



Science and Technology Education for Land / Life Assessment

An instrument
for science, education, outreach, and engagement

Created by Paul Mirel
Presented by Petya Campbell

STELLA's Mission

"With STELLA, we want to democratize scientific instrumentation, in the same way that Landsat Science has democratized Earth science data; by making the science and scientific tools available to people who are interested.

We built the STELLA instruments so that anyone can build one.

Building your own instrument teaches you to think about the capabilities and limitations of instruments we use and of our understanding.

The limits of our instruments set the limits of our understanding, so understanding our instrumentation is key to scientific discovery."

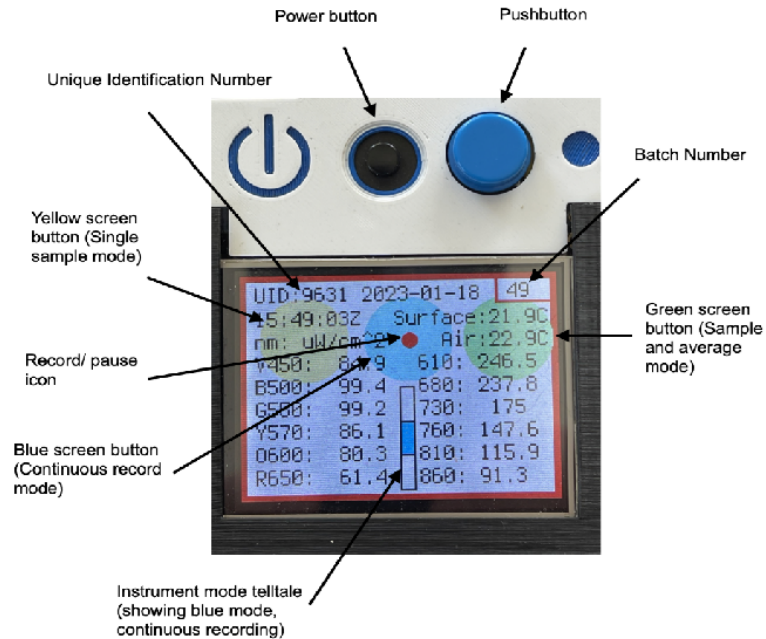
- Paul Mirel, creator of STELLA



STELLA 1.0

Hello and welcome to STELLA!

