

Education and CubeSatSim Project Update



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AMSAT Space Symposium 2025

Topics

- CubeSatSim Team
- What is a CubeSatSim?
- CubeSatSim Technical Details and Telemetry
- CubeSatSim in the Classroom, at Events, in the Journal, etc
- New Activity Guides
- FunCube mode and Cross Band Repeater Demo
- Get Involved
- Q & A
- Acknowledgements



Core CubeSatSim Project Team

Fredric Raab, KK6NOW

Mark Samis, KD2XS

David White, WD6DRI

Thank You!



What is a CubeSatSim?

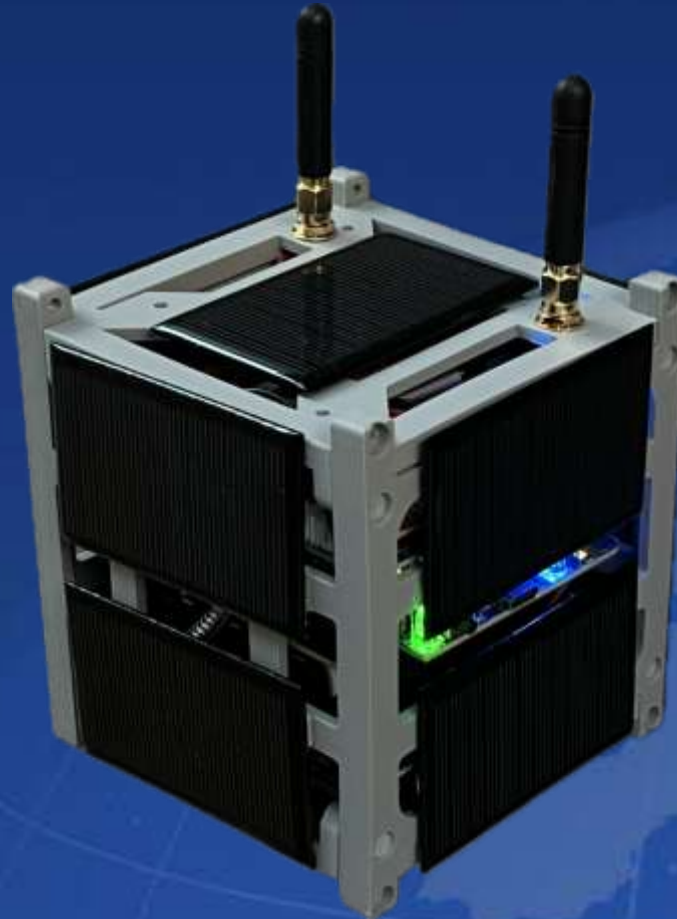
- It is the core of an education program to evangelize the science and technology used in radio satellites.
 - University engineering programs
 - Amateur radio community
 - STEM programs
 - Libraries, Museums, Maker Faires, etc.

Fully open source hardware and software!



What is a CubeSatSim?

- A low-cost satellite emulator that runs on solar panels, batteries, and transmits UHF radio telemetry



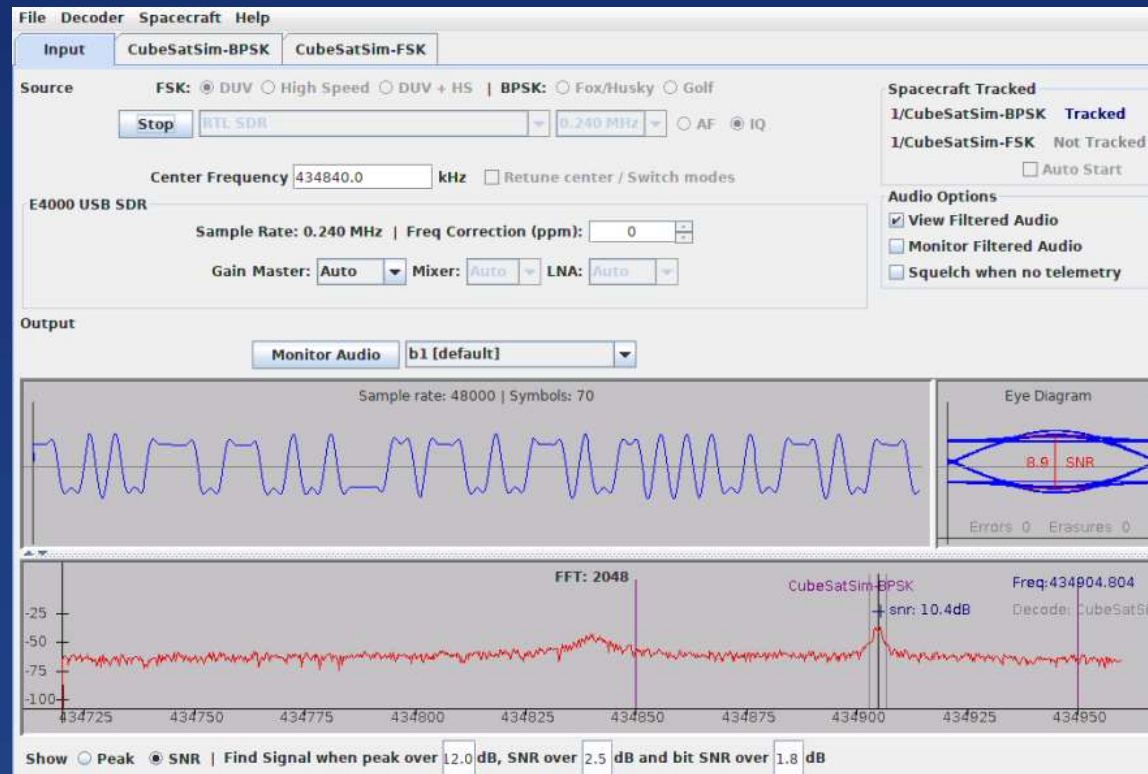
What is a CubeSatSim?

- Uses a custom 3-board stack plus Raspberry Pi Zero 2 and a Raspberry Pi Pico microcontroller, rechargeable batteries, voltage/current sensors, and environment sensors.



