Low-Cost, Off-the-Shelf Components for Stratospheric Ballooning (Part 1)

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Sensors

- Neulog Modules
- HOBO Data Loggers
- PocketLab Weather
Niches

- Low-Cost
- Off-the-Shelf
Neulog Modules

Features
Individual sensor modules - up to 5 in one “chain” - must have a battery module in every chain too (the USB module is for communication with laptop, not for flight)

Modules
Examples: Battery ($45), USB ($50), Pressure ($83), Wide-range Temperature ($64), Voltage ($50), Light ($55), UVA ($106), UVB ($101), and many more

Pros: Wide variety of sensors, ease of use
Cons: Poor battery management system, no real-time clock, size (a full module case for each sensor - bigger than necessary)
HOBO Data Loggers

**Devices:** Pendent G (3-axis accel), U12-013 4-Channel Data Logger (built in thermometer and humidity sensor, two plug in sensors, can plug in thermometers and raw voltage cables)

**Costs:** $140 U12-013 device, $35 Temp Sensor, $83 Pendent G, $70 Optical Cable (required for Pendant G)

**Pros:** Very reliable, real-time clock, delayed start feature, quality sensors, compact

**Cons:** Software sold separately, optical cable sold separately, limited sensor selection (e.g. no pressure sensor)
PocketLab Weather

Features
Bluetooth 4.0 Connectivity

Functions
Temperature, Humidity, Barometric Pressure, Light intensity

Cost: $98.00
Pros: Compact, convenience, user friendly, portability
Cons: Accuracy, limited range on some sensors

*See also PocketLab One, PocketLab Voyager, and PocketLab Air (coming soon)
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Cameras

- GoPro Session
- Lightdow 4000 1080P HD “Sports Action” Camera
- Mobius Actioncam (including IR version)
GoPro Session

- Cost: $150
- Pros: small size, battery life
- Cons: requires heating
Lightdow 4000

- $40 range
- Pros: cost, video duration
- Cons: resolution, possible shock sensitivity
Mobius Actioncam (including IR version)

- Cost: $80
- Pros: size, weight
- Cons: battery life

IR Conversion: https://publiclab.org/notes/clastic/04-22-2014/mobius-ir-conversion
Trackers

- Stratotrack
- Big Red Bee
- SPOT Finder
- PocketFinder
Stratotrack

- APRS HAM Radio GPS Tracker
- Cost: $225
- Pros: size, weight, “very very small,” temperature robust (using Li batteries), Internet tracking, reports temperature and battery voltage
- Cons: HAM license required, internet tracking, occasionally mis-reports GPS data
Big Red Bee*

- APRS Unit
- Cost: ~$300
- Pros: Ruggedness**, Reliability,
- Cons: Size, Weight

*There is a special high-altitude ballooning package
SPOT Gen3 Satellite GPS “Finder”

- Satellite GPS tracking device
- Cost: $140 per unit, $150 per year for the basic service plan
- Pros: Rugged, Temperature Tolerant, Use Lithium Batteries, updates to about 80,000 feet - reconnects during descent
- Cons: no altitude, updates only once every ten minutes

*Attach to apex of parachute for best results
PocketFinder

- Cost: $130/device, $13/month service plan
- Pros: small size
- Cons: updates only to about 20,000 feet, often struggles to re-establish GPS lock during descent (and sometimes won’t reconnect even after landing)

*uses cell-tower network