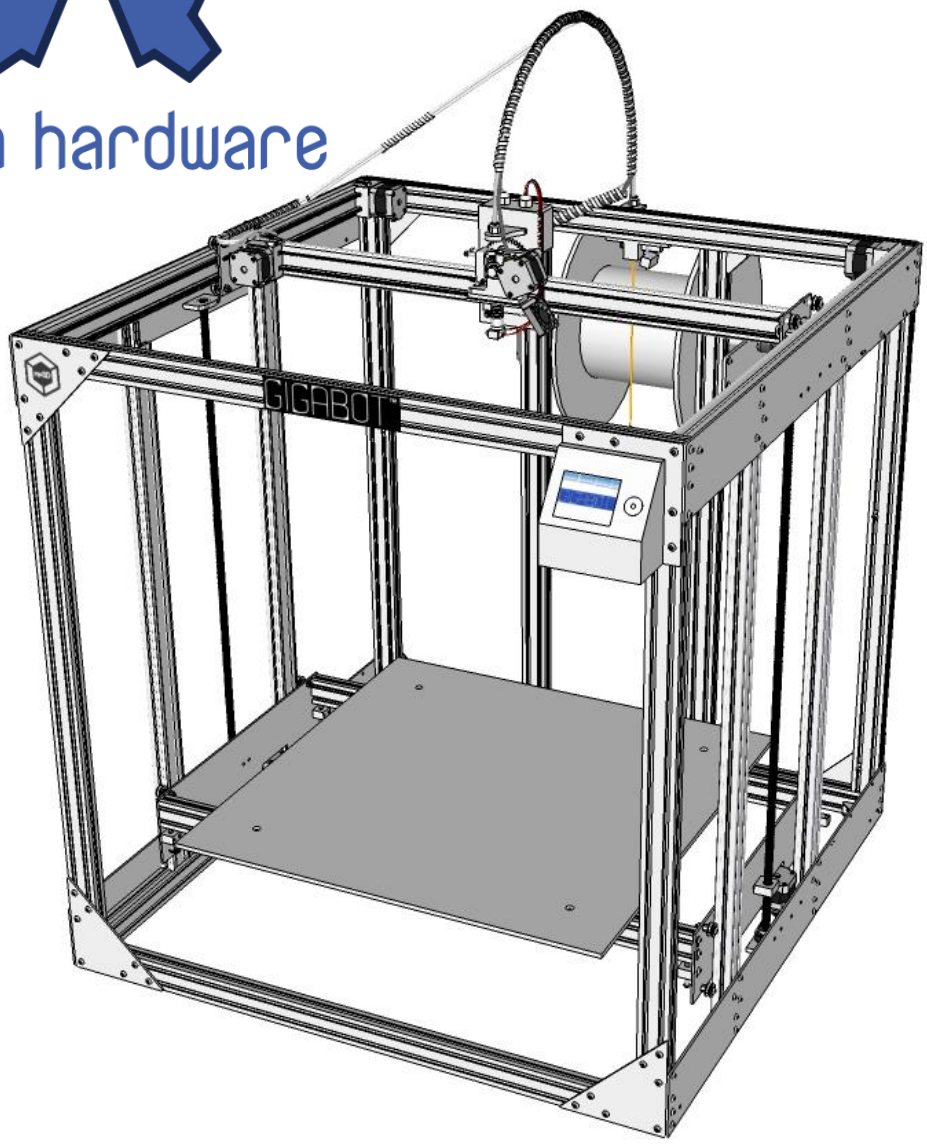
GIGABOT™

As Open Source Platform

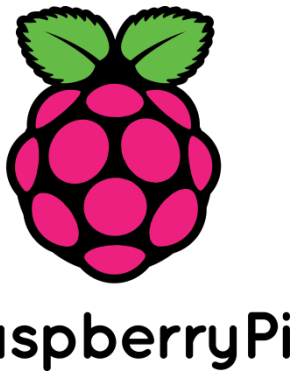
open hardware



Gigabot as Open Source-Hack able Platform

Include parts from many high profile open source hardware companies produces and call them out in marketing.