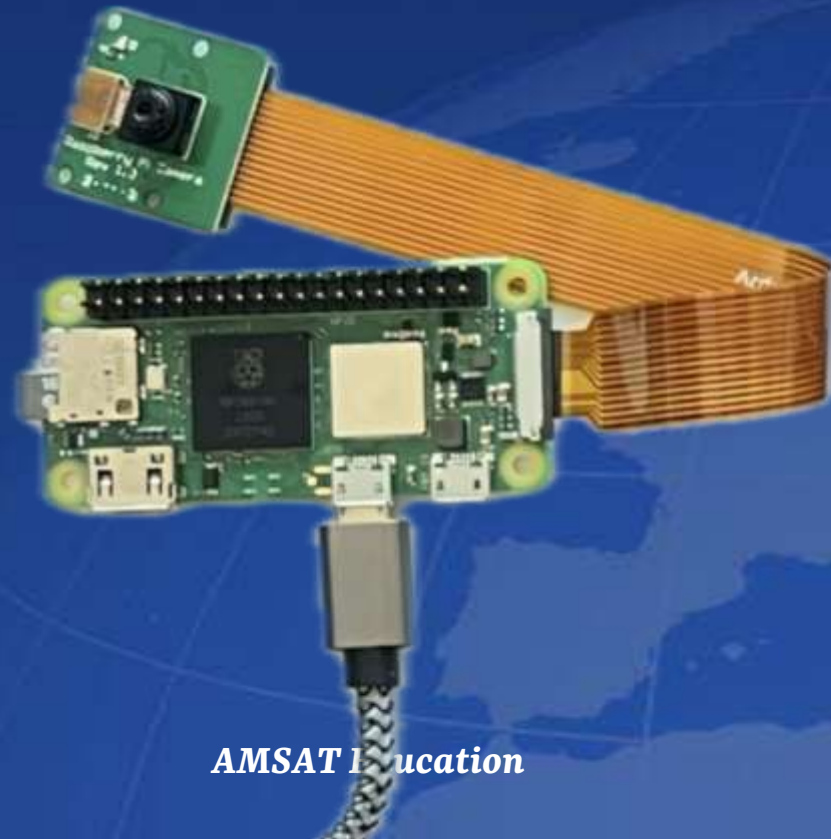
What is a CubeSatSim?

- Transmits 70cm amateur band UHF radio housekeeping telemetry to a ground station in multiple formats - describing the operational location/health of the satellite.



Technical Details

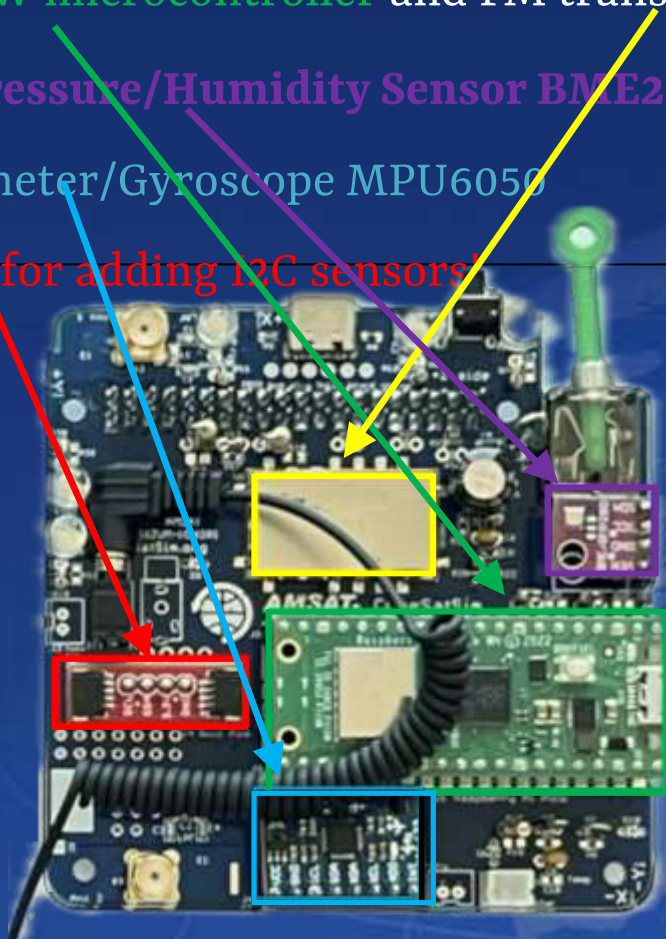
- Raspberry Pi Zero 2
 - Runs housekeeping software: C, Python
 - Has Pi Camera and USB Sound Card



Technical Details

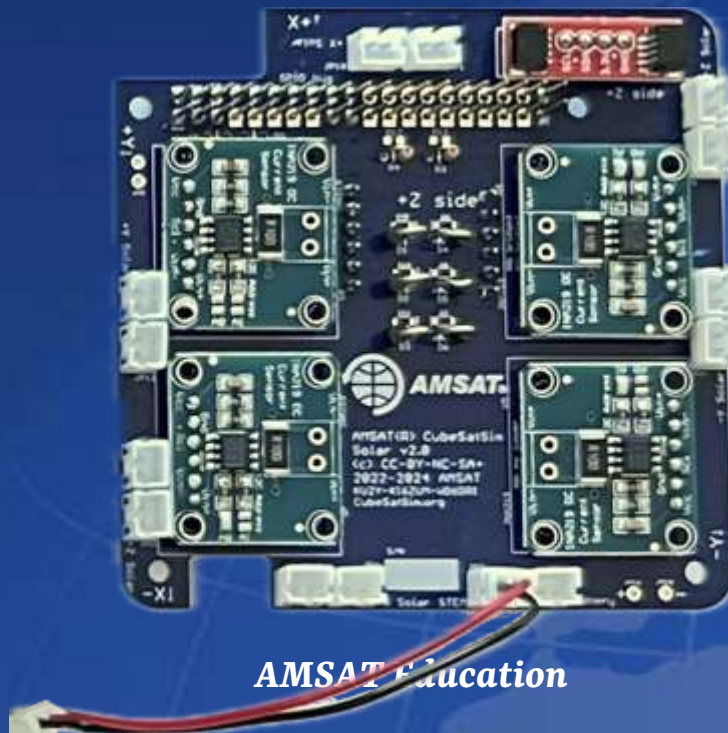
- Main Board

- Raspberry Pi Pico W microcontroller and FM transceiver
- Temperature/Pressure/Humidity Sensor BME280
- 3-Axis Accelerometer/Gyroscope MPU6050
- Qwiic connector for adding I2C sensors



Technical Details

- Solar Board
 - 6 INA219 Voltage/Current Sensors – one for each side Solar Panels
 - Solar panels plug into JST 2.0 connectors
 - Uses low cost solar panels (\$1.50/panel)



