

Sea Beaver III

Electronic Design

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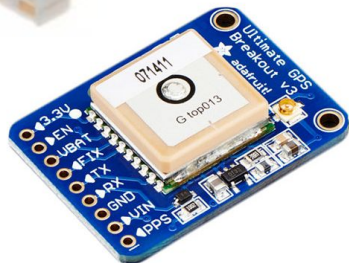
Start With Specifications

- Speak with experienced sources
- Assemble specifications for system capabilities
- Organize into “must have” and “nice to have” categories
- Reduce to hard numbers, if possible
- Consider flexibility and future demands
- Build up tables of electrical requirements (system voltages, battery capacity, etc.) and hardware requirements (eg - must have an IMU, GPS, etc.)

Specifications (cont.)

Component Selection

- Select components that will fulfill requirements
- Find the right balance of price, performance, form factor, product lifetime, stability, software support, and availability
- Decide what functionality requires custom designs (eg - a PCB)



Power requirements

<p>3.3 V System voltage: <input type="checkbox"/></p>	<p>Make it clean! https://www.pololu.com/product/4891</p>	<p>Main board:</p> <ul style="list-style-type: none"> • none <p>D1:</p> <ul style="list-style-type: none"> • 2 mA for barometer • 50 mA for IMU • 5 mA for depth • 50 mA for GPS <p>D2:</p> <ul style="list-style-type: none"> • none <p>Total: 94mA. Get at least 1A supply.</p> <p>Harness wiring: Selected a 3.7A supply. Use 22 gauge throughout.</p>
<p>5 V: servos, uP boards, GPS, IMU, etc</p>	<p>Provide lots of 5V capacity for flexibility: 20A@5V Uxcell for \$18! or (2) Pololu D36V50F5 (provides 16A@5V total) \$50</p>	<p>Main:</p> <ul style="list-style-type: none"> • RasPi: 3A • Wifi: 200mA? • Cell: 500mA? • Iridium: 450mA max <p>D1:</p> <ul style="list-style-type: none"> • PocketBeagle: 2A

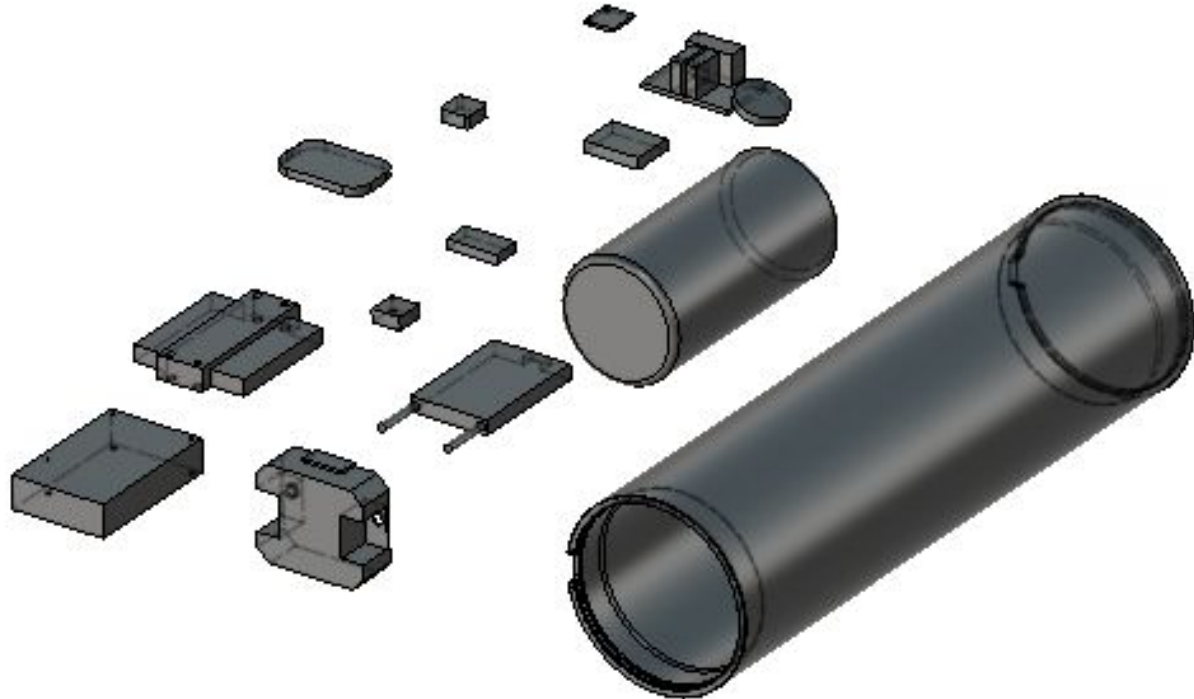
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Physical Design