Built with…



Summary and Goal

The goal of the OpenGB (development name) is to create a version of the Gigabot (GB) that is more accessible to the maker/hack type customer. A bot that is comfortable in a home office. Like any design there are tradeoffs when defining features, but the following are general goals:

1. Size – OpenGB needs to fit through the a typical residential door

2. Configuration – OpenGB needs to require access to a minimum number of sides when being used. And take up the least amount of floor space as possible.

3. Cat proof – OpenGB needs to be safe for typical household use. Minimizing pinch and or burn points.

4. Networked – OpenGB needs to be easy to network on a typical home network

5. GUI – OpenGB needs a feature rich, user programmable interface on the front of the bot AND a mobile enabled full control web interface.

6. Expanded Features/ Error detection –Filament feed error, low filament error, motor driver faults

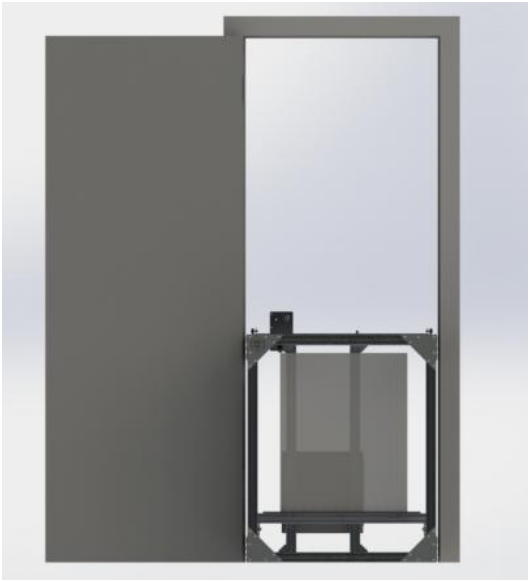
7. Hackable (hardware)– OpenGB needs to expose as many data ports (GPIO, UART, I2c, etc) as possible with easy to use terminal blocks or common, easy to source plugs and provide voltage at both power, and logical levels (12v or 24v, and 5v and 3.3v) anywhere a user might want to add features.

8. Hackable (software) – OpenGB needs to have all open source software that is fully documented. Use python where possible because it is easy to learn.

Configuration and Size

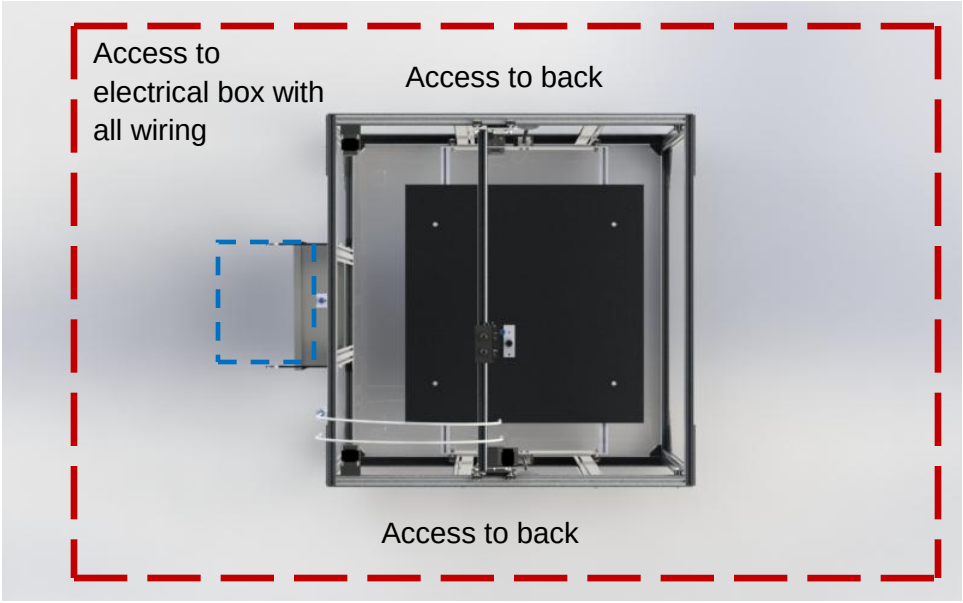
The Gigabot 2.0 does not fit through most residential doors.