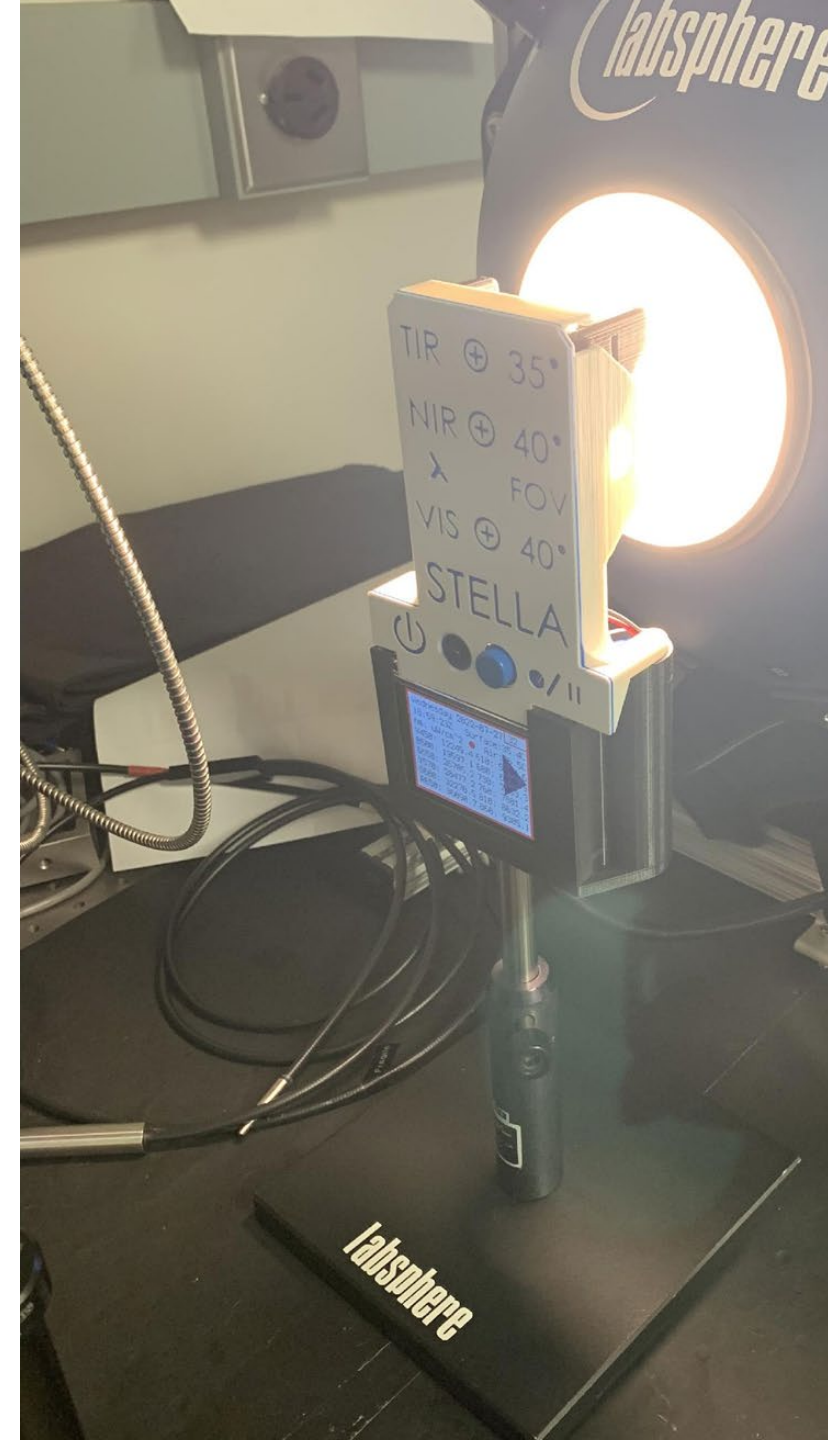
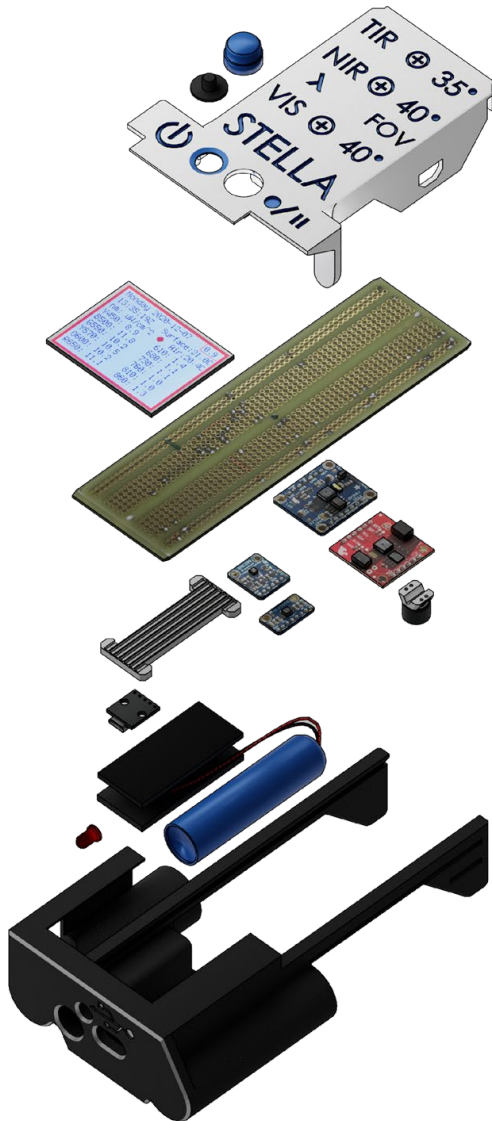
STELLA-1 controls and screen indicators



Press the power button to turn on your STELLA-1. The display will show the STELLA welcome screen while the system is booting up, and then switch to the instrument table display.

If no micro SD card has been inserted, the sample indicator LED will light up a constant red. Turn the instrument off, insert an SD card, and turn it back on again. The sample indicator LED will flash when a datapoint is recorded.

The batch number provides a reference to one or several samples taken as a batch. The batch number restarts at 0 on a new calendar day.



STELLA: A Landsat Analog

	VISIBLE LIGHT							NEAR INFRARED				
STELLA - Landsat Analog: A DIY Handheld Spectrometer	Violet - 450nm	Blue - 500nm	Green - 550nm	Yellow - 570nm	Orange - 600nm	Red - 615nm	Red - 650nm	580 nm	750 nm	760 nm	810 nm	860 nm
Landsat 1-3 Multispectral Scanner (MSS)			Band 4: 500 - 500nm				Band 5: 550nm - 700nm		Band 6: 700 nm - 800nm		Band 7: 800nm - 1100nm	
Landsat 4-5 Thematic Mapper (TM)							Band 3: 550 nm - 690nm				Band 4: 760nm - 900nm	
Landsat 7 Enhanced Thematic Mapper (ETM+)							Band 3: 550 nm - 690nm				Band 7: 770 nm - 900nm	
Landsat 8-9 Operational Land Imager (OLI) & Thermal Infrared Sensor (TIRS)							Band 4: 610nm - 870nm				Band 5: 850nm - 860 nm	
Landsat Next: Super Spectral	Band 2: 430nm - 450nm	Band 3: 480nm - 520nm	Band 4: 510nm - 560nm	Band 5: 585nm - 595 nm	Band 6: 610nm - 650 nm	Band 7: 610nm - 660 nm	Band 8: 650nm - 680 nm			Band 9: 720nm - 760 nm		
											Band 11: 780nm - 900nm	

STELLA's Meat and Potatoes

- Detailed Description
- User Manual
- Parts List
- Build Instructions
- Software
- Software Instructions
- 3D Print Files
- Print File Instructions
- Sensor Technical Details
- Data Viewer
- Web Presence

Future Offerings?