Technical Details

- Battery Board
 - 3 AA Nickel Metal Hydride (NiMH) Batteries for safety
 - New improved 2800 mAh PRO batteries
 - Includes INA219 current and voltage sensor
 - Charged with solar panels or USB-C cable



Technical Details

- Ground Station

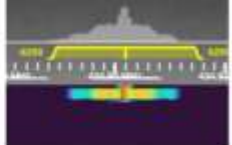
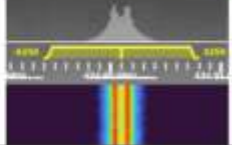
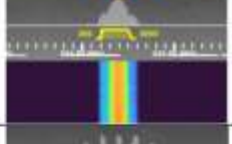
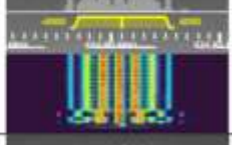
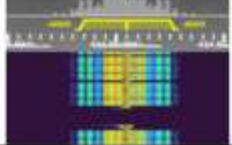
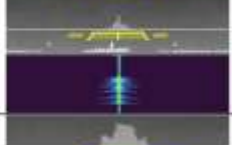
- Pre-built Software Stack (Fox-in-a-Box v4 Beta)
 - **Now works on Pi 5 Bookworm**
- Or, install on your own PC

- Software:

- FoxTelem
- Direwolf
- QSSTV
- OpenWebRX
- **SDR++ (new!)**
- CubicSDR
- RTL-TCP
- Gpredict
- KLATracker



Technical Details

Blinks	Mode	Description	Decoding	Command	Audio	Waterfall(WebSDR)
1	APRS	Automatic Packet Reporting System. This digital mode sends a packet of data with AFSK or Audio Frequency Shift Keying modulation.	Windows: SoundModem or Direwolf Raspberry Pi/Linux: OpenWebRX or Direwolf	a	CubeSatSim.org/a	
2	FSK	Frequency Shift Keying. This mode transmits a continuous signal that makes a rumbling sound that emulates the AMSAT Fox CubeSats such as Fox-1C or AO-95. Also known as DUV or Data Under Voice.	Windows/Raspberry Pi/Linux: FoxTelem	f	CubeSatSim.org/f	
3	BPSK	Binary Phase Shift Keying. This mode transmits a continuous signal that sounds like noise that emulates the AMSAT Fox-1E CubeSat. You demodulate using USB.	Windows/Raspberry Pi/Linux: FoxTelem	b	CubeSatSim.org/b	
4	SSTV	Slow Scan TeleVision. This mode transmits stored images in Scottie 2 format which sounds like a series of tones.	Windows: MMSSTV Raspberry Pi/Linux: QSSTV	s	CubeSatSim.org/s	
5	CW	Continuous Wave or Morse Code. This mode transmits a FM modulated tone at 20 words per minute Morse Code telemetry.	Windows/Raspberry Pi/Linux: fldigi with spreadsheet http://cubesatsim.org/telem	m	CubeSatSim.org/m	
6	Cross Band Repeater	Simulates a U/V (UHF uplink, VHF downlink) FM satellite repeater. Default uplink is 435 MHz and downlink is 144.9 MHz.	OpenWebRX	e	CubeSatSim.org/e	
7	Fun Cube	FUNCube simulates the BPSK telemetry of the FUNCube series of CubeSats such as AO-73.	Raspberry Pi: FUNCube Telem	j	CubeSatSim.org/j	

•Telemetry Modes

- APRS (Automatic Packet Reporting System)
- FSK (Frequency Shift Keying DUV (Data Under Voice))
- BPSK (Binary Phase Shift Keying)
- SSTV (Slow Scan TV)
- CW (Continuous Wave aka Morse Code)
- **FunCube mode (New!)**
- **Cross Band Repeater (New!)**
- U/V FM



Recent CubeSatSim Improvements

- CubeSatSim v2 hardware and software released in 2024 as v2.0
- Software v2.1 released in 2025 adding:
 - New FunCube telemetry mode
 - New Cross Band Repeater mode
 - Improved Command and Control (C2C)
- Beta v2.2 testing underway
 - Improved simulated telemetry
 - Support for BME and MPU sensors attached to Pi Zero
 - **Simulated failures**



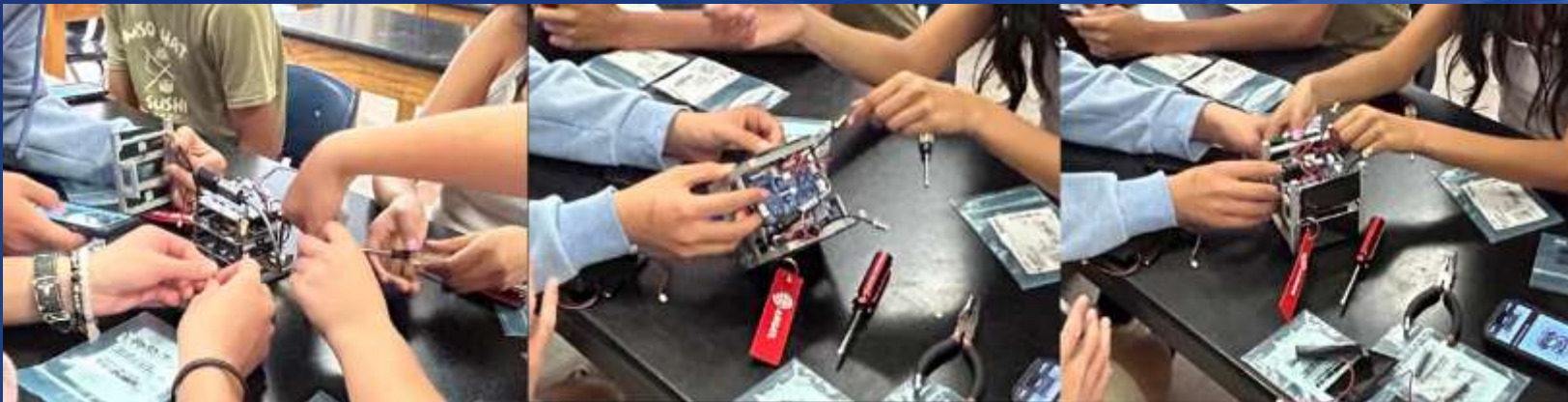
Kits, Kits, and More Kits!