Gigabot 2.0 Vs 30 inch door



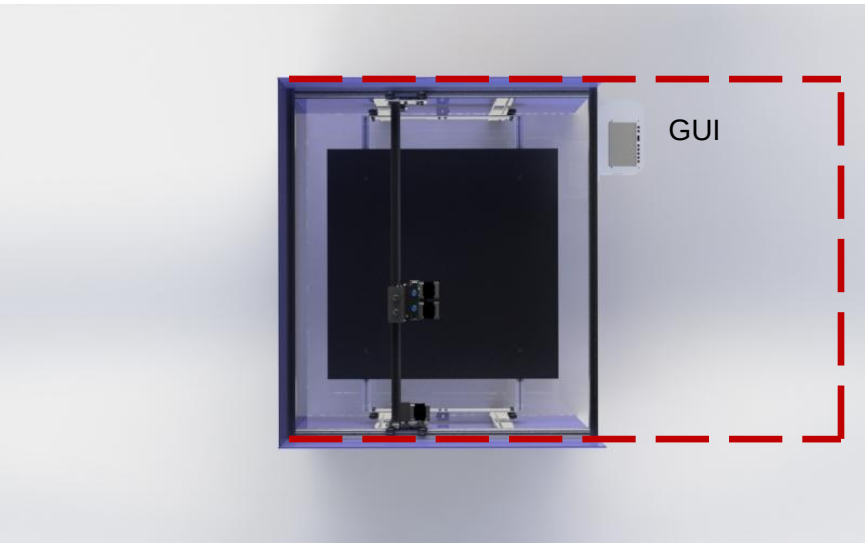
29 inch GB vs 30 inch door

The overall footprint of the bot is also import for limited space in a home office. It is important to remember that the footprint also includes the easements for access to different parts of the machine during use.



Front
(Logo and
name plate)

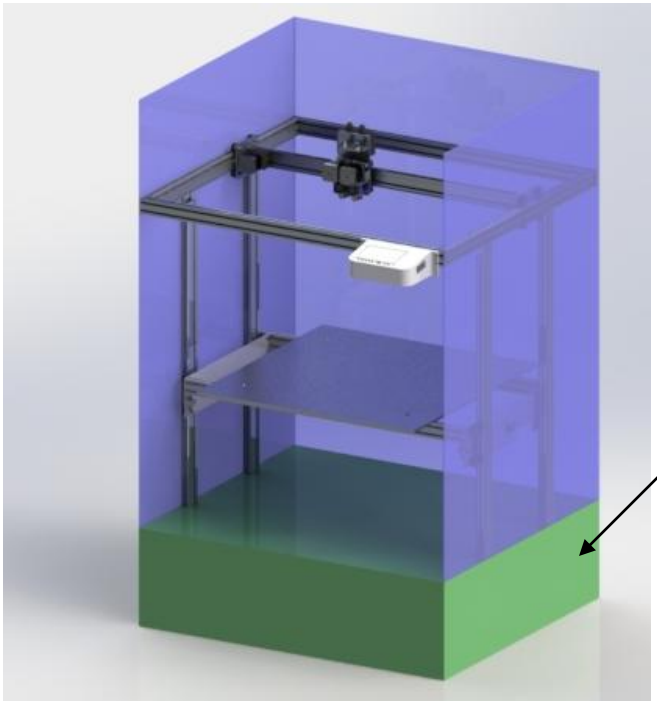
Gigabot 2.0 Foot print (~5’ x ~6’)



