative generative design process in Fusion360 that reduces weight while maintaining structural integrity. The motor spacing and overall dimensions are based on the **GEPRC Smart35 3.5-inch frame**. By leveraging AI-driven optimization and organic structures, the frame exhibits a futuristic, nature-inspired appearance that also enhances mechanical performance. The design process prioritized stress distribution and impact resistance, making it a viable alternative to traditional carbon fiber frames.



Manufacturing and Materials

Synthara is designed for FDM 3D printing, making it accessible to makers worldwide. The frame has been successfully printed using **carbon-fiber-reinforced polycarbonate (Prusament PC Blend Carbon Fiber -**

PCCF), providing a strong yet lightweight structure with excellent impact resistance. Other materials like PLA, PETG, or other carbon-fiber-reinforced filaments can also be used, depending on the desired balance between flexibility and rigidity.

Printed with PCCF, three perimeters and a 15% infill the frame weighs about 29g.

Required Components

In addition to the 3D-printed frame, the following components are needed to complete the build:

- FC - GEPRC GEP-TAKER G4 35A AIO
- Camera and VTX - Walksnail 1S HD Nano Kit V3
- RX - Happymodel ExpressLRS EP2 2.4Ghz
- Motors - iFlight XING2 1404 3800KV
- Propellers HQ Prop T3.5x2.5x3 - PC - 1.5
- Battery - Tattu R-Line 4S 650mAh
- HD Cam - Naked GoPro Hero 11 Black - Flywoo V2.1
- TPU parts - Since the frame has the same dimensions, the mounts for the Smart35 can be used:
 - [Naked-GoPro-Mount](#)
 - [Camera Adapter 14-19mm](#)
 - [Mount-Plate](#)
 - [Soft-Mount-Pads](#)
- And some spare parts like the battery strap, LiPo-pad, screws, cables and adhesive tape
 - to connect a USB-C cable to the FC, you will need a 90° USB-C angle

Assembly Challenges

Fitting all components into the compact frame and performing the necessary soldering was a challenging task, requiring careful planning and precision. However, despite the tight space constraints, the build process was successful, demonstrating the viability of Synthara as a functional and lightweight FPV drone frame.

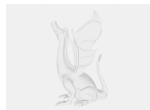
A Generative Journey

One of the most fitting aspects of this project is that both the **design of the frame** and even its **name and this description** were created using generative approaches. Just as the frame was developed through an AI-assisted design process, this article and the project name Synthara were crafted with the help of ChatGPT. This parallel highlights how generative methods can enhance both engineering and creative processes.

Get Involved

The Synthara frame is available for download on [Printables.com](https://www.printables.com), where you can tweak and improve it for your own builds. Whether you're an FPV racer, freestyle pilot, or drone builder, this project is meant to evolve with the community. Try it, modify it, and share your experiences!

Model files



synthara-frame.stl



synthara-frame_pccf.3mf



synthara-frame_petg.3mf

Print files



synthara-frame_pccf_04n_02mm_pc_mk4s_4h40m.bgcode

⚙️ PC ⚙️ 0.40 mm ⚙️ 0.20 mm ⌚ 4.66 hrs ⚖️ 48 g 🖨️ Prusa MK4S



synthara-frame_petg_04n_02mm_petg_mk4s_5h8m.bgcode

⚙️ PET ⚙️ 0.40 mm ⚙️ 0.20 mm ⌚ 5.14 hrs ⚖️ 48 g 🖨️ Prusa MK4S

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