- We now have no-solder CubeSatSim kits available periodically at Hamvention and on the AMSAT Store
 - 1-2 hours of assembly, no soldering!
- Price increase due to tariffs
- 100 produced so far!
 - 40 in 2024
 - 40 so far in 2025 plus 20 for ARRL Teachers Institute
 - <https://CubeSatSim.org/kit>
- **Look for AMSAT News Service announcement on the AMSAT BB mailing list for next batch**



Loaner Kits

- Thanks to grant from Quarter Century Wireless Association (QCWA)
- Has a Pi Ground Station, turntable, LED lamp, and Kit parts
- Receive as no-solder kit, return assembled
- Tried by students of the San Diego area Mount Carmel High School Amateur Radio Club (MCHSARC) club sponsor, teacher John Earnest, KG6EQU
- **Available to anyone who wants to take into a classroom or build as a group**



Project Partnerships

- ARISS
 - SPARKI (ARISS Radio Pi)
 - STAR (Lite - see later slide)
- ARRL
 - Teachers Institute (see later slide)
- Science Centers
 - CubeSatSim on display at Cox Science Center and Aquarium in West Palm Beach, FL by Jim Nagle, KF4OD
- **Look for more in 2026!**



New Lite v2 Coming Soon

- Single board, size of a Pi Zero
- Plug into a Pi Zero 2 and it generates simulated telemetry in all 7 modes
- Can add BME and MPU sensors via Qwiic connector
- Can add GPS with serial port
- Can do C2C with USB sound card and OTG cable
- Can plug a 3-cell battery with JST connector including full Battery Board
- Can remove attenuator for 0.5 W FM transmission for balloon payload
- **In the AMSAT Store soon!**



ARRL Teachers Institute on Wireless Technology

- ARRL Teachers Institute on Wireless Technology
 - Space Comms and Radio Astronomy course
 - Used 20 kits
 - They soldered the BME and MPU sensors
 - Each teacher built a CubeSatSim and took it home!
 - Very positive feedback from instructors and teachers
- GitHub Discussion board active!
 - Helping troubleshoot
 - Enhancements – new Yaw Pitch Roll – see demo
 - <https://github.com/alanbjohnston/CubeSatSim/discussions>



ARRL Teachers Institute on Wireless Technology



Photo courtesy of ARRL



ARRL Teachers Institute on Wireless Technology



Photo courtesy of ARRL



AMSAT Education

New CubeSatSim Quick Start Guides

CubeSatSim Quick Start Guide

AMSAT



How to Turn on the CubeSatSim:

If the Remote Before Flight pin is plugged in (see photo), unplug pin and the CubeSatSim should turn on in about 30 seconds. The Green Power LED will first turn on, then the Blue Transmit LED will blink when it is transmitting.

If unplug the Remote Before Flight pin doesn't turn it on, try starting and removing the Remote Before Flight pin. If it still doesn't turn on, the battery may be drained – see below on how to charge the CubeSatSim.

How to Turn Off the CubeSatSim:

Press and hold the pushbutton. The Green Power LED will blink a number of times fast, then it will blink slowly. Release the pushbutton as it is blinking slowly and the CubeSatSim will begin to shut down. After about 30 seconds, insert the Remote Before Flight pin to completely shut down the CubeSatSim.

How to Charge the CubeSatSim:

The CubeSatSim can be charged while turned on or off, with the Remote Before Flight pin unplugged or plugged. For fastest charging, charge with CubeSatSim off and the Remote Before Flight pin plugged in.

Plug the USB-C cable into the USB charging connector. The Red Charging LED will illuminate. Charging for 5 hours is needed for a full charge. The battery will self discharge so charging should be done the day before or night before use.

If the Remote Before Flight pin is not inserted during storage, the batteries will quickly drain, so always insert the Remote Before Flight pin to shut down the CubeSatSim.

You file can be downloaded here: <https://cubesatsim.org/usa>
Videos are available at <https://www.youtube.com/c/amsat>

Ground Station Quick Start Guide

AMSAT

This guide provides a short description of how to use the CubeSatSim Ground Station. The Ground Station is an SDP (Software Defined Radio) system that has the capability of receiving and decoding signals from the CubeSatSim. For details of assembly of the Ground Station, please see: https://cubesatsim.org/usa/groundstation/CubeSatSim_GS.pdf. For details of assembly of the CubeSatSim please see: <https://cubesatsim.org/usa/cubesatsim/CubeSatSim.pdf>.

Before you begin, please make sure that you have the following ready:

- Raspberry Pi version 3B or 3B+ (or 4 or 5 or 5.1 or 5.2)
- RTL-SDR Receiver with an antenna
- AMSAT 1800L to image loaded into a Micro SD card and inserted into the Raspberry Pi
- Power Adapter for the Raspberry Pi
- Keyboard and mouse connected (you can use a USB wireless mouse if desired)
- HDMI monitor

Steps:

1. Turn on your CubeSatSim. See <https://cubesatsim.org/usa/cubesatsim/CubeSatSim.pdf> (make sure you are in BPSK mode).
2. Make sure your RTL-SDR, keyboard/mouse, and monitor are inserted in Raspberry Pi and then apply the power. It will take about 10 seconds for the operating system to load and then the Pi will automatically load the software to test completion.
3. When you turn it the first time, Raspberry will ask you which satellite profile you want to use – choose "CubeSatSim AMSAT CubeSat Simulator".

To Decode BPSK:

The CubeSatSim will initially start in BPSK Mode, or you can change to mode 3 using the pushbutton (three blinks of the Green LED). Raspberry will start listening in BPSK Mode (Mode 3) and automatically tune to around 434.0 MHz. The "Satellite Frequency" will be "BPSK 1200bps (FSK12)".

If you have a handheld VHF FM radio, you can listen on that frequency for the sound. Raspberry will then copy to the "Input" tab that shows the waveforms of the signal.

The "One-Button" looks like an eye, you will want to see an increasing level of noise of data being decoded in the lower left corner of the window.

Cross Band Repeater Quick Start Guide

AMSAT

This guide provides a short description of how to use the CubeSatSim in Cross Band Repeater mode.

What It Is:

CubeSatSim v2.1 software and later has a Cross Band Repeater mode that simulates a UHF repeater, with a built-in FM satellite repeater when inserted as "Mode UHF". See also: <https://cubesatsim.org/usa/cubesatsim/CubeSatSim.pdf>.