Front
(Logo and
name plate)

OpenGB Goal Foot print (~3’ x ~4’) 1/3 of the space needed

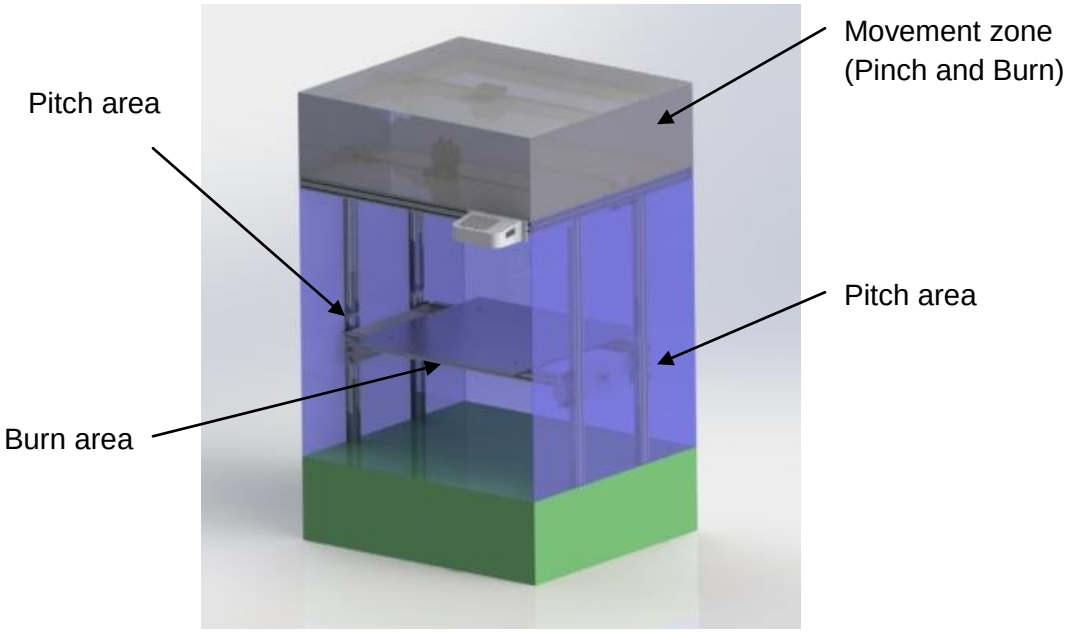
Make better use of vertical space

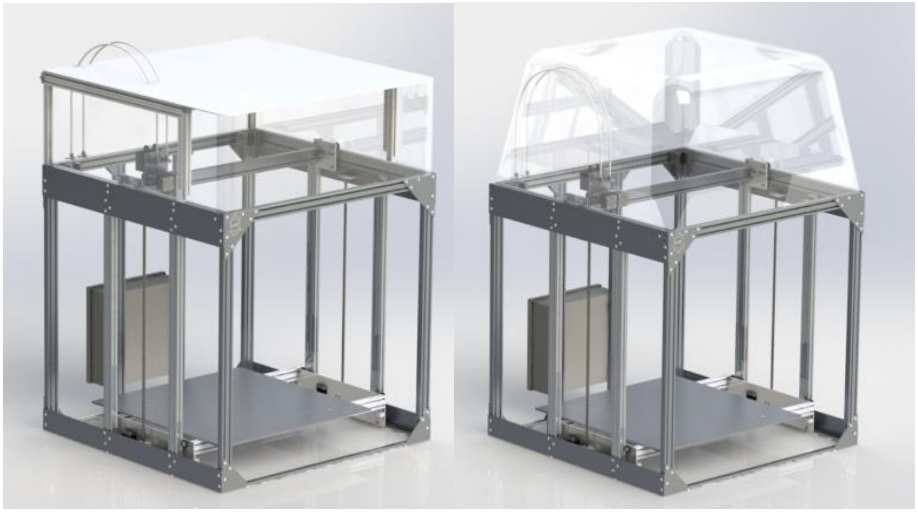


Increase the height and use space for filament and power supply, etc

Safety (aka Cat Proofing)