- A choice guide directing people to the correct STELLA
- An Applications section: what has been learned and in what way
- ...

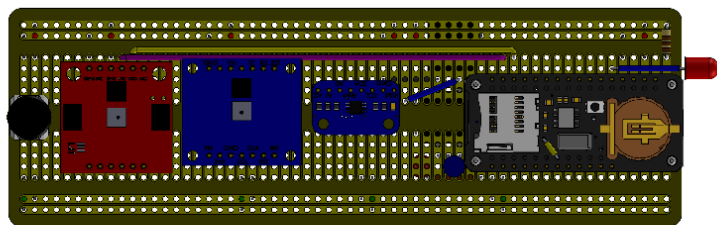
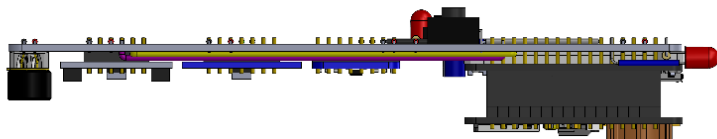
<https://landsat.gsfc.nasa.gov/stella/>



STELLA's Potential

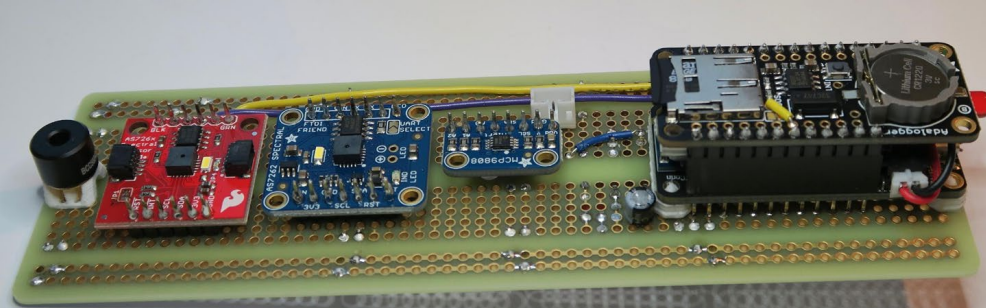
- A) offer new tools for science efforts
- B) to measure ecological processes at a potentially large number of locations and timescales
- C) create new models for science, engineering, and environmental education
- D) empower students from middle school to graduate school levels in Earth System Science
- E) provide an effective outreach tool for demonstrating and communicating how earth observation instruments work





17. complete bare

STELLA - 2



install adalogger over main battery,
install coin cell battery, insert micro SD card

STELLA-2

- STELLA-2
 - S2 Documentation
 - S2 build instructions
 - 0. S2 wiring list apple numbers.numbers
 - 0. S2 wiring list excel.xlsx
 - 0. S2 wiring list pdf.pdf
 - 1. S2 build instructions text.rtf
 - 2. S2 programming and test instructions.rtf
 - 3. S2 real time clock setting instructions.rtf
 - S2 build 3D print parts
 - S2 build step CAD images
 - S2 build step photos
 - S2 parts, tools, supplies lists
 - S2 schematic and component information
 - S2 software
 - STELLA-2 brochure.rtf
 - S2 Software
 - S2 code and libraries
 - S2 current libraries bundle
 - S2 current uf2
 - S2 test codes
 - 00. unique identifier
 - 01. blink_indicator
 - 02. i2c_bus_scan
 - 03. pushbutton mode toggle
 - 04. real_time_clock
 - 05. SD_card_write_read
 - 06. AT_air_temperature
 - 07. VIS_spectrum
 - 08. NIR_spectrum
 - 09. TIR_remote_temperature
 - 10. HUM_humidity
 - 11. BARO_pressure
 - 12. MAG_magnetometer
 - 13. MOT_motion
 - 14. battery_voltage
 - 15. bluetooth



STELLA's Data Viewer

In Google Chrome go to:

stella-webpage.vercel.app

STELLA versions

- STELLA – Q
 - Solderless made with modules
- STELLA – 1.0
 - The original model with 3D printed housing and screen
- STELLA – 2.0
 - Bluetooth enabled, phone attached, screenless version
- STELLA – 3.0
 - custom print PCB board concept
- STELLA – D
 - The drone variant



STELLA-Q