What You Need:

Turn on the Cross Band Repeater Mode, you will need:

- CubeSatSim with v2.1 software or later
- Two VHF/UHF FM radios (or two UHF FM radio and an SDP (just as a backup and an RTL-SDR plugged into a Pi or Computer) or a VHF/UHF transceiver with full duplex (such as an Icom IC-7000)

Setting the Cross Band Repeater Mode:

There are three ways to set this mode:

- Use the pushbutton to change to the Repeater Mode by pressing and holding the pushbutton and releasing when the Green Power LED blinks up twice.
- Logging into your Pi Zero 2 and typing the command `CubeSatSim/config -r` (see https://cubesatsim.org/usa/groundstation/CubeSatSim_GS.pdf for details of how to log into your Pi Zero 2).
- Use Command and Control (C&C) by sending 94 with DTMF or M0000 with APRS (see the Command and Control Quick Start Guide for details).

Using the Cross Band Repeater Mode:

The Green Power LED will be illuminated all the time, but the Blue Transmit LED will illuminate when the repeater is active. No telemetry is transmitted after the initial 150 Hz. The CubeSatSim will use its receive mode, listening on the default frequency of 435.0 MHz, or accept UHF frequency set by the `CubeSatSim/config -f` command.

When the squelch is broken on that frequency, the CubeSatSim will transmit the FM signal received at the default frequency of 144.5 MHz. Do it again (repeat frequency) to set to the `CubeSatSim/config -f` command, the repeat frequency will be the set frequency minus 200 MHz (for example, the default 435.0 MHz - 200 MHz = 235.0 MHz).

The Blue Transmit LED will illuminate as long as the squelch is broken. There is about a one-second timeout. If using the Raspberry Pi Ground Station, select "RTL-SDR in repeater mode" (435 MHz "CubeSatSim Cross Band Repeater").

You should initially listen for the VHF received signal with no squelch set on your receiver as the signal will be weak. Also, there will be a small random frequency offset from expected.

Command and Control Quick Start Guide

AMSAT

This guide provides a short description of how to use Command and Control (C&C) with the CubeSatSim.

What It Is:

Satellite Command and Control refers to the ability to connect, usually over radio, with a satellite and upload commands, settings, schedule operations and experiments, and other functions. The CubeSatSim v2 can now support radio Command and Control using a FM transceiver in the UHF band by sending either a carrier signal, DTMF tones or APRS packets to change modes or turn the transceiver on or off.

What You Need:

- A v1.3.1 or v2.0 CubeSatSim with the USB connector
- A UHF FM radio or transceiver (for example, a Baofeng)
- An amateur radio (ham) license (since Command and Control involves transmitting in the Ham Radio X-band band. Before doing this, ensure you have your license and comply with all local rules and regulations. If you live in the USA, here is some information: <https://www.fcc.gov/radiocomm>).

Transmit Frequency:

The default frequency which you should transmit on for Command and Control is 435 MHz. You can change the frequency by logging into your Pi Zero 2 and typing `CubeSatSim/config -f` and changing the UHF receive frequency of the CubeSatSim.

How to Turn Command and Control ON and OFF:

By default, Command and Control is OFF on the CubeSatSim. There are two ways to turn it on or off:

- Using the pushbutton. Press and hold the pushbutton until it goes through its full sequence: a series of short blinks, some longer blinks, then some even longer blinks. At this point, you can release the pushbutton. This will toggle the state. That is, if Command and Control was ON, it will turn off. If it was OFF, it will turn ON.
- Using a command line or your Pi Zero 2. You will need to log into your Pi Zero 2 (see https://cubesatsim.org/usa/groundstation/CubeSatSim_GS.pdf for how to do this) then type the command `CubeSatSim/config -t` and then follow the prompts to turn it on or off.

You can tell if Command and Control is On if the Green C&C LED is illuminated in C&C after the call sign on power up.

Using Command and Control:

When turned on, Command and Control has three modes:

- Center Command and Control in this mode, the CubeSatSim is just listening for a carrier signal on the receive frequency. The squelch setting on the FM Transceiver set with the `CubeSatSim/config -q` will determine the sensitivity. If a carrier is detected, the CubeSatSim will move to the next mode and the Green Power LED will blink the number of times of that mode. The sequence is APRS -> FM -> BPSK -> DTMF -> C&C -> Repeater -> Full Duplex -> APRS. This mode is the intended, but it can produce false triggers.
- DTMF Command and Control in this mode, the CubeSatSim is listening for DTMF key presses followed by the pound (hash) sign #. The DTMF number corresponds to the mode number. The Green Power LED will blink with the number of the mode and then the CubeSatSim will repeat or reboot. The set of commands is listed in this table:

<https://CubeSatSim.org/qsg>

CubeSatSim Activity Guides

Problem Statement

I just built (or borrowed) a CubeSatSim!

What can I do with it?



What are Activity Guides?

- Step by step instructions for how to do a STEM educational activity using a CubeSatSim
- Most work with just a CubeSatSim or Lite
- Some are very easy
 - Listening to the sounds of the different modes on a HT and/or looking at modes on an SDR waterfall
- Some are more challenging
 - Telemetry analysis using FoxTelem



What are Activity Guides?

- Activity Guides include questions
- Instructors Guide has example data and answers to questions
- Released under Creative Commons with Attribution license
 - Teachers can edit and include in their lesson plans



Status of Activity Guides

- They have been under review over the summer
- Published on GitHub now
 - <https://github.com/alanbjohnston/CubeSatSim/wiki/CubeSatSim-Activity-Guides>
- 10 available now – more in future
- Videos available soon!



List of CubeSatSim Activity Guides

AMSAT CubeSatSim – MPU Sensor Activity

Version 1 – July 2025

Alan Johnston KU2Y ku2y@arrl.net

Group: _____ Date: _____

Introduction:

In this activity, you will learn about the MPU6050 Rotation/Acceleration sensor on the CubeSatSim Main board, and rotation and acceleration readings.

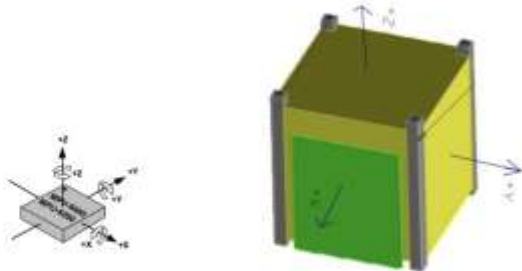
This online [Glossary](#) can help with any terms or acronyms you may not know.