The Gigabot has a number of pinch and burn points that should be covered for home office use. The wheels, pulleys and belts on all three axis's are exposed and have the potential can bite an untrained user. The extruder and heated bed can burn.





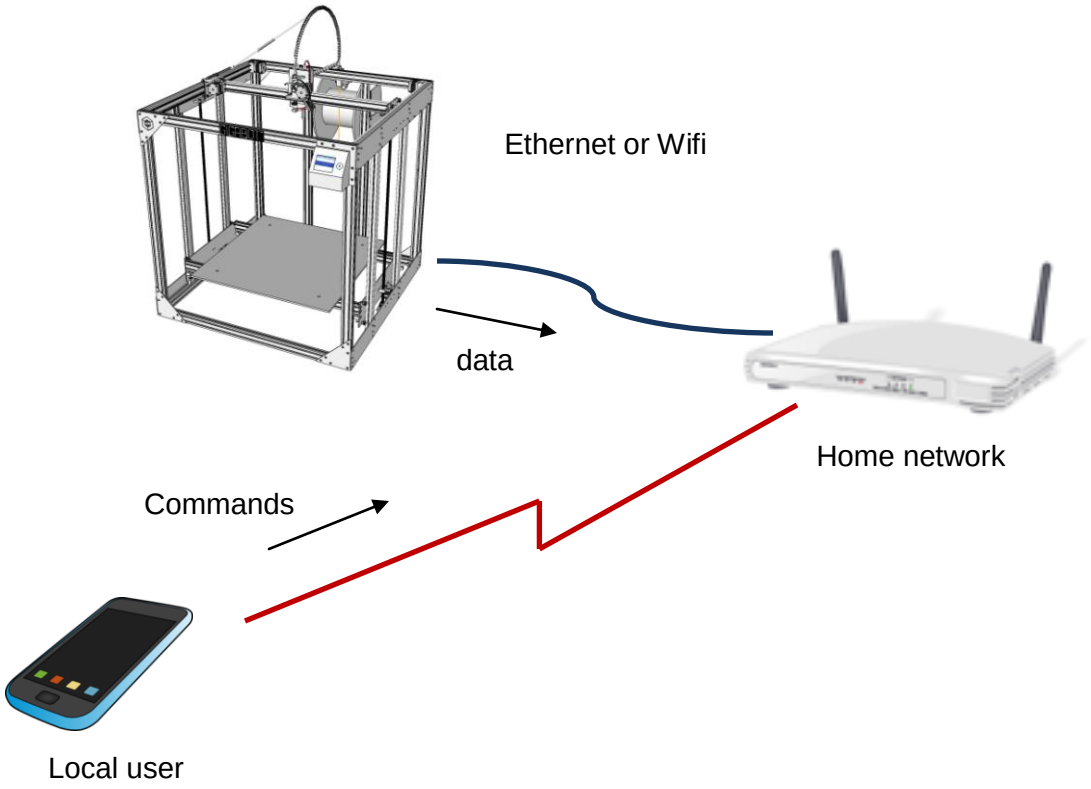
Framed and unframed cover ideas (shown on Gigabot)

Combining full side panel and a cover would greatly reduce the risk of injury. Another good practice is to include more big, bold, warning labels.

Below are some examples:

Networking

Network connectively for the OpenGB is provided the single board computer. All of the computers being evaluated included a Ethernet build and at least one USB port. With the addition of the USB hub a USB doogle for Wifi is supported.