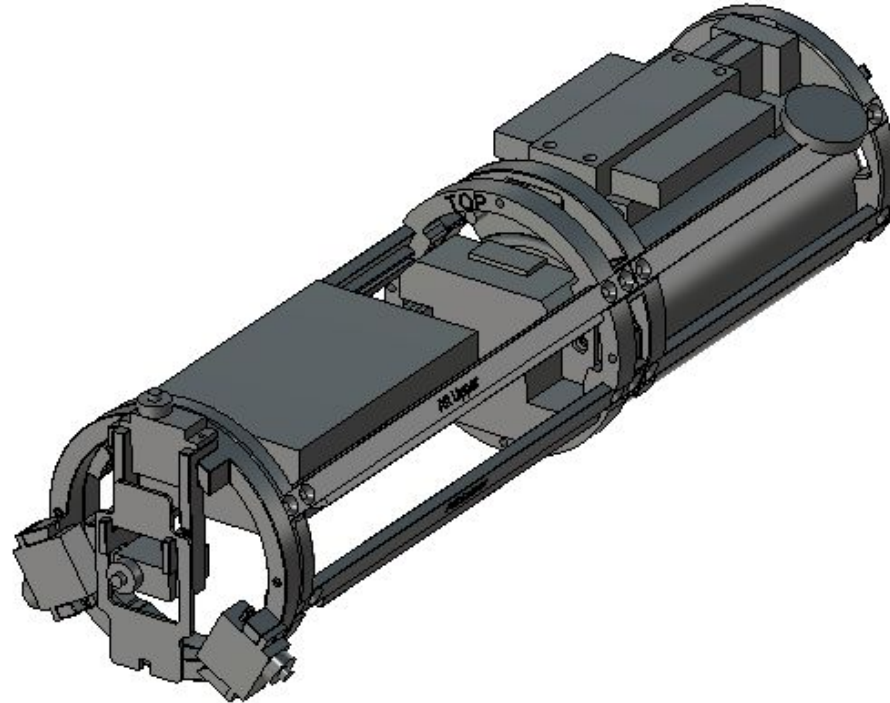
- Make CAD models of all components
- Work the physical design until everything “fits”
- Remember to leave adequate room for harnessing!
- Make sure there is sufficient access for assembly/disassembly
- Try to separate power lines from signal lines

Perfection is achieved, not when there is nothing more to add, but when there is nothing left to take away.” — Antoine de Saint-Exupéry

Physical Design (cont.)



Physical Design (cont.)