A. MPU Rotation/Acceleration Sensor Readings

The MPU6050 sensor is the blue sensor board U2 on the Main board.



The [datasheet](#) for the IC shows the X, Y, and Z axes, which is also printed on the board. The MPU6050 sensor is mounted horizontally on the Main board, which is mounted horizontally in the CubeSatSim frame so that the axes align:



A device that measures rotation rate is known as a gyroscope, or simply a gyro. A device that measures acceleration is known as an accelerometer. The MPU6050

- Listening Activity Guide
- Telemetry Activity Guide
- Advanced Telemetry Activity Guide
- BME Sensor Activity Guide
- MPU Sensor Activity Guide
- Solar Panel Activity Guide
- Battery Activity Guide
- Troubleshooting Activity Guide
- Group Building Activity Guide
- MQTT Adafruit IO Activity Guide

Example: CubeSatSim MQTT Adafruit IO Activity Guide

- New code on Raspberry Pi Pico W microcontroller so it connects to your WiFi network!
- BME and MPU sensor data is published to the Adafruit IO cloud
 - Uses an Internet-of-Things protocol called **MQTT**
 - Free account at <https://adafruit.io>
 - Instructions to create a call web-based dashboard that is updated in real time
- Shows an alternative way to get telemetry from a CubeSat



The screenshot shows the MQTTTool web interface. It has a blue background and a white form. The form contains the following fields and controls: 'Host' (set to 'adafruit.io'), 'Port' (set to '1883'), 'Client ID' (set to 'MQTTTool-1310001832'), 'Username' (set to 'root'), and 'Password' (empty). There is a 'Connect' button and a 'Show/Hide Password' toggle. Below the form, there is a 'Status' section with a 'Connected' indicator and a 'Disconnect' button. At the bottom, there is a 'Subscribe' button and a 'Unsubscribe' button.



CubeSatSim...

in the Classroom

- *Villanova University, PA* Electrical and Computer Engineering Freshman Projects by Alan Johnston, KU2Y and Xun Jao, 6 CubeSatSims built
- *Johns Hopkins University, MD*, Drew Knuth is using CubeSatSims and Lites in a Small Satellite Development and Experimentation capstone graduate class
- *University of Texas at Dallas, TX*, Ron Dang, K5SUS, Kangkook Jee, Jaehyun Park, Agustya Bose organized a satellite workshop at University of Texas at Dallas
 - See Agustya presentation today!
- *Iowa State University, IA* building CubeSatSims in Make to Innovate (M2I) and Cy Sat program, organized by Matthew Nelson

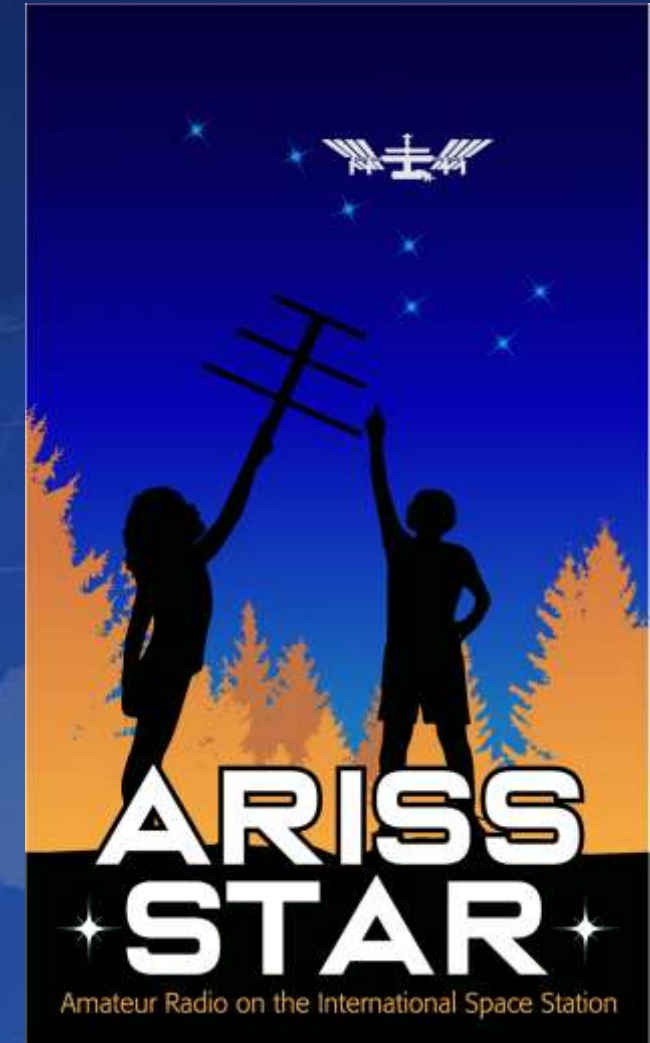


at Events

- *Hamcation 2025, FL* by Dennis Veselka, KI4KNC
- *Hamvention 2025, OH*
 - Thanks to Jack Spitznagel, KD4IZ, Carsten Glasbrenner, KQ4SJM, and Dennis Veselka, KI4KNC for running education table
- *Frontiers of Flight Moon Day, TX* by Tom Schuessler, N5HYP and Virginia Smith, NV5F with 2U loaner
- Don Rhodes, KB2YSI, borrowed one in May and organized an AMSAT table at the Cheanago Valley Amateur Radio Association Hamfest NY
- Rusty Moore K1FVK Field Day NC
- Garth Likens and Nick Pugh, K5QXJ, multiple events for CAPE Satellite Program, University of Louisiana at Lafayette

CubeSatSim and the ARISS STAR Program Update

- We continue to work with ARISS on the STAR Project (Space Telerobotics with Amateur Radio).
- We provide SSTV and telemetry from a CubeSatSim Lite attached to the top of an **XRP rover**.
- The XRP is controlled from an ARISS Pi ground station with a new STAR app which now hosts the SSTV images broadcast from the rover.
- The XRP rover can receive commands sent via APRS or from other locations on the Web via MQTT that are passed to the STARApp's Mission Controller
- The CubeSatSim Lite can receive commands via APRS, DTMF or directly from the ARISS Pi.
- The CubeSatSim Lite can also operate as a cross-band repeater as it sits on top of the XRP



STARApp decodes SSTV signal from XRP Robot after it is moved with STARapp Mission Controller