It is also possible to run the single board computers network in ad-hoc mode. This requires no external network or router. You wifi device can connect directly to the Gigabot.

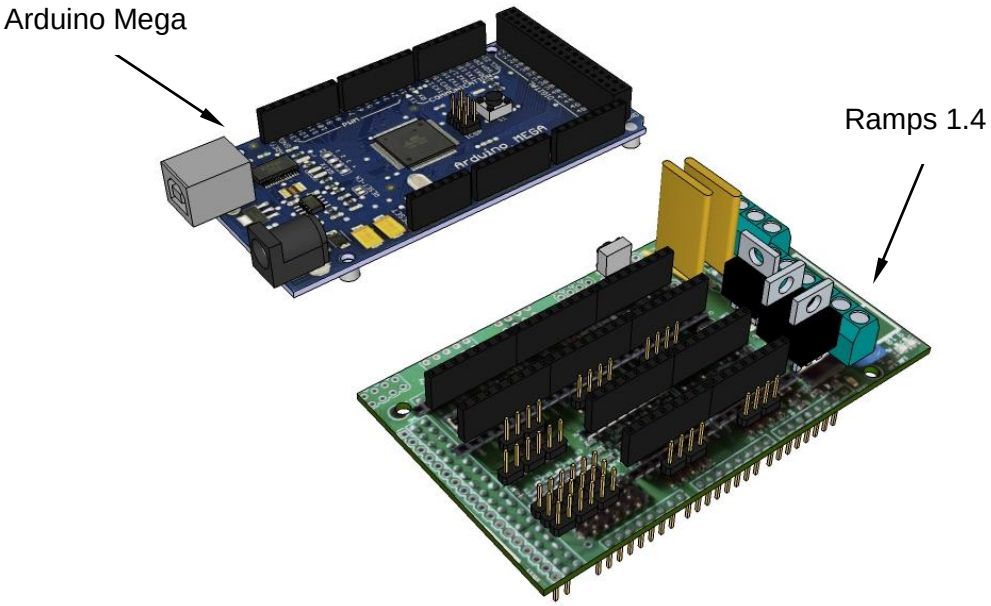
User Interface

GUI

Server

Electrical

Controller



Power

Components that require power

Component	Voltage	Current / Power
Motors (x7)	12v – 36v	1.5amps each (10 amps)
Heating Element	12v or 24v	40 watts
Arduino	7v – 12v or USB (5v)	500mA (?)
Single Board Computer	5v	1 amp
USB hub	5v	1 amp
Heated Bead	Mains (120v or 240v)	900 watts

Power supply options

Current Power supply – The current supply would require a rebuse circuit to step the voltage down to 12v and 5v and provide at least 2 amps.

Dual channel Power supply - 24v and 5v dual channel supply

ATX – Cheap, provides 12v and 5v

Wiring

Head Cable

The head cable provides power and data to the trolley plate with the following requirements

Extruder 1 (EX1)–
- Heater element:
  - +12v or +24
  - Switched ground (-)
- Thermo resister:
  - data to pin,
  - ground (-)

Extruder 2 (EX2) (optional)
- Heater element:
  - +12v or +24
  - Switched ground (-)
- Thermo resister (TR2):
  - data to pin,
  - ground (-)

Fan A(controlled)
- +12v or +24
- Switched ground (-)

Fan B(always on)
- +12v or +24
- ground (-)

Each component can use at least one common wire. For example:

Wire 1: +12v or 24v (Ex1 heater (+), Ex2 heater (+), Fan A (+), Fan B (+)
Wire 2: ground (-) TR1 (-), TR2 (-), Fan B (-)
Wire 3: EX1 heater switched ground
Wire 4: EX2 heater switched ground
Wire 5: TR1 data
Wire 6: TR2 data
Wire 7 Fan A, Switched Ground

Optional expanded cable to improve hackablity
+5 volt to power TTL level devices
2-4 data line for future use