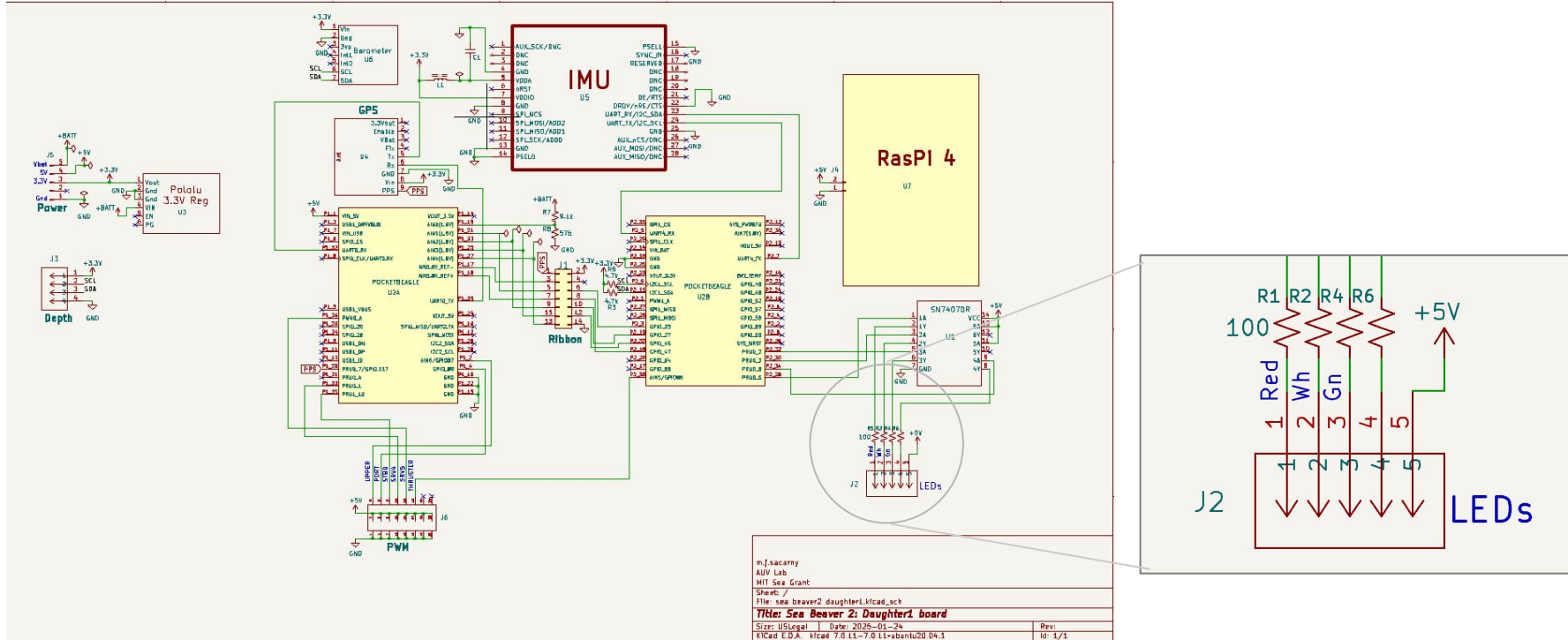
Physical Design (cont.)



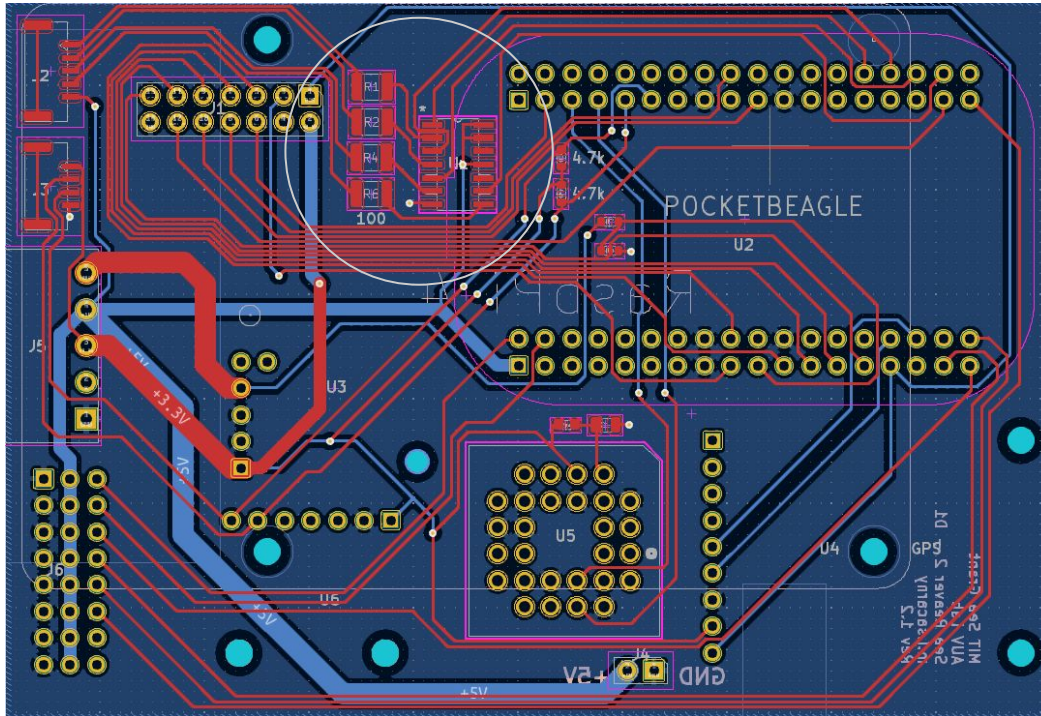
Custom PC Board

- It is common to make custom PC boards to “glue” the electronics together
- Special care must be taken when mixing power, digital, and analog circuitry
- Components can be mounted during production, speeding production and improving quality

Custom PC Board (cont.)



Custom PC Board (cont.)



Production