07:48

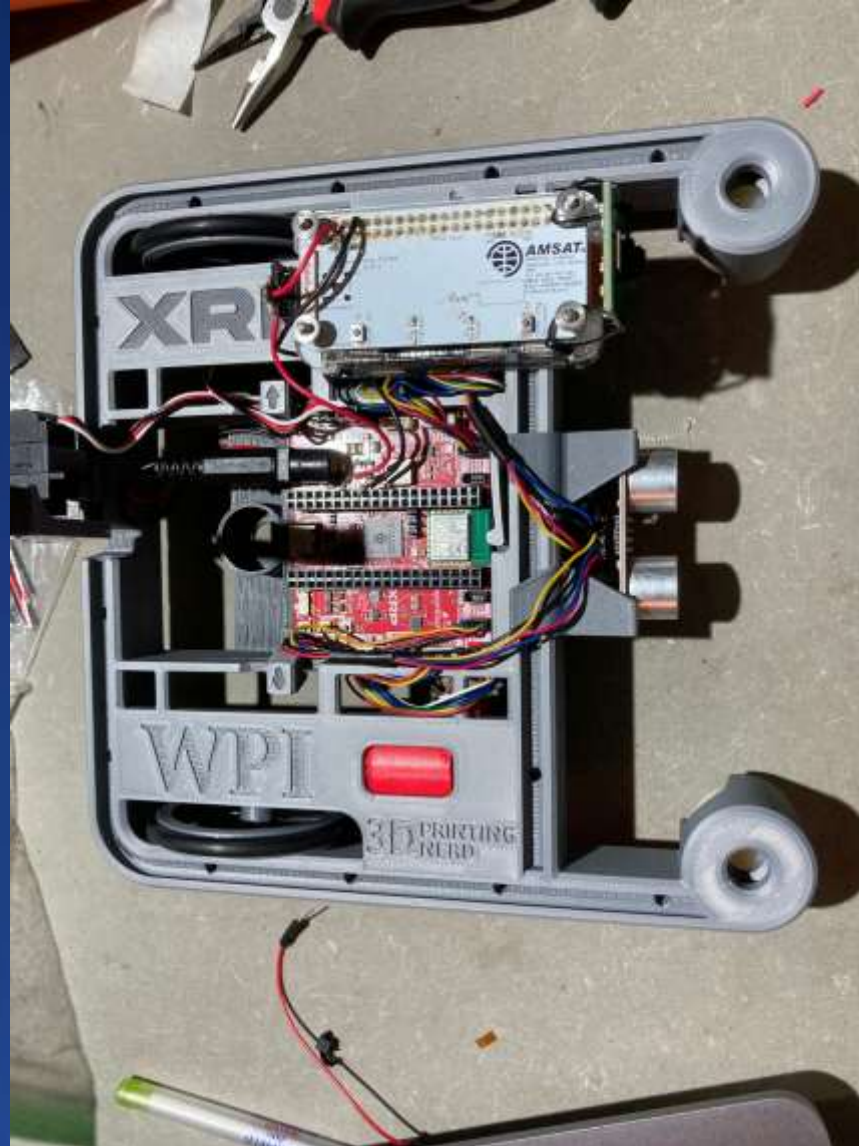
The screenshot displays a Raspberry Pi desktop environment. The desktop background features a large graphic with the text "Amateur Radio" and "ARDC" (Australian Radio Digital Centre). In the top right corner, there are system icons for Bluetooth, network, and volume, along with the time "07:48".

Several application windows are open:

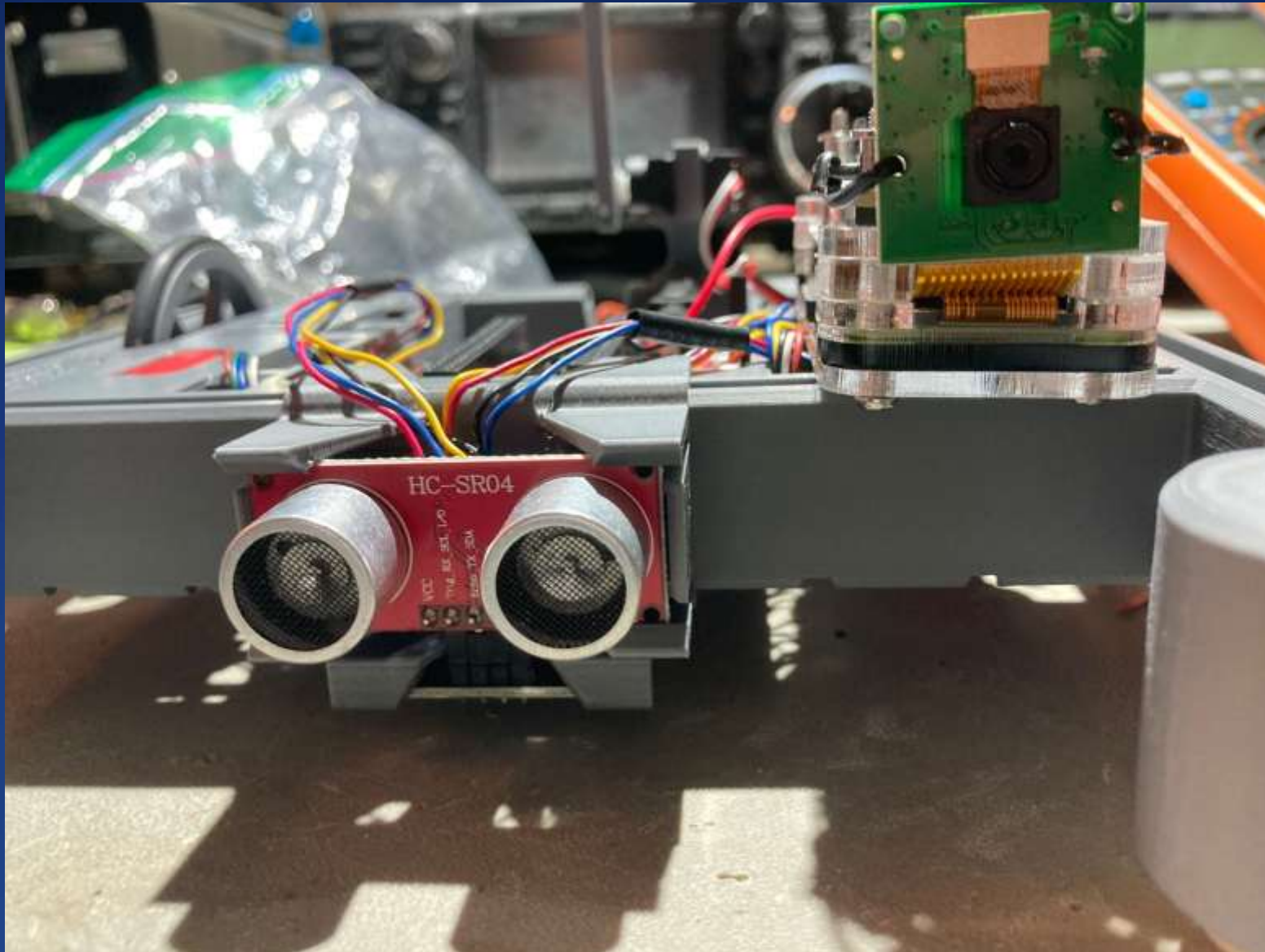
- Mission Controller:** A window titled "Mission Controller" with tabs for "Setup", "Other Features", and "Help". It shows a "XRProver" dropdown menu, a "Send" button, and checkboxes for "Do Not Disturb", "Start QSSTV", "Send Via APRS", "Receive APRS", and "Enable Visualizer". Below these are three panels: "Commands Sent" (showing "backward 20"), "Commands Received" (empty), and "SSTV Decoding" (showing a video feed of a robot labeled "AMSAT").
- Terminal (Top):** A terminal window titled "pi@fox-in-box-v4: ~" showing the output of the command `rtl_fm -M fm -f 434.9M -s 48k | aplay -r 48000 -f S16_LE -D pulse`. It reports finding a Realtek RTL2832U OEM device and tuning to 435152000 Hz.
- Terminal (Bottom):** A terminal window titled "pi@fox-in-box-v4: ~/STARAppNew4" showing a series of debug messages: "[DEBUG]: Processing linenum 157", "[DEBUG]: Processed linenum 157", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 158", "[DEBUG]: Processed linenum 158", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 159", "[DEBUG]: Processed linenum 159", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 160", "[DEBUG]: Processed linenum 160", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 161", "[DEBUG]: Processed linenum 161", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 162", "[DEBUG]: Processed linenum 162", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 163", "[DEBUG]: Processed linenum 163", "[DEBUG]: Received QSSTV message", "[DEBUG]: Processing linenum 164", "[DEBUG]: Processed linenum 164".

Other desktop icons include "Web SDR", "SSTV Decode using QSSTV", "FoxTelem", "FoxTele 2z3", "d_linux", "PacSatGround_0.44a_linux", "3d_linux", "Arduino IDE", and a "Wastebasket".

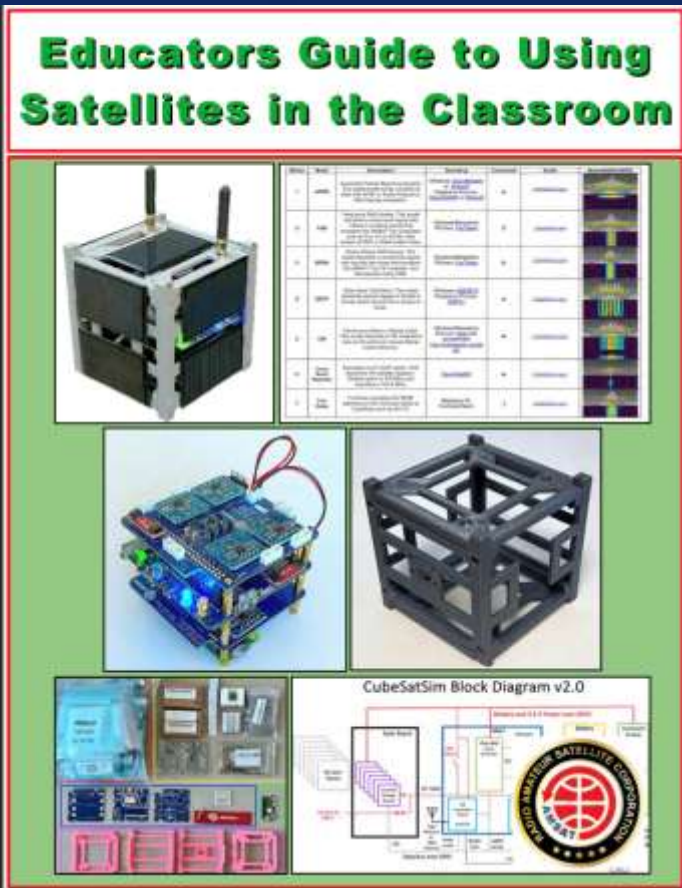
CubeSatSim Lite and Camera attached to the top of XRP Robot. A separate battery supply is positioned in the back of the XRP to power the CubeSatSim.



View from the front of the XRP showing the CubeSatSim Lite with camera facing forward on the right side of the robot. The XRP's ultrasonic sensors are in the center.



AMSAT Educator's Guide to Using Satellites in the Classroom



<https://CubeSatSim.org/EducatorsGuide>



- Preface
- Introduction by **David A. Vine, WA1EAW**
- AMSAT® CubeSatSim Project Wiki
- CubeSatSim Quick Start Guide
- Ground Station Quick Start Guide
- Cross Band Repeater Quick Start Guide
- Command and Control Quick Start Guide
- CubeSatSim Activity Guides
- AMSAT Youth Initiative Update
- AMSAT Education and CubeSat Simulator Update
- Bridging Orbit and Classroom: SatNOGS and CubeSatSim
- New CubeSatSim Features and Capabilities
- Building AMSAT CubeSatSims in the Classroom
- CubeSatSim YouTube Playlist Links
- AMSAT CubeSatSim Glossary
- Radio Amateur Satellite Corp. Strategic Plan - 2021-2031
- Join AMSAT

CubeSatSim v2.1 New Modes

Ready for the Demo?



Get Involved with the CubeSatSim Project

- Borrow a CubeSatSim Loaner
 - AMSAT members can borrow a loaner to show at an event or in a classroom
 - Teachers can also borrow a loaner – contact me!
- Borrow a Loaner Kit
 - Available now for classrooms or other group activities
- Build a CubeSatSim
 - Fully open source – about \$400 to build



Questions?

Contact Alan at ku2y@arrrl.net

<https://CubeSatSim.org>

<https://www.amsat.org>

<https://github.com/alanbjohnston/CubeSatSim/wiki>



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CubeSatSim Block Diagram v2.0

